BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

Faculty of Engineering & Technology
B.Tech. - Information Technology
New Syllabus

Bharati Vidyapeeth

(Deemed to be University)

Pune, India

College of Engineering, Pune

B.Tech. (Information Technology)

Program Curriculum (2021 Course)

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY),
COLLEGE OF ENGINEERING, PUNE

Department of Information Technology

VISION OF THE UNIVERSITY:

Social Transformation Through Dynamic Education

MISSION OF THE UNIVERSITY:

- To make available quality education in different areas of knowledge to the students as per their choice and inclination.
- To offer education to the students in a conducive ambiance created by enriched infrastructure and academic facilities in its campuses.
- To bring education within the reach of rural, tribal, and girl students by providing them substantive fee concessions and subsidized hostel and mess facilities.
- To make available quality education to the students of rural, tribal, and other deprived sections of the population.

VISION OF THE INSTITUTE

To be a world-class Institute for Social Transformation through Dynamic Education.

MISSION OF THE INSTITUTE

- To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet the needs of the profession and society.
- To provide an environment conducive to innovation, creativity, research, and entrepreneurial leadership.
- To practice and promote professional ethics, transparency, and accountability for social community, economic and environmental conditions.

VISION OF THE DEPARTMENT

To be a leading Programme, transforming students into skilled IT professionals.

MISSION OF THE DEPARTMENT

- Amplify the student’s technical skills by conducting continuing education programs, organizing and participating in various technical events.
- Provide comprehensive support in synchronization with industry to achieve professional and technological excellence.
- Provide an environment for effective social and ethical skills.

Program Educational Objectives:

PEO1: Cultivate IT graduates for industry, pertaining to Information Technology solutions.

PEO2: Practice technical competency and teamwork abilities.

PEO3: Exhibit social responsibilities by following ethical practices in graduates’ professional pursuits.

Program Specific Outcomes

At the end of the program, Graduates will be able to

- **PSO 1:** Use knowledge of core and allied courses for developing a computer-based system to deliver a quality product for real-world problems of society.

- **PSO 2:** Apply modern IT tools and techniques for perusing student’s professional career by practicing effective communication with team members.

- **PSO 3:** Develop time-bound, cost-effective and sustainable solutions by following professional ethics.

Program Outcomes

1. Apply knowledge of Mathematics and Computer Science to analyze computer-based information systems.
2. Apply logical and programming skills to identify, formulate and analyze for solving computational problems.
3. Examine complex problems by a diagnosis of available information to provide an appropriate conclusion.
4. Design applications with suitable consideration of societal needs.
5. Use functional skills of modern IT tools and techniques for modeling and implementation.
6. Play the role of a team player to accomplish a common goal.
7. Convey technological concepts through significant documentation and presentation skills.
8. Demonstrate professional conduct by following norms of the Engineering practice.
9. Apply Software Engineering methodologies for sustainable development.
10. Follow ethical and legal practices related to the functioning of the IT industry.
11. Apply management skills and techniques for creating time-bound and cost-effective projects.
12. Exhibit lifelong learning by upgrading to state-of-the-art IT practices and technology.

COURSE COMPONENTS OF UNDERGRADUATE ENGINEERING PROGRAMME

Sr. No.	Category	Number of Courses
1	Basic Science Course (BSC)	05
2	Engineering Science Course (ESC)	03
3	Core Course (CC)	36
4	Elective Course (EC)	02
5	Project (PROJ)	02
6	Internship (INT)	01
7	Vocational Course (VC)	04
8	Massive Open Online Course (MOOC)	02
9	Research Paper Publication (Research)	01
10	Social Activities (SA)	02
11	Mandatory Course (MC)	01
TOTAL		**59**

CORRELATION BETWEEN GRADUATE ATTRIBUTES AND PROGRAMME OUTCOMES

Graduate Attributes/ Program Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
Engineering Knowledge	✓											
Problem Analysis		✓										
Design/Development of Solutions			✓									
Conduct Investigations of Complex Problems				✓								
Modern Tool Usage					✓							
The Engineer and Society						✓						
Environment and Sustainability							✓					
Ethics								✓				
Individual and Teamwork									✓			
Communication										✓		
Project Management and Finance											✓	
Life-long Learning												✓

CREDIT DISTRIBUTION TO COURSE COMPONENTS OF UNDERGRADUATE ENGINEERING PROGRAMME

Sr. No.	Category	Breakup of Credits
1	Basic Science Course (BSC)	20
2	Engineering Science Course (ESC)	15
3	Core Course (CC)	139
4	Elective Course (EC)	10
5	Project (PROJ)	09
6	Internship (INT)	03
7	Vocational Courses (VC)	04
8	Massive Open Online Course (MOOC)	04 (Add On)
9	Research Paper Publication (Research)	02 (Add On)
10	Social Activities (SA)	04 (Add On)
11	Mandatory Course (MC)	Non-Credit
TOTAL		**200**

Program: B.TECH. (Information Technology) Semester - I CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Mathematics for Computing-I	3	-	1	60	40	-	-	-	100	3	-	1	4
2		Physics for Computing System	3	2	-	60	40	25	-	-	125	3	1	-	4
3		Computer Aided Drafting	4	2	-	60	40	50	-	-	150	4	1	-	5
4		Digital Electronics	4	2	-	60	40	25	-	-	125	4	1	-	5
5		Structured Programming	4	2	-	60	40	50	-	50	200	4	1		5
6		Computer System Workshop Technology	-	2	1	-	-	25	-	25	50	-	1	1	2
	Total		**18**	**10**	**2**	**300**	**200**	**175**	**-**	**75**	**750**	**18**	**5**	**2**	**25**

Program: B.TECH. (Information Technology) Semester - II CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Mathematics for Computing-II	3	-	1	60	40	-	-	-	100	3	-	1	4
2		Organic and Electrochemistry	3	2	-	60	40	25	-	-	125	3	1	-	4
3		Electrical Technology	4	2	-	60	40	25	-	-	125	4	1	-	5
4		Object Oriented Programming	4	2	-	60	40	25	-	50	175	4	1	-	5
5		Programming Paradigms	4	2	-	60	40	25	50	-	175	4	1	-	5
6		Web Programming	-	2	1	-	-	25	-	25	50	-	1	1	2
	Total		**18**	**10**	**2**	**300**	**200**	**125**	**50**	**75**	**750**	**18**	**5**	**2**	**25**

Program: B.TECH. (Information Technology) Semester - III CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Discrete Structures and Graph Theory	4	-	-	60	40	-	-	-	100	4	-	-	4
2		Data Structures	4	2	-	60	40	25	-	25	150	4	1	-	5
3		Database Management System	4	2	-	60	40	25	-	25	150	4	1	-	5
4		Software Engineering*	3	2	-	60	40	25	-	-	125	3	1	-	4
5		Computer Communication and Networks	3	2	-	60	40	25	-	-	125	3	1	-	4
6		Information Technology Laboratory - I	-	2	1	-	-	25	-	25	50	-	1	1	2
7		Vocational Course-I	-	2	-	-	-	25	25	-	50	-	1	-	1
	Total		**18**	**12**	**1**	**300**	**200**	**150**	**25**	**75**	**750**	**18**	**6**	**1**	**25**
	#Social Activity - I		-	-	-	-	-	-	-	-	-	-	-	-	2

*** Industry Taught Course -I**

 # Add on Course

List of Vocational Courses will be published by the department before the commencement of respective semester.

Program: B.TECH. (Information Technology) Semester - IV CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		IT Infrastructure Management*	4	-	-	60	40		-	-	100	4	-	-	4
2		Formal Languages and Computation Theory	4	-	-	60	40	-	-	-	100	4	-	-	4
3		Microprocessors and Microcontrollers	4	2	-	60	40	25	-	-	125	4	1	-	5
4		Applied Algorithms	4	2	-	60	40	25	25	-	150	4	1	-	5
5		Operating System	3	2	-	60	40	25	-	25	150	3	1	-	4
6		Information Technology Laboratory - II	-	2	1	-	-	25	-	50	75	-	1	1	2
7		Vocational Course - II	-	2	-	-	-	25	25	-	50	-	1	-	1
	Total		19	10	1	300	200	125	50	75	750	19	5	1	25
	#MOOC - I		-	-	-	-	-	-	-	-	-	-	-	-	2

*** Industry Taught Course – II**

 # Add-on Course - List of MOOC and Vocational Courses will be published by the department before the commencement of respective semester.

Program: B.TECH. (Information Technology) Semester - V CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Human Computer Interaction	4	-	-	60	40	-	-	-	100	4	-	-	4
2		Artificial Intelligence and Machine Learning	4	2	-	60	40	25	25	-	150	4	1	-	5
3		Computer Architecture and Organization	3	-	1	60	40	-	-	-	100	3	-	1	4
4		Advanced Database System*	3	2	-	60	40	25	-	25	150	3	1	-	4
5		Mobile Application Development	4	2	-	60	40	25	-	25	150	4	1	-	5
6		Information Technology Laboratory- III	-	2	1	-	-	25	-	25	50	-	1	1	2
7		Vocational Course - III	-	2	-	-	-	25	25	-	50	-	1	-	1
	Total		**18**	**10**	**2**	**300**	**200**	**125**	**50**	**75**	**750**	**18**	**5**	**2**	**25**
	#Social Activity - II		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
	Environmental Studies**		2	-	-	50	-	-	-	-	-	-	-	-	-

*** Industry Taught Course - III**

 # Add on Course

**** Mandatory Audit Course - 50 Marks Theory Examination**

Program: B.TECH. (Information Technology) Semester - VI CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Cloud Computing*	4	2	-	60	40	25	25	-	150	4	1	-	5
2		Software Testing and Quality Assurance	4	2	-	60	40	25	-	50	175	4	1	-	5
3		Data Warehousing and Data Mining	3	-	1	60	40	-	-	-	100	3	-	1	4
4		Quantitative Techniques, Communication and Values	4	-	-	60	40	-	-	-	100	4	-	-	4
5		Agile Methodologies	4	-	-	60	40	-	-	-	100	4	-	-	4
6		Information Technology Laboratory- IV	-	2	1	-	-	25	-	50	75	-	1	1	2
7		Vocational Course- IV	-	2	-	-	-	25	25	-	50	-	1	-	1
	Total		19	8	2	300	200	100	50	100	750	19	4	2	25
	#MOOC - II		-	-	-	-	-	-	-	-	-	-	-	-	2

***Industry Taught Course - IV**

 # Add-on Course - List of MOCC and Vocational Courses will be published by the department before the commencement of respective semester.

Program: B.TECH. (Information Technology) Semester - VII CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Project Planning & Management	3	-	-	60	40	-	-	-	100	3	-	-	3
2		Web Services*	4	2	-	60	40	25	-	25	150	4	1	-	5
3		Business Intelligence	4	2	-	60	40	25		25	150	4	1	-	5
4		Elective - I	4	2	-	60	40	25	25	-	150	4	1	-	5
5		Information Technology Laboratory -V	-	2	-	-	-	25		25	50	-	1	-	1
6		Project Stage - I	-	2	-	-	-	50	50		100	-	3	-	3
8		Internship	-	-	-	-	-	-	50	-	50	-	3	-	3
	Total		**15**	**10**	**-**	**240**	**160**	**150**	**125**	**75**	**750**	**15**	**10**	**-**	**25**

***Industry Taught Course - V**

Elective - I

1. Software Architecture
2. Information Retrieval
3. User Experience
4. Storage Area Network

Program: B.TECH. (Information Technology) Semester - VIII CBCS 2021 Course

Sr. No.	Course Code	Name of Course	Teaching Scheme (Hrs./Week)			Examination Scheme (Marks)						Credits			
			L	P	T	ESE	IA	TW	OR	PR	Total	L	P	T	Total
1		Information Security	4	2	-	60	40	25	-	25	150	4	1	-	5
2		Elective - II	4	2	-	60	40	25	25	-	150	4	1	-	5
3		Internet of Things*	4	2	-	60	40	25	-	25	150	4	1	-	5
4		Data Engineering	3	-	-	60	40	-	-	-	100	3	-	-	3
5		Information Technology Laboratory-VI	-	2	-	-	-	25	-	25	50	-	1	-	1
6		Project Stage - II	-	4	-	-	-	50	100		150	-	6		6
	Total		**15**	**12**	**-**	**240**	**160**	**150**	**125**	**75**	**750**	**15**	**10**	**-**	**25**
	#Research Paper Publication		-	-	-	-	-	-	-	-	-	-	-	-	-

***Industry Taught Course - VI**

 # Add-on Course

Elective - II

1. Semantic Web Mining
2. Social Analytics in Digital Marketing
3. Management Information System
4. Cyber security

B.Tech. (Information Technology)

Semester-I

TEACHING SCHEME		**EXAMINATION SCHEME**		**CREDIT SCHEME**	
Lecture:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**3**
Tutorials:	**1 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Tutorial**	**1**
Total	**4 Hours/Week**		**100 Marks**		**4**

Course Objective:
To study
1. Linear equations and its basis and dimension.
2. Linear mapping and its matrix representation.
3. Orthogonalization and diagonalization of matrices.

Prerequisite: The students should have knowledge of algebra of matrices and determinants.

Course Outcomes: On completion of the course, students will have the ability to:
1. Apply rank of matrix in solving system of equations.
2. Identify basis and dimension of matrix.
3. Solve problems on kernel and image of linear transformation.
4. Apply linear operator to represent matrix.
5. Evaluate orthogonalization of inner product space.
6. Use methods to find eigen values and eigen vectors.

Unit I **06 Hours**
System of Linear Equation: Vectors and linear combinations, Rank of a matrix, Gaussian elimination, LU Decomposition, Solving Systems of Linear Equations using the tools of Matrices.

Unit II **06 Hours**
Vector Spaces: Definition, linear combination, spanning sets subspaces, linear dependence and independence, basis and dimension, rank of matrix.

Unit III **06 Hours**
Linear Mapping: Linear mapping, Kernel and image of linear mapping, rank and nullity of a linear mapping, singular and non-singular linear mapping

Unit IV **06 Hours**
Linear mapping and matrices: Matrix representation of linear operator, change of base, similarity matrices

Unit V **06 Hours**
Inner Product space and orthogonalization: Inner product space, Cauchy-schwarz equality, orthogonality, orthogonal sets and bases, projections, Gramschidt orthogonalization, orthogonal and positive definite matrices, matrix representation of inner product

Unit VI **06 Hours**
Diagonalization Eigen values and eigen vectors:
Characteristic polynomial, Cayley-Hamilton theorem, eigen values and eigen vectors, properties.

List of Assignment for Internal Assessment will be framed by respective Course Coordinator.

Textbooks/Reference Books

1. P. N. Wartikar and J. N. Wartikar, Applied Mathematics (Volumes I and II), 7^{th} Ed., Pune Vidyarthi Griha Prakashan, Pune, 2013.
2. B. S. Grewal, Higher Engineering Mathematics, 42^{nd} Ed., Khanna Publication, Delhi
3. B.V. Ramana, Higher Engineering Mathematics, 6th Ed., Tata McGraw-Hill, New Delhi, 2008.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10^{th} Ed., John Wiley & Sons, Inc., 2015.
5. Peter V. O'Neil, Advanced Engineering Mathematics, 7^{th} Ed., Cengage Learning, 2012.
6. Michael Greenberg, Advanced Engineering Mathematics, 2^{nd} Ed., Pearson Education, 1998.

Project Based Learning Assignments*

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list)

Students are expected prepare report on any one topic, write its definition, applications and illustrate with few examples. Also, write pseudo code for it, wherever applicable.

1. Gauss Elimination method.
2. LU-decomposition method
3. Rank of matrix
4. Linear combination
5. Basis and dimension
6. Spanning sets
7. Kernel and image of linear transformation
8. Rank-nullity theorem
9. Non-singular linear mapping
10. Linear operator
11. Similarity matrices
12. Change of base
13. Cauchy Schwarz equality
14. Orthogonality
15. Gram schmidt Orthoginalization
16. Matrix representation of matrix
17. Cayley-Hamilton theorem
18. Eigen values and Eigen vectors

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Physics for Computing System

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**03 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**3**
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work:	**25 Marks**	**Practical**	**1**
Total	**5 Hours/Week**		**125 Marks**		**4**

Course Objective: To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the Computer Engineering and Science.

Prerequisite: Students are expected to have a basic understanding of physics and calculus.

Course Outcomes: At the completion of the course, the students should be able to**:**
1. Interpret the properties of charged particles to develop modern instruments such as electron microscopy.
2. Appraise the wave nature of light and apply it to measure stress, pressure and dimension etc.
3. Summarize the structure and properties of lasers to their performance and intended applications.
4. Classify the optical fiber, understanding the structure, types and its applications in the field of communication.
5. Solve quantum physics problems to micro level phenomena and solid-state physics.
6. Explain mechanical properties of solid matter, and connect to applications in the field of engineering.

Unit I **06 Hours**

Modern Physics: Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatics focusing, Electron microscope, Wavelength and resolution, Specimen limitation, Depth of field and focus, Transmission electron microscope (TEM), Scanning electron microscope (SEM), Separation of isotopes by Bainbridge mass spectrograph, Cathode ray tube (CRT).

Unit II **06 Hours**

Wave Optics

Interference: Interference of waves, interference due to thin film (Uniform and nonuniform (only formula-no derivation is expected), Newton's ring, Applications of interference (optical flatness, highly reflecting films, non-reflecting coatings).

Diffraction: Introduction, Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Plane diffraction grating, Conditions for principal maxima and minima

Polarization: Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism, Dichroism.

Unit III **06 Hours**

Lasers: Principle of laser, Einstein's coefficients, Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Single Hetro-junction laser, Gas laser: CO_2 laser, Properties of lasers, Laser speckles, Applications of lasers (Engineering/ industry, medicine, Computers).

06 Hours

Unit IV

Fiber Optic: Principle of fiber optics, Construction, Numerical Aperture for step index fiber; critical angle, angle of acceptance, V number, number of modes of propagation, types of optical fibers, Fiber optic communication system, advantages, and disadvantages of fiber optics.

Unit V **06 Hours**

Quantum Mechanics: Dual nature of matter, DeBroglie's hypothesis, Heisenberg's uncertainty principle with illustrations, Physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, step potential and potential barrier (analytical discussion), tunnelling effect.

Unit VI **06 Hours**

Solid state physics: Free electron theory, Density of states, Bloch theorem (Statement only), Origin of band gap, Energy bands in solids, Effective mass of electron, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.

Textbooks

1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018).
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)
3. Concepts of Modern Physics**,** Arthur Beiser**,** Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017).

Reference Books

1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, JohnWiley and Sons (2013).
2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017).
3. Principles of Physics, John W. Jewett, Cengage publishing (2013).
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004).
5. Principles of Solid-State Physics, H. V. Keer, New Age International (1993).
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011).
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014).
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997).
9. Introduction to Electrodynamics –David R. Griffiths, Pearson (2013).
10. Renewable Energy: Power for a Sustainable Future, Boyle, Oxford University Press (2012).

List of Laboratory Exercise (Any Eight of the Following)

1. Study of lissajous figure by Cathode Ray Oscilloscope (CRO).
2. Determination of e/m by Thomson method.
3. Determination of radius of planoconvex lens/wavelength of light/Flatness testing by Newton's rings.
4. Determination of wavelength of light using diffraction grating.
5. Determination of resolving power of telescope.
6. Determination of thickness of a thin wire by air wedge.
7. Determination of refractive index for O-ray and E-ray.
8. Determination of divergence of a laser beam.
9. Particle size by semiconductor laser.
10. Determination of wavelength of laser by diffraction grating.
11. To study Hall effect and determine the Hall voltage.
12. Calculation of conductivity by four probe methods.

13. Study of solar cell characteristics and calculation of fill factor.
14. Determination of band gap of semiconductor.
15. Determination of Planck's Constant by photoelectric effect.

Project Based Learning Assignments*

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list.

1. Measurement and effect of environmental noise in the college
2. Design and simulation of automatic solar powered time regulated water pumping
3. Solar technology: an alternative source of energy for national development
4. Design and construction of digital distance measuring instrument
5. Design and construction of automatic bell ringer.
6. Design and construction of remote-control fan
7. Design and construction of sound or clap activated alarm
8. Electronic eye (Laser Security) as auto switch/security system
9. Electric power generation by road power
10. Determination of absorption coefficient of sound absorbing materials
11. Determination of velocity of O-ray and E-ray in different double refracting materials
12. Need of medium for propagation of sound wave
13. Tesla Coil
14. Thin film interference in soap film-formation of colors
15. LiFi- wireless data transfer system using light

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Computer Aided Drafting

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work :	**50 Marks**		
Total:	**6 Hours/Week**		**150 marks**		**5**

Course Objectives:

To provide knowledge about

1. Fundamentals of engineering drawing and curves.
2. Isometric views and projection.
3. Projections of points, lines, planes & solids.
4. Use of CAD tools.

Prerequisite: The students should have knowledge of
Basics of mathematics at secondary school level

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand dimensioning methods and drawing of engineering curves.
2. Draw orthographic projections using 1st angle method of projection*.
3. Draw Isometric views from given orthographic projections*.
4. Draw projection of Lines, its traces, and projections of planes*.
5. Draw projection of different solids*.
6. Draw development of lateral surfaces of solids*.

*Using CAD tools

Unit I **08 Hours**

Lines and Dimensioning in Engineering Drawing and Engineering Curves: Different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.
Ellipse by Arcs of Circle method, Concentric circle method. Involutes of a circle, Cycloid, Archimedean Spiral, Helix on cone & cylinder, Introduction to Auto CAD commands.

Unit II **08 Hours**

Orthographic Projections: Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views, and types of cutting planes and their representation, hatching of sections. (Also using AutoCAD commands).

Unit III **08 Hours**

Isometric Projections: Isometric view, Isometric scale to draw Isometric projection, non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view. (Also using AutoCAD commands).

08 Hours

Unit IV

Projections of Points, Lines and Planes: Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines,

Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP. (Also using AutoCAD commands).

Unit V **08 Hours**

Projection of Solids: Projection of prism, pyramid, cone and cylinder by rotation method. (Also using AutoCAD commands).

Unit VI **08 Hours**

Development of Lateral Surfaces of Solids: Introduction to development of lateral surfaces and its Industrial application, draw the development of lateral surfaces of cone, pyramid, and prism. (Also using AutoCAD commands).

Textbooks

1. "Elementary Engineering Drawing", N. D. Bhatt, Charotar Publishing house, Anand India.
2. "AutoCAD 2020 Beginning and Intermediate", Munir Hamad, Mercury Learning & Information Publication, 2019.
3. "Engineering Drawing and Graphics", Venugopal K., New Age International publishers.

Reference Books

1. "Textbook on Engineering Drawing", K. L. Narayana & P. Kannaiah, Scitech Publications, Chennai.
2. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi.
3. "Engineering Drawing", M. B. Shah and B.C. Rana, 1st Ed, Pearson Education, 2005
4. "Engineering Drawing", P. J. Shah, C. Jamnadas and Co., 1st Edition,1988
5. "Engineering Drawing (Geometrical Drawing)", P. S. Gill, 10th Edition, S. K. Katariaand Sons, 2005.

List of Laboratory Exercise

All sheets should be completed using AutoCAD.

List of Drawing Sheets

1. Types of lines, Dimensioning practice, free-hand lettering, 1nd and 3rdangle methods symbol.
2. Engineering curves.
3. Orthographic Projections.
4. Isometric views.
5. Projections of Points and Lines and planes.
6. Projections of Solids.
7. Development of lateral surfaces

List of Assignments: Assignment questions are supposed to be solved in A3 size sketchbook

1. At least 4 questions on engineering curves.
2. At least 2 questions on orthographic projections without sections.
3. At least 2 questions on sectional orthographic projections.
4. At least 2 questions on isometric views.
5. At least 4 questions on projections of lines.
6. At least 4 questions on projections of planes.
7. At least 4 questions on projections of solids.

8. At least 4 questions on development of lateral surfaces.

Project Based Learning Assignments*

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list)

1. To obtain industrial drawings to identify the types of lines, dimensioning methods and method of projection.
2. To develop the model/charts based on engineering curves.
3. To demonstrate different methods of orthographic projection.
4. To demonstrate projection of Points.
5. To demonstrate projection of Lines.
6. To demonstrate projection of Planes.
7. To demonstrate projection of Solids.
8. To demonstrate developments of surfaces for solids.
9. To demonstrate industrial application of development of surfaces such as steam carrying pipes, Ducts of air conditioning systems, etc.
10. To demonstrate Isometric projection method through model of a cube.
11. To obtain industrial drawings to identify the types of lines, dimensioning methods, and method of projection.
12. To develop the model/charts based on engineering curves.
13. To prepare model/chart for identification of engineering curves in nature for industrial, societal, etc application.
14. To demonstrate different methods of orthographic projection.

Syllabus for Unit Tests:

Unit-Test-1: Unit-I, Unit-II, Unit-III

Unit-Test-2: Unit-IV, Unit-V, Unit-VI

Digital Electronics

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lectures:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work:	**25 Marks**		
Total	**6 Hours/Week**		**125 Marks**		**5**

Course Objective:

1. To present the Digital fundamentals, Boolean algebra and its applications in digital systems.
2. To familiarize with the design of various combinational digital circuits using logic gates

3. To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits.
4. To understand the various semiconductor memories and related technology.

Prerequisite: Physics, Mathematics, Basics of electrical engineering

Course Outcomes: On completion of the course, students will have the ability to:

1. Comprehend different number systems and Boolean algebraic principles.
2. Apply logic design minimization techniques to simplify Boolean expressions
3. Analyze and design combinational logic circuits.
4. Demonstrate the operations of systems with sequential circuit elements.
5. Comprehend characteristics and structure of Programmable Logic Devices and Memory.
6. Draw ASM charts for sequential circuit design.

Unit I **08 Hours**

Digital systems:
Number Systems: Introduction to Number Systems-Decimal, Binary, Octal, Hexadecimal, Conversion of number system, Representation of Negative Numbers, 1's complement and 2's complement.
Binary Arithmetic: Binary addition, Binary subtraction, Subtraction using 1's complement and 2's complement, Binary multiplication, and division.
Digital Codes: BCD code, Excess-3 code, Gray code and ASCII code.
Logic Gates: Logical Operators, Logic Gates-Basic Gates, Universal Gates, realization of other gates using universal gates.

Unit II **08 Hours**

Logic Design Minimization: Boolean algebra, De Morgan's Theorems, Standard representation of logic functions, Sum of Product (SOP) form, Product of Sum (POS) form, Simplification of logical functions, Minimization of SOP and POS forms using Karnaugh-Maps up to 4 variables Don't care condition, Quine-McCluskey Method.

Unit III **08 Hours**

Combinational Circuits: Binary and BCD arithmetic, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Binary Adder (IC 7483), BCD adder, Code converters, Multiplexers, De multiplexer, Decoder (IC 74138) and their use in combinational logic design, Priority Encoder, Digital Comparators, Parity generators and Checker (IC 74180, ALU.

Unit IV **08 Hours**

Sequential Circuits: Flip- flop: SR, JK, D, T flip flops, Truth Tables and Excitation tables, Conversion from one type to another type of Flip Flop.
Registers: Buffer register, Shift register.
Counters: Asynchronous counters, Synchronous counters, Modulus counters

Unit V **08 Hours**

FSM and ASM charts: Introduction to FSM, Moore and Mealy State machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization, ASM chart notations, ASM block, State diagram, ASM chart for sequential circuits, Multiplexer Controller.

Unit VI **08 Hours**

Memory and PLD: Semiconductor memories: memory organization, memory expansion, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM. Programmable logic devices: Study of PROM, PAL, PLAs. Architecture of PLA, designing combinational circuits using PLDs.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. M. Morris Mano and M. D. Ciletti, Digital Design, Pearson Education.
2. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill Publication.
3. F.J. Hill and G.L. Peterson, Switching Theory and Logic Design, John Wiley
4. J.F. Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2
5. David J. Comer, Digital Logic & State Machine Design, Oxford University Press.
6. Digital Integrated Electronics- H.Taub & D.Shilling, Mc Graw Hill.

List of Laboratory Exercises:

1. Verify truth tables of logic gates. (AND, OR, XOR, NOT, NAND, NOR). Simplify the given Boolean expression using K-map and implement using gates
2. State De-Morgan's theorem and write Boolean laws. Implement NAND and NOR as Universal gates.
3. Design (truth table, K-map) and implement half and full adder/subtractor.
4. Design (truth table, K-map) and implement 4-bit BCD to Excess-3 Code converters.
5. Study of magnitude Comparator using IC 7485.
6. Implement of logic functions using multiplexer IC 74151 (Verification, cascading & logic function implementation).
7. Implement logic functions using 3:8 decoder IC 74138.
8. Verify truth tables of different types of flip flops.
9. Design (State diagram, state table & K map) and implement 3 bits Up and Down Asynchronous and Synchronous Counter using JK flip-flop.
10. Design and implement modulo 'n' counter with IC 7490.

Project Based Learning Assignments*

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list)

1.Survey report of basic gates ICs 7432, 4011, 4050, 4070,4071,40106
2. Implement combinational logic Circuit of given Boolean Equation.
3. Implement Half Adder and Half Subtractor.
4. Implement Full Adder using two Half Adders
5. Build 4-bit parallel Adder / Subtractor using IC.
6. Build Code Converters: Binary to Gray
7. Build Code Converters: Excess 3 to Binary)
8. Implement Two Bit Magnitude Comparator using IC 7485
9. Implement given combinational logic using MUX
10. Implement 7 segment decoder driver using IC 7447.
11. Build a Decade counter and Up-Down Counter.
12. Build a Shift Registers: SISO and SIPO
13. Implement the Johnson Counter and Ring Counter.
14. Survey Report on Static I/O and transfer Characteristic of TTL and CMOS.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit –V, Unit - VI

Structured Programming

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work	**50 Marks**	**Practical:**	**1**
		Practical:	**50 Marks**		
Total	**6 Hours/Week**		**200 Marks**		**5**

Course Objective:

1. To build the programming skills using 'C' to solve real world problems.
2. To provide an overview of fundamental principles, concepts, and constructs of computer programming.

Prerequisite:

Basic knowledge of Computer Handling.

Course Outcomes: On completion of the course, students will have the ability to:

1. Apply steps towards problem solving.
2. Apply fundamental concepts of programming language.
3. Implement conditional, branching and iteration
4. Decompose a problem into functions.
5. Apply programming to solve simple numerical method problems.
6. Exercise structures to formulate programs.

Unit I **08 Hours**

Introduction to Computing: Components of computer system, concept of hardware and software, introduction to system software- operating system, editor, compiler, assembler, linker, loader, introduction to computer programming, types of programming languages, software development life cycle, problem solving techniques- fundamental stages of problem solving, define the problem, -designing-development of an algorithm, algorithm design tools- flowcharts, pseudo codes.

Unit II **08 Hours**

Programming language 'C': Features of C, header files, pre-processor directives, compiling and executing a C program, syntax and semantic errors, libraries, structure of a C program, declarations, constants, variables, data types, operators and expressions, precedence and associativity of operators, type conversions, input, and output functions- printf and scanf.

Unit III **08 Hours**

Control Structures: if-else statement, nested if-else, use of logical operators, Loop control structure: for, while, do-while loops, use of break and continue, Case control structure: switch case

Pointers: Concept, pointer declaration, assignment, initialization, and access.

Unit IV **08 Hours**

Function: Types of functions, function definition and declaration, function prototype, calling and returning function, passing values between functions, standard library functions and user defined functions, passing array as function parameter, call-by-value, call-by-reference, recursive function.

Unit V **08 Hours**

Arrays: Concept, declaration, initialization, processing with array, one and multidimensional array, pointer to an array, use of array for searching techniques: linear and binary search. sorting techniques: bubble sort, insertion sort, selection sort, applications of array in image processing.

Strings: concept, declaration, initialization, and standard string library functions.

Unit VI **08 Hours**

Structures: Concept, declaration, accessing structure elements, array of structures, pointer to structures, self-referential structures, use of structures, union.

Introduction command line concepts, programs using command line argument.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language”, Prentice Hall, ISBN 0131103628.
2. Donald E. Knuth, “The Art of Computer Programming”, Addison-Wesley, ISBN-10:

0201485419, ISBN13: 978-0201485417.
3.T. E. Bailey, "Program design with pseudo code", Brooks/Cole Publisher, ISBN-10 : 0534055745, ISBN-13: 978-0534055745.
4. Kanetkar Yashavant P, "Let us C", BPB publications.
5. Subrata Saha and Subhodip M., "Basic Computation and Programming with C", Cambridge University of Press, India, ISBN:9781316601853.

Reference Books

1 Lamey Robert, "Logical problem solving", Prentice Hall, ISBN: 9780130618825.
2 Henry Mullish, Herbert L. Cooper, "The Spirit of C", Thomson Learning, ISBN 0314285008.

List of Laboratory Exercise

1. Write a program to accept the length of three sides of a triangle and to test and print the type of triangle as equilateral, isosceles or right angled or none.
2. Write a program to check whether input number is Prime or not with and without use of recursive function.
3. Write a program to separate digits of input 4-digit integer, separate and display its digits.
4. Write a program to implement linear and binary search techniques.
5. Write a program to implement sorting techniques: Bubble, Selection, and Insertion sorting.
6. Write a program to accept a string and to display the following:
   (a) Total number of characters in the string.
   (b) Total number of vowels in the string.
   (c) Total number of occurrences of character in the string.
   (d) Check whether string is palindrome or not.
7. Write a program to carry out following operations on strings using library functions.
   (a) To concatenate a string S2 to string S1.
   (b) To find the length of a given string.
   (c) To compare two strings S1 and S2.
   (d) To copy a string S2 to another string S1.
8. A class teacher wants to keep record of 10 students in the class along with the names and marks obtained in 5 subjects. Write a C program with function that displays.
   (a) Name of the student with highest marks in a particular subject.
   (b) Overall percentage result of the class.
   (c) Total number of passing students in the class.
   (d) Total number of students failing in one subject.
9. Write a program with function to swap values of two elements (call by reference).

Project Based Learning Assignments*

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list)

1. Design and develop a project for Diary management System
2. Design and develop a project for Calendar using C
3. Design and develop a project for Contact Management System
4. Design and develop a project for Library Management System
5. Design and develop a project for Snake Game
6. Design and develop a project for Bus Reservation system
7. Design and develop a project for Hospital Management system
8. Design and develop a project for Employee management system
9. Design and develop a project for Diary management System
10. Design and develop a project for Calendar using C
11. Design and develop a project for Contact Management System
12. Design and develop a project for Library Management System

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit –V, Unit - VI

Computer System Workshop Technology

TEACHING SCHEME		**EXAMINATION SCHEME**	**CREDIT SCHEME**	
Practical:	**2 Hours/Week**	**Practical : 25 Marks**	**Practical:**	**1**
Tutorial:	**1 Hours/Week**	**Term work: 25 Marks**	**Tutorial:**	**1**
Total	**3 Hours/Week**	**50 Marks**		**2**

Course Objective:
Provide student a knowledge of computer hardware and networking, enabling them to identify computer hardware, software and network related problems, and develop an ability to use the basics of computing, necessary for computing courses.

Prerequisite: Basic knowledge of Computer and Electronics.

Course Outcomes: On completion of the course, students will have the ability to:

1. Identify the architecture of a computer and its different components, including their technology evolution.
2. Apply their knowledge about computer peripherals to identify problems.
3. Install and uninstall given software step-by-step.
4. Configure local area network to access the Internet.
5. Prepare document using Latex.
6. Use GitHub tool for coding and collaboration.

Unit I **08 Hours**

Computer hardware peripherals: Introduction to hardware components, random access memory (RAM), Types Of RAM & their speed, tips for buying ram, how to add memory to a computer, problems when installing memory, Central Processing Unit (CPU), Types Of CPU: considerations when buying a new CPU (Types & Differences), different speeds available for CPU and what do they mean, 32 Bit vs 64 Bit – Which One To Choose &Why? How to choose a CPU type for different needs? Graphic Card & Types, How to install a Graphics Card, Installing a CD or DVD burner, Jumper Switch settings, Hard Disk upgrade, Different ports and why we use them - USB, PS2, DivX, Graphic card & types, Virtual Memory and how to configure it for optimum system performance.

Unit II **08 Hours**

Assembly of Computer and Software Installations: Assembling the motherboard, Replacing fan, how to avoid common mistakes during assembly, Installation of system software: Operating system (Windows and Linux),Installations step for operating system, Dual booting, Configure the BIOS, Installation of Antivirus, Installation of the open source software such as Scilab, Latex Installation of MS Office.

Unit III **08 Hours**

Basic Diagnostic of Hardware and Software: Diagnosis of Power Up problem, Boot Drive, Errant Keyboard, mouse problems, slow computer performance, Computer freezes and displays BSOD (Blue screen of death), no display on monitor, no sound, computer rebooting or turning itself off, how to troubleshoot a computer that does not boot, Registry Cleaner.

Unit IV **08 Hours**

Computer network environments: Network connecting devices. Configure the TCP/IP setting, connect to Local Area Network and access the Internet, Configuring Wireless network. Server and Its Configuration, Email Clients, Browsers, Office tools, customize web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers, Browsing netiquettes and cyber laws. Cloud Access Tools.

Unit V **08 Hours**

Configuration of External devices: Physical set-up of Printers- Performing test print out, Printing of document etc, Scanner set-up, Webcam, Bluetooth device, Memory card reader etc.

Unit VI **08 Hours**

Productivity tools: Open-Source Tools Such as Latex, GitHub.
Latex: Format words, lines, and paragraphs, design pages, create lists, tables, references, and figures in LaTeX. Introduction to LaTeX Packages and classes. Using Git, Version Control Systems, interacting with GitHub, Reverting Changes, Creating Pull Requests.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft).
3. LaTeX Companion – Leslie Lamport, PHI/Pearson.
4. https://nptel.ac.in/courses/106/105/106105081/.
5. http://nptel.ac.in/courses/106105084/.
6. https://guides.github.com/.
7. Introduction to Linux: Installation and Programming, N B Venkateswarlu, BS Publication.

Reference Books

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
2. Computer Fundamentals, MS Office, and Internet & Web Technology by Dinesh Maidasani.

List of Laboratory Exercise

1. Demonstrate the Computer Hardware Components and explain its working.
2. Demonstrate the Networking Components and explain its working.
3. Installation of operating system MS windows, Unix on the personal computer
4. Installation of Application software Latex, MS office on the personal computer
5. Troubleshooting hardware related problem.
6. Customize web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
7. Execution of Important “layout” and formatting commands in Latex,
8. Installation of Antivirus and customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms
9. Assignment on Pull request, code review and collaboration using GitHub.

Project Based Learning Assignments

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list

1. Collect specifications of similar types of hardware and software and prepare report comparing them
2. Assembling and disassembling the PC back to working condition.
3. Installation of operating systems LINUX on Server and different packages on a PC.
4. Practice hardware troubleshooting exercises related to various components of computer like monitor, drives, memory devices, printers etc. and software troubleshooting related to BIOS etc
5. To start your own computer repair workshop. What would your initial planning involve? What would you look for in terms of building, furnishings, tools and any other equipment that you can think of?
6. Cyber Hygiene: Installing antivirus for Windows.
7. Prepare the report of need of programming language in 21^{st} century.
8. Collect various types of computer hardware and prepare summary report
9. Prepare Seminar report using LaTeX.
10. Prepare Project report using LaTeX.

B.Tech
(Information Technology)
Semester-II

Mathematics for Computing-II

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**3**
Tutorials	**1 Hour/Week**	**Internal Assessment:**	**40 Marks**	**Tutorial**	**1**
Total	**4 Hours/Week**		**100 Marks**		**4**

Course Objectives:

1. Fourier series and integral transforms.
2. Multiple integrals and its applications.
3. Vector calculus and its applications.

Prerequisite: The students should have knowledge of vector algebra, derivative and integration.

Course Outcomes: On completion of the course, students will have the ability to:

1. Use periodic functions as Fourier series.
2. Apply methods of finding Fourier and Z-transforms.
3. Apply methods of Laplace transform of piecewise continuous functions.
4. Identify concepts of double and triple integrals.
5. Apply vector derivative for physical quantities.
6. Evaluate line, surface, and volume integrals.

Unit I **06 Hours**

Fourier Series: Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis.

Unit II **06 Hours**

Fourier Transform (FT): Complex Exponential Form of Fourier series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses. Introductory.

Z-Transform (ZT): Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

Unit III **06 Hours**

Laplace Transform and its application: Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations.

Unit IV **06 Hours**

Multiple Integrals and their Application: Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values, moment of inertia, centre of gravity.

Unit V **06 Hours**

Vector Differential Calculus: Physical interpretation of Vector differentiation, Vector differential operator, Gradient, Divergence and Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities.

Unit VI **06 Hours**

Vector Integral Calculus and Applications: Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications to problem in engineering.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks/Reference books:

1. P. N. Wartikar and J. N. Wartikar, Applied Mathematics (Volumes I and II), 7th Ed., Pune Vidyarthi GrihaPrakashan, Pune, 2013.
2. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publication, Delhi
3. B.V. Ramana, Higher Engineering Mathematics, 6th Ed., Tata McGraw-Hill, New Delhi, 2008.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Ed., John Wiley & Sons, Inc., 2015.
5. Peter V. O'Neil, Advanced Engineering Mathematics, 7th Ed., Cengage Learning, 2012.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

Students are expected prepare report on any one topic, write its definition, applications and illustrate with few examples. Also, write pseudo code for it, wherever applicable.

1. Fourier series
2. Harmonic analysis
3. Fourier transform
4. Z-Transform
5. Laplace transform technique to solve ODE
6. Multiple Integral to evaluate area and volume
7. Directional derivative
8. Divergence and curl
9. Greens theorem
10. Gauss Divergence Theorem
11. Stokes theorem
12. Unit step function
13. Solenoidal and irrotational fields
14. Simple difference equation

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Organic and Electrochemistry

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lectures:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**3**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work:	**25 Marks**		
Total	**5 Hours/Week**		**125 Marks**		**4**

Course Objective:

The student should acquire the knowledge of

1. To develop the interest among the students regarding chemistry and their applications in engineering.
2. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field.
3. The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the computing field.

Prerequisite: Capacitor, insulator, classification and properties of polymers, electromagnetic radiation, electrochemical series

Course Outcomes: On completion of the course, students will be able to:

1. Differentiate between ionic and covalent bonding and classify the bonding in a compound as ionic or covalent.
2. Develop a working knowledge of the twelve fundamental principles of green chemistry and what it is all about.
3. Apply standard reduction potential data to determine the relative strength of oxidizing/reducing agents.
4. Demonstrate the knowledge of polymer materials for futuristic engineering applications.
5. Describe the properties of materials and Application of semiconductor electronics
6. Describe the manufacturing and refining process of fuels and lubricants.

Unit I **06 Hours**

Chemical Bonding in Molecules: MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronic spectra and magnetic properties of complexes with relevance to bio-inorganic chemistry, organ metallic chemistry.

Unit II **06 Hours**

Green Chemistry: Introduction, Twelve Principles of Green chemistry, numerical on atom economy, synthesis, adipic acid and indigo. Organic dye-Traditional methods of organic dye. Green solvents (ionic liquid supercritical CO_2), and products from natural materials.

Unit III **06 Hours**

Electrochemistry: Electrochemical cells and Galvanic cells, EMF of a cell, Single electrode potential, Nernst equation, Electrochemical series, Types of electrodes, Reference electrodes, pH, pOH, acids and basis, Fuel cells, Construction and Working of - Acid and Alkaline Storage Battery, Dry Cell, Ni-Cd Batteries, Li-Ion Batteries, Li-Po Batteries.

Unit IV **06 Hours**

Polymers for the Electronics Industry: Polymers, Conduction mechanism, Preparation of conductive polymers, Polyacetylene, Poly (p-phenlylene), Polyhetrocyclic systems, Polyaniline Poly (Phenylene sulphide), Poly (1,6-heptadiyne), Applications, Photonic applications.

Unit V **06 Hours**

Semi-Conductors, Insulators and Superconductors: Semi conductivity in non-elemental materials, Preparations of semiconductors, Chalcogen photoconductors, photocopying process Introduction to Superconductors, types of Superconductors, Properties of superconductors, Applications of Superconductors, Electrical insulators, or Dielectrics.

Unit VI **06 Hours**

Fuels and Lubricants: Classification of fuels, Calorific values, Comparison between solid, liquid and gaseous fuels, Theoretical calculation of calorific value of a fuel, Selection of coal, analysis of coal, Natural Gas, Producer gas, water gas, Lubricants, Mechanism of lubrication, classification of lubricants, lubricating oils, Solid lubricants, Greases or Semi-Solid lubricants, Synthetic lubricants, Lubricating emulsions, Properties of lubricating oils.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, 2008.
2. Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie Academic & Professional, 1994.
3. A Textbook of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co, 2004.
4. Engineering Chemistry (16th Edition) Jain, Jain, Dhanpat Rai Publishing Company, 2013.
5. Inorganic Chemistry (4th edition), D. F. Shrives and P. W. Atkins, Oxford University, Oxford, 2006.
6. Applications of Absorption Spectroscopy of Organic Compounds (4th edition), John R. Dyer, Prentice Hall of India Pvt. Ltd., 1978.
7. Reactions, Rearrangements and Reagents (4th edition), S. N. Sanyal, Bharti Bhawan (P & D), 2003.

List of Laboratory Exercise

1. Determination of Hardness of water sample by EDTA method.
2. Determination of Chloride content in water sample by precipitation titration method.
3. To determine strength of acid by pH – metric Titration
4. To measure the Conductance of a solution by conductometric titration
5. Measurement of Surface tension of a given liquid by Stalagmometer.
6. Determination of viscosity of a given liquid by Ostwald's Viscometer.
7. Determination of Saponification value of an oil sample.
8. To determine alkalinity water sample.
9. Determination of Hardness of water sample by EDTA method.
10. Determination of Chloride content in water sample by precipitation titration method.
11. To determine strength of acid by pH – metric Titration
12. To Prepare Phenol formaldehyde/Urea formaldehyde resin.
13. To study set up of Daniel cell.

Project Based Learning Assignments

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list

1. Green Chemistry approach to Nano-Structured Electronics
2. Assessment of Environmentally Benign Photopolymers as an Alternative to the Use of Formaldehyde Based Textile Finishing Agents
3. Solvent-Free Synthesis of Phthalocyanines

4. Synthesis of Conjugated Polymers and Molecules Using Sugar Reagents and Solventless Reactions
5. Environmentally Benign Control of Polymer Solubility: Photoresist Materials Using DNA Mimics
6. Enzymatic Synthesis of Non-Formaldehyde Phenolic Polymers: Control of Hydrogen Peroxide Concentration.
7. The materials chemistry and electrochemistry of lithium and sodium-ion batteries
8. Electroplating- the principles, how different metals can be used and the practical applications
9. Electroplating, Metal Polishing, Anodizing, Phosphating Metal Finishing and Powder Coating Projects.
10. To determine calorific value of a fuel by any suitable method
11. To study various properties of lubricants
12. To study various types of lubricants and its properties.
13. To determine quality of coal sample & its analysis.
14. To study mechanism of lubrication.
15. To study coal analysis & its significance.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit –V, Unit - VI

Electrical Technology

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work:	**25 Marks**	**Practical**	**1**
Total	**6 Hours/Week**		**125 Marks**		**5**

Course Objective:
To study of power system basics, magnetic circuits electrical machines, transformers, wiring, measurements, illumination and batteries.

Course Outcomes: On completion of the course, students will have the ability to:
1. Explain the various parameters related to magnetic circuit.
2. Describe basic concepts of AC fundamentals and circuits.
3. Illustrate constructional features and describe different parameters of transformer.
4. Describe basic concepts of power system and three phase circuits.
5. Demonstrate AC and DC electrical machines.
6. Classify types of batteries.

Unit I **08 Hours**
Magnetic Circuits: Magnetic effect of electric current, Cross & Dot Convention, Right hand thumb rule, Concept of flux, flux linkages, magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability Kirchhoff's laws for magnetic circuits. Magnetic circuit concepts, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling

Unit II **08 Hours**
AC Fundamentals and circuits: AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasor, phasor representation of sinusoidal varying voltage and current. Analysis of series, parallel and series parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems.

Unit III **08 Hours**
Single Phase Transformer: Faradays law of electromagnetic induction, statically and dynamically induced e.m.f, self-inductance, mutual inductance, coefficient of coupling. Single Phase Transformer: Principle of operation, construction, e .m. f. equation, voltage ratio, current ratio, KVA rating ,determination of efficiency and regulation by direct load test, equivalent circuit, power losses,(simple numerical problems), introduction to auto transformer. Three phase transformer and its different winding connections.

Unit IV **08 Hours**
Introduction to Power System and Three Phase Circuits: General layout of electrical power system and functions of its elements, standard transmission and distribution voltages, concept of grid (elementary treatment only) Power generation to distribution through overhead lines and underground cables with single line diagram. Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and

phase voltage/current relations, three phase power and its measurement (simple numerical problems).

Unit V **08 Hours**

Electrical Machines: DC & AC: Principles of electromechanical energy conversion, DC machines: types, e. m. f. equation of generator and torque equation of motor, characteristics, and applications of dc motors (simple numerical problems). Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Induction Motor: types, Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only).

Unit VI **08 Hours**

Batteries: Basic idea of primary and secondary cells, Construction, working principle and applications of Lead-Acid, Nickel Cadmium and Silver-Oxide batteries, Charging methods used for lead-acid battery (accumulator), Care and maintenance of lead-acid battery, Series and parallel connections of batteries, General idea of solar cells, solar panels and their applications, Introduction to maintenance free batteries, Safe disposal of Batteries; Fuel cell: Principle & Types of fuel cell.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. B.L.Theraja, A Textbook of Electrical Technology, Vol.1, S.Chand& Company Ltd. New Delhi
2. V.K.Mehta, Basic Electrical Engineering, S Chand & Company Ltd. New Delhi.
3. J.Nagarath and Kothari, Theroy and applications of Basic Electrical Engineering, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Electrical Technology - Edward Huges (Pearson).
2. Basic Electrical Engineering - D. P. Kothari, J Nagarath (TMC).
3. Electrical power system technology - S. W. Fordo, D. R. Patric (Prentice Hall).
4. Electrical, Electronics Measurements and Instruments - (Satya Prakashan).

Project Based Learning Assignments

Note: - *Students in a group of 3 to 4 shall complete any one project from the following list

1. Building a small resistive load lamp bank.
2. Building a small resistive load lamp bank for various types of connections like series, parallel, star, delta
3. Building a small inductive load lamp bank for various types of connections like series, parallel, star, delta
4. Building a small capacitive load lamp bank for various types of connections like series, parallel, star, delta
5. Building a small resistive load lamp bank
6. Building a staircase wiring model on a board
7. Building a Go down wiring model on a board
8. Rewinding of a choke
9. Rewinding of a small transformer
10. Building a small rectifier circuit on bread board
11. Building a mobile charger circuit on a bread board
12. Building an electric buzzer circuit
13. Building a solar charger for mobile phone
14. Building a small wind turbine

15. Small Agricultural pump model with DC motor
16. Small Agricultural pump model with AC motor

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Object Oriented Programming

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT CHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work :	**25 Marks**		
		Practical:	**50**		
Total	**6 Hours/Week**		**175 Marks**		**5**

Course Objective:
The course focuses on the understanding and practical mastery of object-oriented paradigm such as classes, objects, data abstraction, methods, method overloading, inheritance, and polymorphism.

Prerequisite:
Basics of C Programming.

Course Outcomes: On completion of the course, students will have the ability to:
1. Differentiate between top-down and bottom-up programming approach.
2. **Associate the object-oriented programming approach in connection with C++.**
3. Apply the concepts of array and operator overloading.
4. Implement basic concepts of inheritance.
5. **Illustrate the process of data file manipulations using C++**
6. Use the concepts of Templates and Exceptions.

Unit I **08 Hours**
Introduction to OOP: programming characteristics of object-oriented languages. Comparison between C and C++. Programming basics of C++: input, output, directives, program structure, data types, decision and loops structure, type conversions.

Unit II **08 Hours**
Functions: function prototyping, function overloading, inline function, friend function, scope resolution operator, static functions
Object and Classes: Encapsulation, Abstraction, Polymorphism, Classes, access specifiers, static data members, static member functions, implementation of class in C++, memory allocation of objects, types of constructors and destructor

Unit III **08 Hours**
Arrays and string: arrays as data member, arrays of objects, The standard C++ String class and library functions.
Operator overloading: rules for overloading operators, overloading unary and binary operators, overloading operators using friend function, manipulation of string using operators.

Unit IV **08 Hours**
I**nheritance**: concept of inheritance, derived class and based class, types of inheritance, virtual base class, abstract class, nesting of classes, constructors in derived classes.
Pointer, **Virtual Function and Polymorphism**: pointers, pointer to objects, this pointer, pointer to derived classes, virtual functions and pure virtual functions.

Unit V **08 Hours**

Streams and Files: Stream classes for formatted and unformatted I/O operations, file stream operations, file pointers and their manipulations, sequential input and output file operations, random access to update a file, error handling.

Unit VI **08 Hours**

Templates: The Standard Template Library, class template with multiple parameters, function template with multiple parameters, overloading template functions, member function templates

Exceptions: basics, exception handling mechanism, mechanism for: throw, catch, rethrow, specify exception

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1 Object Oriented Programming with C++ Author: E. Balagurusamy.
2 C++: The complete Reference Author: Herbert Schildt.

Reference Books:

1 Object Oriented Programming C++, Fourth Edition, By Pearson.
2 Object Oriented Programming in C++ Author: Robert Lafore.

List of Laboratory Exercise:

1. Describe the OOP Concepts.
2. Demonstrate class concept using suitable programmes.
3. Demonstrate array concepts using suitable programmes.
4. Demonstrate Operator Overloading concepts using suitable programmes.
5. Demonstrate Inheritance and its types using suitable programmes.
6. Demonstrate the use of Pointer using suitable programmes.
7. Demonstrate the types of functions using suitable programmes.
8. Demonstrate File Handling using suitable programmes.
9. Demonstrate Templates using suitable programmes.
10. Implement User define Exception.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Login and Registration System using C++
2. Car Rental System using C++
3. Bookshop inventory system using C++
4. Student Report Management System using C++
5. Sudoku Game using C++
6. Credit Card Validator using C++
7. Using Graphics to Draw and Move Shapes using C++
8. Banking Record System using C++
9. Hotel Management System using C++
10. Student Management System using C++
11. Bus reservation System using C++

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Programming Paradigms

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	4 Hours/Week	End Semester Examination:	60 Marks	Theory	4
Practical:	2 Hours/Week	Internal Assessment:	40 Marks		
		Term Work	25 Marks	Practical	1
		Oral:	50 Marks		
Total	6 Hours/Week		175 Marks		5

Course Objectives:

1. To introduce the basic building blocks that underlie programming languages.
2. To introduce the basics of programming language design and implementation.

Prerequisite:

Introduction to computing and programming environment.

Course Outcomes:

On completion of the course, students will have the ability to:

1. Compare and contrast a range of programming paradigms.
2. Apply functional programming language features.
3. Implement the concepts of object orientation.
4. Interpret the features of logic programming paradigm.
5. Summarize the use and types of system programs.
6. Discuss the appropriateness of the using a given programming paradigm within a given environment.

Unit I **08 Hours**

Introduction to Programming: Role of programming languages, need to study programming languages, Characteristics of Programming Languages

The Nature of Programming Languages: Imperative languages and non-imperative languages, Functional Language, Scripting languages, Data-oriented languages, Object-oriented languages, Event-driven Programming, Language Standardisation

Programming Environments: Compilers and Interpreters, Interactive development tools, Run-time support environments, Debugging Tools, Testing Tools, Configuration Management.

Unit II **08 Hours**

Functional Programming: Definition of a function and Subprogram control: domain and range, total and partial functions, strict functions, subprogram sequence control, attributes of data control, shared data in subprograms, different parameter passing methods, lifetime of variables, Recursion, Referential transparency, Storage management. Desirable and undesirable characteristics of procedural programming.

Unit III **08 Hours**

Object Orientation: Basic concepts: Objects, classes, methods, overloading methods, messages inheritance: overriding methods, single inheritance, multiple.

Inheritance, Interfaces (e.g., in Java), encapsulation, polymorphism, Implementing object-oriented programming, desirable characteristics of object-oriented programming, Comparative study of C++ and JAVA.

Unit IV **08 Hours**

Logic programming Paradigm: Introduction, Logic programming language model, Brief Introduction to Predicate Calculus, Predicate Calculus and Proving Theorems, An Overview of Logic Programming, The Origins of Prolog, The Basic Elements of Prolog, Deficiencies of Prolog, Applications of Logic Programming Limitations of Logic Programming.

Unit V **08 Hours**

System Programming: Types and functions of system Programs: Language processors and language processing activities, Assemblers, Macro processor, Linker, Loader, Interpreter, Compiler (steps in compilation).

Unit VI **08 Hours**

Additional Programming Paradigms: Data flow programming design principles, Database programming design principles, Network programming design principles, Socket programming in JAVA, Internet programming design principles, windows programming.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. Roosta Seyed, "Foundations of Programming Languages Design & Implementation", 3rd Edition, Cenage learning, ISBN-13:978-81-315-1062-9.
2. Pratt T.W., Zelkowitz **"**Programming Languages: Design and Implementation" PHI, 2002, 3rd Edition, ISBN-81-203-1038-1
3. Sebesta R. W., "Concepts of programming languages", Pearson Education 2001, 4th edition, ISBN-81-317-0837-3.
4. D.M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw-Hill, ISBN- 13:978-0-07-463579-7
5. Max Bramer, "Logic Programming with Prolog", 2nd Edition, Springer, ISBN-13 978-1447154860

Reference Books:

1. Sethi Ravi, **"**Programming Languages: Concepts and Constructs**"** Pearson Education, ISBN:9788177584226
2. Herbert Schildt, "C++: The Complete Reference, 4th Edition", McGraw Hill Education; 4th edition, ISBN-13 : 0070532465-978

List of Laboratory Exercises:

1. Implement parameter passing using functional programming approach.
2. Implement recursion using functional programming approach.
3. Implement and comparing lifetime of variable using functional and object-oriented programming approach.
4. Implement and comparing reference passing using functional and object-oriented programming approach.
5. Implement encapsulation in object-oriented programming approach.
6. Case study of Prolog.
7. Implement and compare functions in functional and object-oriented programming approach.
8. Implement concept of binding in functional and object-oriented programming approach
9. Implement inheritance using object-oriented programming approach.
10. Study of a website/software to identify event driven programming elements used.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Make a project in C to maintain student record using files. The project should be able to read, write, modify, add and search records.
2. Make a project in C++ to maintain employee data using files and dynamic object. The project should be able to read, write, modify, add and search records.
3. Implementation of a simple calculator with memory functions in C++ using polymorphism. The screen should continuously display numbers, signs, and symbols similar to calculator. Use shortcut keys for operations and memory functions.
4. Implementation of a simple predicate logic system for diagnosis and applicable medicines using prolog
5. Develop a simulator for assembler. It should accept a assembly program and separate the components of the program as per the data structures of assembler.
6. Develop a macro-processor like program which should identify the macro definitions, macro calls in an assembly program. It should also replace macro calls with macro definitions.
7. Implement a phone book using C/C++.
8. Develop a simple 3-page website to show event elements. It should have at least one registration page to communicate data to and from a server.
9. Implement result calculation system for student marks using each structured programming and object-oriented programming. Make use of files. Compare the difference in both implementation and identify the pros and cons of both implementations with the features of the programming types used.
10. Implement event driven programming on at least one webpage.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Web Programming

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Practical:	**2 Hours/Week**	**Practical:**	**25 Marks**	**Practical:**	**1**
				Tutorial:	**1**
Tutorial:	**1 Hours/Week**	**Term Work:**	**25 Marks**		
Total:	**3 Hours/Week**		**50 Marks**		**2**

Course Objectives:
To develop the skill & knowledge of Web page design.

Prerequisite:
Basic knowledge in HTML tags & skill of creating web pages should be known

Course Outcomes: On completion of the course, students will have the ability to:

1. Use HTML in website designing according to theme.
2. Design web pages with attributes
3. Design various layout of websites.
4. Implement responsive web design.
5. Implement front end framework with Bootstrap Elements.
6. Build website with Content Management System.

Unit I **06 Hours**

HTML Tags: Choose a Website Topic, Overview of HTML Tags, The HTML 5 Template, The Head, Formatting Content, Compound Tags, Character Entities, Commenting and Formatting Code, Other HTML Tags.
HTML Attributes and Images:
Acquiring Images, Graphics File Formats, Editing Images, The img Tag, Absolute Links, Embedding Media, Relative Links, Validating Code

Unit II **06 Hours**

CSS – Styling Tags and Page Layout: CSS Basics, Colors and Inline Styles, Internal Style Sheets and Basic Formatting, External Stylesheets, Common Properties. Classes IDs Divs Spans, The Box, Boxes in Boxes, Styling Page Divisions, Additional Resources
Designing with Sections: - Sections and Background Colors, Background Images, Adding a Navigation Bar

Unit III **06 Hours**

Publishing Websites: -FTP and Web Servers
JavaScript: - Adding a jQuery Animated Scrolling Effect.
Responsive Design: - Media Queries, Multiple Media Queries, Targeting Devices, Images and Video, Columns and Tweaks, The Viewport

Unit IV **06 Hours**

Front End Frameworks: Explore Bootstrap Elements, Downloading Bootstrap, downloading a Bootstrap Example, Reviewing the Example Code, Replacing Page Content, Customizing the Design.

Unit V **06 Hours**

Web API: Working of APIs, Relationship between JavaScript, APIs, and other JavaScript tools.

Common browser APIs :- APIs for manipulating documents, APIs that fetch data from the server, APIs for drawing and manipulating graphics, Audio and Video APIs, Device APIs, Client-side storage APIs.
Common third-party APIs :- YouTube API, Facebook suite of APIs, Twitter API.

Unit VI **06 Hours**
Content Management Systems: Setting up WordPress, Creating Posts, and Creating Pages, Working with Media, Themes and Widgets.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:
1) Getting Started with Web Components: Build modular and reusable components using HTML, CSS and JavaScript by Prateek Jadhwani.
2) Jump Start Bootstrap: Get Up to Speed With Bootstrap in a Weekend By Syed Fazle Rahman.
3) Fronted Web Development/Web Designing, HTML, CSS & JavaScript Basic Tutorial by Sachin Srivastav
4) Web Design and Development: Website Technologies Fundamentals By Steven Bright.

Reference Books
1) HTML and C Learn HTML, CSS, and JavaScript and Build a Website, App, and Game by Young Rewired State and Duncan Beedie.
2) Mastering HTML, CSS & Javascript Web Publishing by Laura Lemay, Rafe Colburn HTML & CSS, and JavaScript & JQuery (2 book set) by Jon Duckett.

List of Laboratory Exercise:
1) Design home page for any website according to domain.
2) Implement various functionality using different tags of HTML while designing web pages.
3) Implement web pages formatting and content formatting using CSS.
4) Implement responsive approach in website designing
5) Explorer front end framework using Bootstrap Elements
6) Demonstrate website design using content management system.

Project Based Learning Assignments
Note:- *Students in a group of 3 to 4 shall complete any one project from the following list
1. Design website for department and college
2. Design website for e-commerce platform.
3. Design website for reservation system (eg. bus, train, air)
4. Design website for online food delivery system.
5. Design website for CRM (database management).
6. Design website for hospital management system.
7. Design website for advertisement of products.
8. Design website for customer support system.
9. Design website for Business Portfolio.
10. Design website for Quiz Game.
11. Design website for E-library system.
12. Design website for survey system.
13. Design website for Banking system.
14. Design website for social media.
15. Design matrimonial website.

B.Tech (Information Technology)

Semester-III

Discrete Structures and Graph Theory

TEACHING SCHEME		EXAMINATION SCHEME		CREDITSCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
		Internal Assessment:	**40 Marks**		
Total	**04 Hours/Week**		**100 Marks**		**4**

Course Objectives:

1. To apply and relate knowledge of mathematics in computer science.
2. To learn proof theory with propositional calculus and induction.
3. To map, represent and solve network problem with trees and graphs.

Prerequisite:
Basic mathematics and programming fundamentals.

Course Outcomes: On completion of the course, students will have the ability to

1. Formulate real world problems into statement forms using sets and relations which
2. can be solved or proved mathematically using set theory and logic.
2. Design mathematical model from theoretical statements.
   Apply counting techniques to real world problems.
4. Apply knowledge of graphs to solve network problems.
5. Design searching algorithm efficiently by applying tree and tree traversal logic.
6. Apply algebraic structure and coding theory in computer science.

Unit I **08 Hours**

Propositional Logic and Proof Theory: Sets, Set operations, Finite and Infinite sets, Venn diagram, Principle of inclusion and exclusion, Multisets. Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, Normal forms, methods of proofs, Principal of mathematical induction.

Unit II: **08 Hours**

Relations and Functions: Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence, Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains. Functions, Composition of functions, Invertible functions, Pigeonhole Principle.

Unit III **08 Hours**

Counting and Recurrence Relations Basic counting principles, permutations, combinations, generalized permutations and combinations (with/without repetitions), Probability theory, Permutations with indistinguishable objects, Binomial coefficients, and identities. Linear Recurrence Relations with constant Coefficients, Homogeneous Solutions, Total solutions.

Unit IV **08 Hours**

Graph theory: Basic terminology, multi graphs and weighted graphs, paths and circuits,shortest path in weighted graph, Dijkstra's algorithm, Hamiltonian and Euler paths and circuits, factors of a graph, planer graph and Travelling salesman problem.

Unit V **08 Hours**

Trees: Trees, rooted trees, path length in rooted trees, prefix codes, binary search trees,tree traversal, spanning trees and cut set, minimal spanning trees, Kruskal's and Prim's algorithms for minimal Spanning tree. The Max flow- Min Cut Theorem (Transport network). Case Study- Game Tree, Mini-Max Tree.

Unit VI **08 Hours**

Algebraic Structures: The structure of algebra, Algebraic Systems, Semi Groups, Monoids, Groups, Homomorphism and Normal Subgroups, Congruence relations, Rings, IntegralDomains and Fields, coding theory, Polynomial Rings and polynomial Codes.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Edition, McGraw Hill.
2. C. L. Liu, D. P. Mohapatra, Elements of Discrete Mathematics: A Computer Oriented Approach, 4th Edition, McGraw Hill.

Reference Books

1. Seymour Lipzschutz, M. Lipson, Discrete Mathematics, 3rd Edition, McGraw Hill.
2. P. Tremblay, R. Manohar, Discrete Mathematical Structures With Applications to Computer Science, McGraw Hill.

List of Laboratory Exercise

1. Write a program to implement set operations. (Set size and elements to be taken from user at runtime).
2. Write a program to calculate value of polynomial for variable x. (Highest degree and coefficients to be taken from user at runtime).
3. Write a program to find value of composite function: fogoh. (f(x), (g(x) and h(x) tobe taken from user.)
4. Write a program to implement Warshall's algorithm.
5. Write a program to check whether Eulerian circuit is present in the given graph.
6. Write a program to find shortest path between the vertices in given graph.
7. Write a program to create binary search tree for the values taken from user.
8. Write a program to implement various tree traversals.
9. Write a program to implement Kruskal's algorithm.
10. Write a program to implement Prim's algorithm.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Study the writings of Lewis Carroll on symbolic logic. Describe in detail some of the models he used to represent logical arguments and the rules of inference he used in these arguments.
2. Describe a variety of different applications of the Fibonacci numbers to the biological and the physical sciences.
3. Explain how graph theory can help uncover networks of criminals or terrorists by studying relevant social and communication networks.
4. Explain what community structure is in a graph representing a network, such as a social network, a computer network, an information network, or a biological network. Define what

a community in such a graph is, and explain what communities represent in graphs representing the types of networks listed.

5. Describe how Euler paths can be used to help determine DNA sequences.
6. Describe some of the strategies and algorithms used to solve the traveling salesperson problem.
7. Five men with different nationalities and with different jobs live in consecutive houses on a street. These houses are painted different colors. The men have different pets and have different favorite drinks. Determine who owns a zebra and whose favorite drink is mineral water (which is one of the favorite drinks) given these clues: The Englishman lives in the red house. The Spaniard owns a dog. The Japanese man is a painter. The Italian drinks tea. The Norwegian lives in the first house on the left. The green house is immediately to the right of the white one. The photographer breeds snails. The diplomat lives in the yellow house. Milk is drunk in the middle house. The owner of the green house drinks coffee. The Norwegian's house is next to the blue one. The violinist drinks orange juice. The fox is in a house next to that of the physician. The horse is in a house next to that of the diplomat.
8. Explain how graph multicolorings can be used in a variety of different models.
9. Define a heap and explain how trees can be turned into heaps. Why are heaps useful in sorting?
10. Describe the techniques used by chess-playing programs such as Deep Blue or stockfish.
11. Discuss the algorithms used in IP multicasting to avoid loops between routers.
12. Compare and contrast some of the most important sorting algorithms in terms of their complexity and when they are used.
13. Describe an algorithm for finding the minimum spanning tree of a graph such that the maximum degree of any vertex in the spanning tree does not exceed a fixed constant k
14. Describe the origins of mathematical induction. Who were the first people to use it and to which problems did they apply it?
15. Explain how the ideas and concepts of program correctness can be extended to prove that operating systems are secure.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Data Structures

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work	**25 Marks**		
		Practical:	**25 Marks**		
Total	**6 Hours/week**		**150 Marks**		**5**

Course Objective:
The objective of the course is to familiarize students with fundamentals of data structures and algorithms.

Prerequisite:
Fundamental knowledge programming and problem-solving steps

Course Outcomes: On completion of the course, students will have the ability to:
1. Understand the fundamentals of data structure and algorithms
2. Execute linear sequential data structures
3. Implement linear linked organization data structures
4. Execute nonlinear data structure-trees
5. Implement nonlinear data structure-graph
6. Know hashing and file organization concepts

Unit I **08 Hours**
Introduction to Algorithm and Data Structures: Introduction to data structures, types of data structure, abstract data types (ADT), introduction to algorithms, characteristics of algorithms, algorithm design tools: pseudo code and flowchart, relationship among data, data structure and algorithms, analysis of algorithms, asymptotic notation.

Unit II **08 Hours**
Sequential Organization Data Structures: Stacks: primitive operations, stack as an ADT, realization of stacks using array,stack operations, multi-stack, applications of stack, expression evaluation and conversion, simulating recursion using stack
Queue: primitive operations, queues as ADT, realization of queue using array, circular queue, double ended queue, priority queue, applications of queue.

Unit III **08 Hours**
Linked Organization Data Structures: Introduction, comparison of sequential and linked organizations, comparison of static and dynamic memory allocation, realization of linked lists, dynamic memory management, linked list as ADT, types of linked list, polynomial manipulations, linked stack, linked queue, generalized linked list (GLL) concept, applications oflink list.

Unit IV **08 Hours**
Non-Linear Data Structure-Tree: Tree terminology, types of trees, binary tree as an ADT, realization of tree, tree traversals, binary search tree, operations on BST, threaded binary tree, AVL tree,heap tree, applications of trees.

Unit V **08 Hours**
Non-Linear Data Structure-Graph: Graph terminologies, graph as an ADT, realization of graphs using adjacency matrix and adjacency list, graph traversals: breadth first search traversal, depth first search traversal, spanning tree, prim’s and kruskal’s algorithms, topological sorting, applications of graph

UNIT VI **08 Hours**

Hashing and File Organization:

Hashing: introduction, key terms, hash function, Collision Resolution strategies,hash table overflow, skip list, comparison of hashing and skip lists.

File: concept of file, file organization, sequential file organization, direct access file organization, indexed sequential file organization.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", Prentice Hall of India, , ISBN-81-203-1177-9.
2. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, ISBN 16782928
3. S. Lipschutz, “Data Structures”, McGraw Hill Pub.
4. Patil V., “Data Structures using C++”, Oxford university press, ISBN 0-19-806623-6
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein,“Introduction to Algorithms”

Reference Books

1. G. A.V, PAI , “Data Structures and Algorithms “, McGraw Hill, ISBN -13: 978-0-07-066726-6
2. M. Welss, “Data Structures and Algorithm Analysis in C++", Pearson Education, ISBN-81-7808-670-0

List of Laboratory Exercise

1. Write a program to implement functions (insert, delete, display) on stack, queue and circular queue data structure.
2. Write a program to convert and solve expression from
3. (a)Infix to Prefix
   (b) Infix to Postfix

Evaluate Postfix expression

3. Write a program to implement Singly Linked List manipulation for storing student information (PRN, Name, Marks).
   a. Display data of top rank student.

How many students secure first class and above rank?

4. Write a program to implement Doubly Linked List manipulation for storing Employee information (Name, Salary, Age).
   a. Display data of employees having salary more than 50,000.

Display list of employees having age less than 30 and salary greater than 30,000.

5. Write a program to implement Binary Search Tree storing city names and Traversal in BST (Inorder, Preorder, Postorder).
6. Write a program to implement Threaded Binary Tree and its Traversals.
7. Write a program to implement graph traversals: BFS and DFS.
8. Write a program to implement Prims and Krushkals algorithms MST.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Design and develop a project for Election System
2. Design and develop a project for Flight ticket booking
3. Design and develop a project for Tourism Management system
4. Design and develop a project for Simple Result system
5. Create a mini project to construct game: Tic-Tac-Toe
6. Design and develop a project for Phone Directory using doubly link list
7. Create a mini project to construct game: Snakes and Ladder

8. School fee enquiry Management System
9. Telecom Billing Management System

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Database Management System

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work	**25 Marks**	**Practical:**	**1**
		Practical:	**25 Marks**		
Total	**6 Hours/week**		**150 Marks**		**5**

Course Objective

The objective of the course is to present an introduction to database management systems,with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information. from a Database Management Systems.

Prerequisite:

Students should have knowledge of

1) Basic understanding of data and data structure.
2) Basic understanding of programming language.

Course Outcomes: On completion of the course, students will have the ability to:

1. Model an application's data requirements using conceptual modeling tools.
2. Implement concepts of relational algebra and SQL queries.
3. Demonstrate concepts of relational database design.
4. Interpret the query processing and optimization activities in database.
5. Interpret the transaction activities in database.
6. Recognize the emerging database applications and security concerns.

Unit I **06 Hours**

Introduction: Introduction to Database system architecture, Data Abstraction, Data Independence.

Data models: Extended Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit II **06 Hours**

Relational algebra: Fundamental and extended relational algebra operations, Tuple and domain relational calculus

Introduction to SQL: Data definition language, Data Manipulation Language, Joined relations, Views.

Introduction to PL/SQL: Functions, Procedures, Triggers, Cursors.

Unit III **06 Hours**

Integrity constraints: What are constraints, types of constrains

Relational database design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms (1NF, 2NF, 3NF, BCNF, 4NF), Dependency preservation, Lossless design.

Unit IV **06 Hours**

Storage strategies: Indices, B trees, B+ trees, Hashing

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms

Unit V **06 Hours**

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit VI **06 Hours**

Data Intensive Computing: Introduction to big data, unstructured data processing using Hadoop, NoSQL database using MangoDB
Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1 Silberschatz, Korth, "Data base System Concepts", 7th ed., McGraw hill.
2 Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems" (3/e), McGraw Hill.
3 Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education.
4 C. J. Date, Kannan, "An Introduction to Database Systems", 8e, Addison-Wesley
5 Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle", BPB Publication

Reference Books

1 Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007
2 Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book" (2nd edition), Pearson Prentice Hall

List of Laboratory Exercise

1. Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc).
2. Convert ER Model to Relational Model (Represent entities and relationships in Tabular form, represent attributes as columns, identifying keys).
3. Remove the redundancies and anomalies in the above relational Tables, Normalize up to Third Normal Form.
4. Study and implementation of SQL: DDL
   Creation of above Tables using SQL- Data types in SQL, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables.
5. Study and implementation of SQL: DML, Querying with set operations and wildcards
6. Study and implementation of aggregate functions, joins, nested subqueries in SQL from querying above tables.
7. Study and implementation of views in SQL.
8. Study and implementation of PL/SQL – Control statements.
9. Study and implementation of PL/SQL Functions and stored procedure.
10. Study and implementation of Triggers.
11. Study and implementation of Cursors.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Make a project to maintain employee data using files and dynamic object/structure. The project should be able to read, write, modify, add, and search records. Also demonstrate the effect of performing change in employer data definition after few records have been added.
2. Make an extended ER diagram for insurance management system. Transform this into relation design and implement these relations with appropriate domain and integrity constraints.
3. Employ various data control restrictions on databases, relations, and attributes of relations.

4. Create a phonebook which enables user to save contacts with additional information and provides various retrieval mechanisms. Provisions should be made to view data in multiple ways.
5. Design and develop a library management system. The relations in the system should be normalized up to BCNF
6. Design and develop a inventory management system and create multiple views on the relations so that users not authorized to edit the relations should be able to views the data.
7. Implement of audit trails and backup on relations.
8. Create a student result calculation system. However, when updating results after calculation should be only of students who paid complete fees, such that transaction of each row is executed separately. Hint- use explicit cursor
9. Develop a student data management system using hash files.
10. Installation of a NoSQL database and implementing a simple student database to compare with SQL database.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Software Engineering

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory:**	**3**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Term Work:**	**1**
		Term Work :	**25 Marks**		
Total	**5 Hours/Week**		**125 Marks**		**4**

Course Objective:

This course presents modern software engineering techniques and examines the software life-cycle, including software specification, design, implementation, testing. The course is organized as a project where the students work in a team to address a real-world software engineering assignment. The project is supplemented by exercises and lectures that provide insight into the assignment students are working on and software engineering in general.

Prerequisite: Programming knowledge

Course Outcomes: On completion of the course, students will have the ability to:

1. Compare various software development methods.
2. Identify requirements for project.
3. Apply software analysis principles.
4. State steps involved in software designing.
5. Show working of software engineering tools.
6. Execute a thorough software test.
7. Function effectively as a member of a team engaged in software engineering activities.

Unit I **08 Hours**

Introduction to Software Development: Software Development Challenges, Software Scope , Software Engineering Discipline, Software Methodologies and Related Process Models, The Human Side of Software Development , Traditional Life Cycle Models o Waterfall , Incremental Evolutionary, Spiral, CBSE, Alternative Process models: Unified Process, Rapid Application Development, Introduction to Agile Software Engineering Process Models: Extreme Programming o Agile Software Development, DevOps, Site Reliability Engineering. Quality and Process Standards: ISO 9000, SWEBOK, ISO 15504, SEI's Capability Maturity Model (CMM).

Unit II **08 Hours**

Requirement engineering: Requirements Development Methodology, Specifying Requirements, Eliciting Accurate Requirements, Documenting Business Requirements, Defining User Requirements, Validating Requirements, Achieving Requirements Traceability, Managing Changing Requirements, Reviews, Walkthroughs, and Inspections, Requirements Modelling, Agile Requirements Engineering.

Business Model Engineering: Business Model Capture Tools, Process Modelling, Capturing the Organization and Location Aspects, Developing a Process Model.

Unit-III **08 Hours**

Analysis and Modeling: Elements of Analysis model, Analysis Modeling approaches, Data modeling, Scenario based modeling, Flow oriented modeling

Unit IV **08 Hours**

System Design: Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Design Concepts, The Design model architecture, cohesion and coupling, Data Design, Architectural Styles and Patterns, Architectural Design, Mapping Data flow into Software Architecture. Functional versus object-oriented approach.
Coding: Programming languages and development tools Selecting languages and Tools, Good programming practices Coding Standards.

08 Hours

Unit V
Software configuration management (SCM): Elements of SCM, Base lines, Software configuration items, SCM Repository, SCM process:
Software Engineering Tools: Requirements Management Tools (e.g., IBM Rational Doors), Design Tools (e.g., Sparx Enterprise Architect), Development Tools o IDEs (e.g., Xcode, Eclipse, IntelliJ IDEA, NetBeans, Microsoft Visual Studio, Atom), Source Control Management (e.g., GitHub), Release Orchestration (e.g., Open Make), Collaboration (e.g., Jira, Trello, Slack).

08 Hours

Unit VI
Testing Strategies: Levels of Testing, Functional Testing, Structural Testing, Test Plan, Test Case Specification, Test case design, A strategic approach to software Testing: Verification and Validation Testing, organizing for software Testing, Software Testing Strategy for conventional Architecture: Unit Testing Integration Testing, Validation Testing, System Testing, Debugging, White-box, Black-box testing, Basis path Testing, Control structure testing.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. Roger Pressman, Software Engineering: A Practitioner's Approach, 6th edition, McGraw Hill, 2005. ISBN 0-07-285318-2
2. Somerville, Ian (2001) Addison-Wesley Software Engineering 7th Edition). Massachusetts: Addison Wesley, ISBN 0-321-21026-3
3. Fundamentals of Software Engineering by Rajib Mall

Reference Books

1. Kniberg, H. (2015) Scrum and XP from the Trenches - 2nd Edition,
2. Pro Git: http://git-scm.com/

List of Laboratory Exercise

1. Preparing Software Requirements Specifications
2. Performing domain analysis
3. Perform E-R Modeling
4. Perform Data-Flow-Modeling
5. Draw State Diagram
6. Designing Test Suites
7. Calculate cyclomatic Complexity for code snippet

Project Based Learning Assignments
Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Android task monitoring
2. Sentiment analysis for product rating
3. Fingerprint-based ATM system

4. Advanced employee management system
5. Image encryption using AES algorithm
6. Fingerprint voting system
7. Weather forecasting system
8. Android local train ticketing system
9. Railway tracking and arrival time prediction system
10. Android Patient Tracker
11. Opinion mining for social networking platforms
12. Automated payroll system with GPS tracking and image capture
13. Data leakage detection system
14. Credit card fraud detection
15. AI shopping system

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Computer Communication and Networks

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**3**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical:**	**1**
		Term Work :	**25 Marks**		
Total	**5 Hours/week**		**125 Marks**		**4**

Course Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. This course will enable students to understand the layering architecture of OSI reference model and TCP/IP protocol suite, protocols associated with each layer.
3. Learn the different networking architectures and their representations and able tolearn the various routing techniques and the transport layer services.

Prerequisite:

Students should have knowledge of

1. How computer networks operate and the fundamentals of data communication.
2. Concepts and fundamental design principles of modern computer networking in a top-down approach, focusing on the Internet's architecture and protocols.

Course Outcomes: On completion of the course, students will have the ability to:

1. Find the components required to build different types of networks.
2. Recognize the different types of network Transmission Media and Technologies.
3. Explain the layered architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
4. Match the division of network functionalities with the layers.
5. Distinguish the basic network Layer services and Protocols associated with each network.
6. Identify the protocols and functions associated with the transport layer services.

Unit I **06 Hours**

Introduction to data communication and networking: Data Communications: Components, Representations, Data Flow. Digital Transmission: Analog-to-Digital Conversion, Digital-to-Digital Conversion. Analog Transmission: Digital-to-analog Conversion, Analog-to- Analog Conversion.

Networks: Physical Structures, Introduction to Networks – Building Network and Network Types: LAN, WAN, MAN and PAN, Overview of Topology, Concepts of Communication Modes and Transmission Modes. Categories of Networks Internet works.

Unit II **06 Hours**

Data Transmission Media and Technologies: Transmission Media: Types of transmission media, principal, Specification of Medium, Performance, and Transmission Impairments. Applications of different transmission media.

Introduction to switching: Switching, Circuit-switched Networks, Packet Switching, Datagram Switching and Datagram networks, Virtual circuit networks, Structure of circuit and packet switch.

Unit III **06 Hours**

Network Models: Protocol Layering: Scenarios, Principles, Logical Connections. Reference Models, Functions of the layers of The OSI Model, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite and its functioning, Description of layers, services, sockets and ports Encapsulation and D-encapsulation, Addressing, Multiplexing and De-multiplexing, Types of Multiplexing and Multiplexing applications. The OSI Model: OSI Versus TCP/IP.

Unit IV **06 Hours**

Networking Devices: Networking Devices: Hubs, Switch, Router, Repeaters, Bridges, Gateway, Modem and Access Point, Backbone networks.

Data-Link Layer:

Introduction: Nodes and Links, Services, Categories of link, Sub layers, Link Layer addressing: Types of addresses, ARP, RARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking.

Unit V **06 Hours**

Network Layer: Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services. IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label. Overview of IPv6 Addressing – Transition from IPv4 to IPv6 Comparison of IPv4 and IPv6.

Network layer Protocols:

Internet Protocol (IP): Datagram Format, Fragmentation, Options, Security of IPv4 Datagrams, ICMPv4: Messages, Debugging Tools.

Routing: Introduction to Types of Routing, Routing Algorithms: Distance Vector Routing, Link State Routing, Path vector routing, Unicast Routing Protocol: Internet Structure, Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol Version 4.

Unit VI **06 Hours**

Transport Layer: Introduction: Transport Layer Services, Connectionless and Connection oriented Protocols, Transport Layer Protocols: Simple protocol, Stop and wait protocol, Go- Back-N Protocol, Selective repeat protocol, User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Transmission Policy, Segment header, Connection, State Transition diagram, Windows in TCP, Flow control, Error control, TCP congestion control, Timer Management. Application Layer Paradigms – Client Server Programming – World Wide Web and HTTP, DNS, Electronic Mail (SMTP, POP3, IMAP, MIME).

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks:

1. Data Communications and Networking, Forouzan, 5th Edition, McGraw Hill, 2016 ISBN: 1-25-906475-3.
2. James F. Kurose, Keith W. Ross, ―Computer Networking - A Top-Down Approach Featuring the Internet, Seventh Edition, Pearson Education, 2016.

Reference Books:

1. Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013,
2. Introductions to Data Communication and Networking, Wayarles Tomasi, Pearson Education,
3. Nader. F. Mir, ― Computer and Communication Networks, Pearson Prentice Hall Publishers,
4. 2nd Edition, 2014.
5. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, ―Computer Networks: An Open Source
6. Approach‖, Mc Graw Hill Publisher, 2011.
7. Larry L. Peterson, Bruce S. Davie, ―Computer Networks: A Systems Approach‖, Fifth Edition, Morgan Kaufmann Publishers, 2011.

List of Laboratory Exercise

1. Study and execution of Network commands.
2. Socket programming Client Server using RPC.
3. Demonstration of different types of cables used in data communication.
4. Perform various line coding formats and compare transmission characteristic of each formats.
5. Perform digital carrier modulation techniques used in wireless communication.
6. Study and demonstration of CISCO packet tracer with data transmission.
7. Study and demonstration of CISCO packet tracer with data loss.
8. Perform serial data communication between two data terminal equipment using optical link.
9. Perform Installation of LAN and troubleshooting of frequently occurred problems.
10. Create and test wireless sensor networks using zigbee.
11. To study various aspects of data communication by field visit at data centre.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Network Desktop Manager. Example Modules: Desktop Sharing, Desktop locking and unlocking, IP Port Scanning.
2. Analysis of IPv4/IPv6 protocols over 3G mobile networks
3. Network Traffic Monitoring & windows Remote Manager. Example Modules: Remote Desktop, Remote Chat, Monitoring
4. Learner's Interaction with Information and Communication Technologies.
5. Use of Information-Centric Networks in Revision Control Systems
6. TCP Performance in an EGPRS system
7. Real-Time Networking based Computer Ideas
8. An Internet Voting System Supporting User Privacy
9. Use of Information-Centric Networks in Revision Control Systems.
10. Networking and Security Projects
11. IP based Patient Monitoring System
12. Network Admission Control (NAC) Securing End Point Devices

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Information Technology Laboratory - I

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Practical:	**2 Hours/Week**	**Term Work**	**25 Marks**	**Practical:**	**1**
		Practical:	**25 Marks**		
Tutorials:	**1 Hour/Week**			**Tutorial:**	**1**
Total	**3 Hours/week**		**75 Marks**		**2**

Course Objective

1. Compute time and space complexity for a given program.
2. Demonstrate concepts OOPS using java
3. Solve specified requirement
4. Infer various approaches to decide the efficiency of the given approach.
5. Formulate a given problem by providing the proof of behavior of the given model.
6. Design an application using a platform-independent approach.

Prerequisite:
Basic understanding of Object-Oriented Programming language and logic to solve.
given problem.

Course Outcomes: On completion of the course, students will have the ability to:
1. Design a solution to a given problem applying logic and features of the java language.
2. Develop their logical skill through various assignments and practicals.
3. Divide complex problem into subpart and then handle every part to achieve the Goal.
4. Model a solution to any real-world problem.
5. Analyze the significance of platform independence.
6. Design application using object-oriented norms.

Unit I **06 Hours**
Introduction to Java: Java Fundamentals, Features of Java OOPs concepts Java virtual machine Reflection byte codes Byte code interpretation Data types, variable, arrays, expressions, operators, and control structures - if, switch, and loops like for, do-
while, while. Introduction to Objects and classes.

Unit II **06 Hours**
Classes and objects: Java Classes, Abstract classes Static classes Inner classes Packages, Wrapper classes. Interfaces This Super Access control, embedded style information Inheritance, Encapsulation, Polymorphism, Data Binding, data abstraction.

Unit III: **06 Hours**
String and Arrays: One dimensional Array, Multidimensional array, Array of an object, Introduction
to vector. String, StringBuilder, String Buffer, String methods, manipulations.

Unit IV **06 Hours**
Exception Handling: Checked exceptions, unchecked exceptions, and Errors, try-catch block, throws,User-defined exception – Throw, Common exception classes.

Unit V **06 Hours**

Threading and multithreading: Lifecycle of Thread, Basic functions of thread, multithreading, synchronization.

Unit VI **06 Hours**

Collections and Generics: Introduction to collection framework, List, Set, Maps, utility class, Reflection API, Generics.

Textbooks

1 OCA Java SE 8 Programmer I Study Guide (Exam 1Z0-808) (Oracle Press) 3rd Edition. by Edward Finegan, Robert Liguori.

2 OCA Java SE 8 Programmer, Exam Guide (Exams 1Z0-808) 1st Edition, Kathy Sierra, Bert Bates.

3 Programmer's Guide to Java SE 8 Oracle Certified Associate (OCA), Khalid A. Mughal and Rolf W Rasmussen.

Reference Books

1 Headfirst Java, 2nd Edition by Kathy Sierra, Bert Bates.

2 Java: The Complete Reference, Eleventh Edition 11th Edition, Herbert Schildt.

3 OCAJP Associate Java 8 Programmer Certification Fundamentals: 1Z0-808, Hanmant Deshmukh.

List of Laboratory Exercise

1. Maintain record of students and perform CRUD functionality.
2. Write a program to redirect a request using a dynamic approach.
3. Write a program to pass the data using session.
4. Write a servlet to remove spam.
5. Maintain the record of faculty member using jsp action tags and directives.
6. Design a tag to perform the necessary editing in a given report.
7. Design reusable components of the form using taglib.
8. Implement sending and receiving mail utility using Java Mail API.
9. Implement Java Message Service queue.
10. Understand working of framework – struts- case study.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Implement assignment and project submission system.
2. Implement a program to issue Leaving Certificate, Transcripts and Bonafede certificate to student.
3. Implement a program to assign problem statement for practical examination in secured environment.
4. Design a template for NBA report.
5. Design an application for Feedback Management System.
6. Design application to maintain track of research paper with indexing per year.
7. Design a post customized as per social media platform.
8. Design an interface to collect job opportunities and disseminate to eligible student
9. Design a project to track details of Industrial Training.
10. Design notice board application to communicate with students.

B.Tech (Information Technology)

Semester-IV

IT Infrastructure Management

TEACHING SCHEME		**EXAMINATION SCHEME**		**CREDIT SCHEME**	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
		Internal Assessment:	**40 Marks**		
Total-	**4 Hours/Week**		**100 Marks**		**4**

Course Objectives:
Students undergoing this course are expected.

1. To introduce basic postulates of IT Infrastructure Management and shows the correlation
2. between system and service management process
3. Able to Know the Storage and database Management in Information Technology.
4. Infer various approach to decide efficiency of given approach.
5. Able to know the Security Management in IT.
6. To provide detailed knowledge of IT recent trends in globally.

Prerequisite:

Object Oriented Programming language and Logic to solve given problem.

Course Outcomes: On completion of the course, students will have the ability to:

1. Outline IT Infrastructure, management challenges and requirement.
2 Select Service Delivery and Service Support Processes required in IT infrastructure management.
3. Breakdown complex problem into subpart and then handle every part to achieve the goal.
4. Categorize various storage levels in IT.
5. Select security techniques in information technology.
6. Explain new communication mechanism based on emerging trends in information technology.

Unit I **08 Hours**

Introduction & It Infrastructure: Information Technology, IT Infrastructure Management, Introduction—IT Infrastructure Management, Challenges in IT Infrastructure Management, Design Issues of IT Organizations and IT Infrastructure, Determining Customers' Requirements, IT Systems Management Process, IT Service Management Process, Information System Design Process

Unit II **08 Hours**

Service Delivery Process & Service Support Process: Service Level Management, Financial Management, IT Service Continuity Management, Capacity Management, Availability Management, Configuration Management, Incident Management, Problem Management, Change Management.

Unit III **08 Hours**

Storage Management: Introduction to Storage, Backup and Storage, Archive, Retrieve, Disaster Recovery, Space Management, Database and application Protection, Bare, Machine Recovery (BMR), Data Retention

Unit IV **08 Hours**

Security Management: Computer Security, Internet Security, Physical Security, Identity Management, Access Control System, Intrusion Detection, Intellectual Property.

Unit V **08 Hours**

IT Ethics: Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes.

Unit VI **08 Hours**

Emerging Trends in It: Introduction, Electronic Data Interchange, Infrared Technology, Bluetooth, GSM, WiFi, Standards of Wifi, WiMax, 5G Wireless Technology.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. Gupta, "IT Infrastructure & Its Management", First Edition, Tata McGraw-Hill Education
2. IT Infrastructure and Management by Manoj Kumar Choubey - Published by Pearson Education

Reference Books

1. Firewalls for dummies, Brain Komar, Ronald Beekelaar, Joern Wettern, for Firewall Security, 70-662 MCTS exchage 2010 microsoft press.

List of Laboratory Exercise

1. Enlist and Illustrate Design Issues of IT Organisations and IT Infrastructure.
2. Demonstrate IT Service Continuity Management and Change Management.
3. Design and Implement various Storage Management and Recovery techniques.
4. Summarize different Security Management policies with assistance of Intellectual Property.
5. Setup and maintenance of Storage – Archive, Retrieve, Backup policies.
6. Configuration and Customization of Access Control List and Active Directory.
7. Discriminate various privacy and Cyber Laws with suitable example.
8. Demonstrate different internet security policies with suitable example.
9. Discover different Problem Management within Service Delivery Process.
10. Case Study- Disaster Recovery within Storage Management.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Develop Infrastructure Management System project for Server Management and Maintenance.
2. Develop Infrastructure Management System project for Software Management and Document Management
3. Secure File Storage on Local Machine Using Hybrid Physical Security Techniques.
4. Design security management for New Data center setup
5. Infrastructure Management System project for Monitoring of Bandwidth.
6. Tracking System for Defects. (For Example: Bug tracking and error system based on the web)
7. Implement Secure Backup Software System.
8. Design system for Detecting Data Leaks within storage management.
9. Implement enterprise management of electronic data interchange systems. (For example: Process mining, Good Security Practice)

10. Develop system for Bluetooth Controlled Electronic Home Appliances.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Formal Languages and Computation Theory

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
		Internal Assessment:	**40 Marks**		
Total	**4 Hours/Week**		**100 Marks**		**4**

Course Objective:
Students will learn about a variety of issues in the mathematical development of computer. science theory, particularly finite representations for languages and machines. Students will gain more formal understanding of algorithms and procedures.

Prerequisite:
Students should have knowledge of set theory and state transition diagrams.

Course Outcomes: On completion of the course, students will have the ability to
1. Design automata machines for strings given.
2. Write a regular expression for the given string and find set of strings if regular expression is given.
3. Write grammar rules for the strings given.
4. Design push down automata for the string and grammar.
5. Design Turing machine and apply the same to solve algorithmic problems.
6. Apply knowledge computation in complexity theory.

Unit I : **08 Hours**
Finite Automata: Introduction to Finite Automata, Structural Representations, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence and Minimization of Automata, Conversion of NFA with epsilon to DFA Equivalence of Moore and Mealy Machine. Applications and Limitation of FA.

Unit II **08 Hours**
Regular expressions: Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to DFA, DFA to Regular expression, Non-Regular Languages, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Applications of regular expressions.

Unit III **08 Hours**
Grammar: Definition, Production rules, Derivation trees, Ambiguous Grammar, Removal of ambiguity, Regular Grammar, Inter-conversion between RE and Grammar, Reduced form of grammar. Linear grammar: left & right linear grammar, Inter- conversion. Chomsky hierarchy of languages, Context Free Grammar- Definition, Context free language (CFL. Normal Forms- Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

Unit IV **08 Hours**

Push Down Automata (PDA): Limitations of FA, PDA: Definition, Uses, Equivalence between FA and PDA, Designing of PDA, Deterministic Push Down Automata and Non-Deterministic Push Down Automata- Definition, Language accepted by PDA, Designing a PDA for CFG, Properties of CFL, Pumping Lemma for CFL. Limitations of PDA, Applications of PDA.

Unit V **08 Hours**

Turing Machine (TM): Definition, Model, Comparison of TM, FSM, PDA, Design of TM, Examples of TM- Combinational TM, Iterative TM, Recursive TM, Universal TM, TM as a language acceptor, Some Problems that cannot be solved by Turning Machines, Language accepted by TM, Recursive sets, partially recursive functions. Church's Turing hypothesis, Multitask TM, TM limitations.

Unit VI **08 Hours**

Computational Complexity: Decidable problems concerning regular languages, Decidable problems concerning context-free languages, Un-decidability, Halting Problem of TM, Reducibility: Un-decidable Problems from Language Theory, A Simple Un-decidable Problem PCP, Mapping Reducibility Time Complexity: Measuring Complexity, The Class P, Examples of problems in P, The Class NP, NP- completeness.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. "Introduction to Automata Theory, Languages and Computation", Hopcroft J, Motwani R, Ullman ,Addison-Wesley, ISBN 81-7808-347-7, Third Edition .
2. "Introduction to Theory of Computation", Michael Sipser, Course Technology, ISBN-10: 053494728X, Forth Edition. ISE.

Reference Books

1. "Introduction to Languages and Theory of Computation", John Martin. Fifth Edition, McGrawHill.
2. "Computational Complexity", Christos H. Papadimitriou, Pearson Education.

List of Laboratory Exercise

1. Solve problems on designing finite automata.
2. Design and inter-convert Moore and Mealy Machine for same problems.
3. Form grammar rules for language of set of regular expression or strings given.
4. Design Push Down Automata for grammar or given string.
5. Construct Turing Machine to solve given problem.
6. Study Assignment on Complexity Theory.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Describe the process of designing the computer. How is it related with the simple automata?
2. Write project based on famous computer scientist Alan Turing. Select suitable material for reference and summarize.
3. Describe the set of problems which can be represented using machines. What are the criteria we can enlist for such representations?

4. Relate the computational theory to World War II. What is the role of cryptography in World War II?
5. Invention of computer as a machine is related to formal automata. How today's complex and high-end computer systems can be mapped to these simple automata. Describe in detail.
6. Select a real-world problem and represent it mathematically. Design an automaton to solve this problem. Write detailed explanation of the entire process.
7. Study any text editor. Enlist its features. Map these features with the concepts you learned in the subject.
8. Enlist set of problems which can be solved, and which cannot be solved by memoryless automata. How memory affects the power of automata? Explain in detail and justify your answer with example.
9. Why Ethereum blockchain must be deterministic? Study and explain application of computation theory to blockchain technology.
10. Can human brain be simulated by Tring machine? Write detailed essay and justify your conclusions with theorem you learned.
11. Study research paper published by Alan Turing and write a summary in your words.
12. What are the similarities and differences between human brain and machine? Support your answers with suitable mathematical model.
13. Study any chess game software. Write the process of developing such software. Describe how this is related to Turing machine.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Microprocessors and Microcontrollers

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**4 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory**	**4**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical**	**1**
		Term Work	**:25 Marks**		
Total	**6 Hours/Week**		**125 Marks**		**5**

Course Objective

This course facilitates the learners with the basic knowledge of microprocessors and microcontrollers. Also, the course supports the learners with detailed study of ARM processor and AVR Microcontroller.

Prerequisite:

Digital Electronics, C/C++/Java Programming

Course Outcomes: On completion of the course, students will have the ability to:

1. Learn basics of 16/32-bit Microprocessors.
2. Cognize the ARM Cortex Processor with its architecture and programming.
3. Discover Intel Pentium and i7 processor with its architecture and pipelining.
4. Comprehend basics of 8/16-bit Microcontrollers.
5. Uncover the details of AVR Microcontroller with its architecture and programming.
6. Understand the basics of Arduino and Raspberry Pi Controllers.

Unit I: **06 Hours**

Introduction to Microprocessors: Basics of 16-bit and 32-bit processor (Intel 8086 and 80386 processors), Multicore Architecture, Hyperthreading Technology, Instruction Set Architectures (ISA), Multiprocessor Organizations, Inter-Processor Communication (IPC).

Unit II: **06 Hours**

Intel Pentium Processor: Features and Internal Architecture, Superscalar Operation, Integer &Floating- Point Pipeline Stages, Branch Prediction Logic, Cache Organization and MESIProtocol, Comparative study of 8086, 80386, Pentium I, Pentium II and Pentium III, Hyper Threading technology and its use in Pentium 4, Intel i7 processor: Features, Architecture, Memory System, Pipelining.

Unit III **06 Hours**

ARM Cortex: ARM Micro-architecture (ARMv7/v8/v9/v11), ARM architectures: Generic Interrupt Controller (GIC), Server Base System Architectures, Trusted Base System Architecture (TBSA), System Memory Management Unit (SMMU), Pipelining, ARM OS, ARM Programming.

Unit IV: **06 Hours**

Introduction to Microcontrollers: Microprocessors vs Microcontrollers, Basics of 8-bit and 16-bit Microcontrollers (Intel 8051 and 8096 microcontrollers), Applications of microcontrollers.

Unit V **06 Hours**

AVR Microcontroller: Types of AVR Microcontrollers, ATmega16/32 8-bit AVR microcontroller: Features, Pin Description, Internal Architecture, Data and Program Memory, AVR Programming using C/Java/Assembly language, Study of VR Studio/Amtel, Studio 7, Visual Micro Lab.

Unit VI **06 Hours**

Introduction to Arduino and Raspberry Pi : Introduction, Difference, Arduino Uno and Raspberry Pi Pico (RP2040), microcontrollers, Programming concepts of Arduino Uno with C/C++/Python and IDE, Programming concepts of Raspberry Pi Pico with C/MicroPython.

Textbooks

1 Arm Microprocessor Systems Cortex-M Architecture Programming and Interfacing, Muhammad Tahir, T&F India.
2 The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, Joseph Yiu.
3 ARM A32 Assembly Language, Bruce Smith.
3 8051 Microcontrollers, Satish Shah, Oxford University Press.
4 Microprocessors and Interfacing, N.Senthil Kumar, M.Saravanan, Oxford University Press
5 Programming and Interfacing Atmel AVR Microcontrollers, Grace, Cengage Learning.
6 Practical AVR Microcontrollers, Alan Trevennor, Technology In Action.
7 Getting Started with Arduino, Massimo Banzi and Michael Shiloh.
8 Getting Started with Raspberry Pi, Matt Richardson and Shawn Wallace.

Reference Books

1 The Definitive Guide to ARM Cortex-M3 Processors, Stellaris, Texas Instruments.
2 ARM System-on-Chip Architecture, Steve Furber.
3 ARM processor, Santul Bisht, Lambert Publications
4 Modern Assembly Language Programming with the ARM Processor, Larry D Pyeatt.
5 Programming and Customizing AVR Microcontroller, Dhananjay Gadre.
6 Arduino Cookbook 2nd Edition, Michael Margolis.
7 Raspberry Pi The Ultimate Guide, Geoff Adams.
8 Internet of Things with Raspberry Pi and Arduino, Anita Gehlot.

List of Laboratory Exercise

1) Programming Assignments based on ARM Processor (Minimum 3) using Assembly Language.
2) Programming Assignments on 8051 using C (Minimum 2).
3) Programming Assignments based on AVR Controller (Minimum 3) on AVR Assembly language or Embedded C.
4) Study of and Using VR Studio/Amtel Studio 6/ Visual Micro Lab.
   Simple programming assignments on Arduino and Raspberry Pi Controllers (1 each) :
   Arduino Uno programs on Arduino Desktop IDE or Web IDE using,
   a) Assembly/C/Python/Atmel Studio7
   b) Raspberry Pi, Pico programs on C/C++/MicroPython.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Design and Implementation of Drunken People Identification with Auto Ignition Disable Function using ARM (Processor/Controller)/AVR Controller/8051 Microcontroller
2. Design and Implementation of Automatic Turn off for Water Pump with Four Different Time Slots using ARM (Processor/Controller)/AVR Controller/8051 Microcontroller
3. Design and Implementation of Gas Leak Detector with Automatic Air Exhaust Using ARM Cortex
4. Design and Implementation of ARM Based Liquid Level Detection & Flow Control
5. Design and Implementation of Motion Based Door Opener (in malls, big shops) using ARM (Processor/Controller)/AVR Controller/8051 Microcontroller

6. Design and Implementation of Fire Detection and Alarm using ARM (Processor/Controller)/AVR Controller/8051 Microcontroller
7. Design and Implementation of Remote-Control Plant Watering System using ARM (Processor/Controller)/AVR Controller/8051 Microcontroller
8. Design and Implementation of Voice Controlled Air Purifier based on Arduino and Raspberry Pi
9. Design and Implementation of Face Recognition Door Lock System based on Arduino and Raspberry Pi
10. Design and Implementation of Vehicle Number Plate Recognition based on Arduino and Raspberry Pi

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Applied Algorithms

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	4 Hours/Week	End Semester Examination:	60 Marks	Theory	4
Practical:	2 Hours/Week	Internal Assessment:	40 Marks		
		Term Work:	25 Marks	Practical	1
		Oral:	25 Marks		
Total	6 Hours/Week		150 Marks		5

Course Objective:
Understand and compare important algorithmic design paradigms and analysis of algorithms. To choose and extend efficient algorithms required for designs.

Prerequisite:
Students should be well versed with algorithms and operations on basic data structures stacks, queues, linked lists, trees, graphs. Students should have knowledge of searching sorting algorithms.

Course Outcomes: On completion of the course, students will have the ability to:
1. Interpret the performance of algorithms using analysis techniques.
2. Examine the fundamental algorithmic strategies.
3. Compare the fundamental algorithmic strategies.
4. Implement graphs and trees algorithms.
5. Interpret the tractable or intractable problem.
6. Summarize the advance types of algorithms.

Unit I **08 Hours**
Introduction to Algorithm analysis: Characteristics of Algorithm. Analysis of Algorithm: Asymptotic analysis of Complexity Bounds – Best, Average and Worst-Case behavior, Performance Measurements of Algorithm, Time and Space Trade-Offs. Analysis of Recursive Algorithms through Recurrence Relations: Substitution Method, Recursion Tree Method and Masters' Theorem.

Unit II **08 Hours**
Algorithmic Strategies 1: Brute-Force technique, Heuristics, Greedy algorithms, Divide and Conquer, Illustrations of these techniques for Problem-Solving.

Unit III **08 Hours**
Algorithmic Strategies 2: Dynamic Programming, Branch and Bound algorithms, Backtracking, methodologies; Illustrations of these techniques for Problem-Solving.

Unit IV **08 Hours**
Graph and Tree Algorithms: Self-Balancing tress, B Trees, B+ Trees, Single source shortest path algorithms, all pair shortest path algorithms, Network Flow Algorithm

Unit V **08 Hours**
Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete andNP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit VI **08 Hours**
Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE, Introduction to Quantum Algorithms and parallel algorithms.

List of Internal Assignment will be framed by respective Course Coordinator.

Textbooks

1. "Fundamental of Computer Algorithms", E. Horowitz and S. Sahni, Orient Black.
2. "Introduction to Algorithms", T. H. Cormen, C. E. Leiserson and R. L. Rivest,PHI Learning Pvt. Ltd. (Originally MIT Press).
3. "The Design and Analysis of Computer Algorithms", A. Aho, J. Hopcroft and J. Ullman, Pearson Education India.
4. Computer Algorithms: Introduction to Design and Analysis, S. Baase, Pearson Education India.
5. "The Art of Computer Programming", D. E. Knuth, Addison Wesley.

Reference Books

1. M. Welss, "Data Structures and Algorithm Analysis in C++", Pearson Education, ISBN- 81-7808-670-0.
2. G. A.V, PAI , "Data Structures and Algorithms ", McGraw Hill, ISBN -13: 978-0-07-066726-6.

List of Laboratory Exercise

1. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
2. Write a Code to find the shortest path using Bellman-Ford algorithm.
3. Write and analyze code to sort an array of integers using merge sort.
4. Write and analyze to sort an array of integers using divide and conquer quick sort Method.
5. Write a program to implement Longest Common Subsequence problem using Dynamic Programming.
6. Write a program to Implement 0/1 Knapsack problem using Dynamic Programming.
7. Write a program to Implement N Queen's problem using Back Tracking.
8. Write a program to implement quick sort using randomize algorithm.
9. Write a program to implement network flow algorithm.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Design and develop a project for Search engine using data structures
2. Design and develop a project for Google form like application
3. Design and develop a project for shortest path calculation for travelling salesman problem
4. Design and develop a project for finding keywords from the paragraph
5. Design and develop a project for Customer Billing system
6. Design and develop a project for word dictionary using search tree concept
7. Design and develop a project for salary calculation of employees based on performance
8. Design and develop a project for password recovery system
9. Create a mini project to construct game: Create Sudoku

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Operating System

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Lecture:	**3 Hours/Week**	**End Semester Examination:**	**60 Marks**	**Theory:**	**3**
Practical:	**2 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Practical:**	**1**
		Term Work:	**25 Marks**		
		Practical:	**25 Marks**		
Total	**5 Hours/Week**		**150 Marks**		**4**

Course Objective:
The learning objective of this course is to introduce the internal operation of modern operating systems. The course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems.

Prerequisite:
Programming skills, elementary data structures, algorithms, and computer architecture.

Course Outcomes: On completion of the course, students will have the ability to:

1. Explain the services provided by the system calls.
2. Implement the scheduling algorithms like FCFS, SJF and priority scheduling.
3. Implement the memory allocation techniques like first fit, best fit and worst fit.
4. Explain practical implementation of the inter-process communication of the processes.
5. Implement the file system.
6. Explain the concept of the deadlock occurrence, avoidance and implementation of deadlock free condition.

Unit I **06 Hours**

Computer System Overview: Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System. - Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

Unit II **06 Hours**

Process Management: Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Preemptive, Non preemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.

Unit III **06 Hours**

Memory Management: Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.

Unit IV **06 Hours**

Inter Process Communication: Basic Concepts of Concurrency, Cooperating process, Advantage of Cooperating process, Bounded- Buffer - Shared-Memory Solution, Inter-process Communication (IPC), Basic Concepts of Inter-process Communication and Synchronization.

Unit V **06 Hours**

File Systems and I/O Systems : Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface – File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

Unit VI **06 Hours**

Concurrency control: Concurrency: Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, pipes, Message Passing, signals, Monitors, Classical Problems of Synchronization: Readers-Writers, Producer Consumer, and Dining Philosopher problem. Deadlock: Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls like signal, kill.

Textbooks

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts. Sixth edition. Addison-Wesley (2003).
2. Modern Operating Systems -By Andrew S. Tanenbaum (PHI).
3. Operating Systems 5th Edition, William Stallings, Pearson Education India.
4. Peterson and Silberschatz, Modern Operating Systems.
5. Harvey M. Deitel, An introduction to operating systems. Addison-Wesley.

List of Internal Assignment will be framed by respective Course Coordinator.

Reference Books

1. A.M. Lister, Fundamentals of Operating Systems. Macmillan (1979).
2 Andrew Tanenbaum & Albert Woodhull, Operating Systems: Design and Implementation. Prentice-Hall.

List of Laboratory Exercise

1. Basic Linux Commands and Overview.
2. Write Shell Script for finding the global complete path for any file.
3. Write Shell Script to broadcast a message to a specified user or a group of users logged on any terminal.
4. Write Shell Script to copy the file system from two directories to a new directory in such a way that only the latest file is copied in case there are common files in both the directories.
5. Write Shell Script to compare identically named files in two different directories and if they are same, copy one of them in a third directory.
6. Write Shell Script to delete zero sized files from a given directory (and all its sub-directories).
7. Implementation of FCFS (First Come First Serve) CPU Scheduling.
8. Implementation of SJF (Shortest Job First) CPU Scheduling.
9. Implementation of FIFO Replacement Algorithm.
10. Implementation of Optimal Page Replacement Algorithm.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Design of Intranet mail system project.
2. Design pf First-fit, worst-fit and best-fit for given allocation memory requirements

3. Simulation of the behavior of the multiprogramming operating system and use CPU scheduler, and CPU Execution.
4. Design the FCFS, SSTF, and SCAN disk-scheduling algorithms to simulate a simple disk drive, which has a specified number of logical blocks numbered from 0 onwards.
5. A Java simulator program to analyze the dependency of Page Faults on the Page Frames for incoming page requests.
6. CPU Scheduling Algorithm to calculate Throughput, Utilization, Turn Around time, Waiting Time. Gantt chart displayed for all n processes.
7. To simulate Round Robin algorithm.
8. A multi-threaded TCP server application, which allows multiple users to be registered and login.
9. Write a simple manual describing how to use the shell. The manual should contain enough detail for a beginner to UNIX to use it.
10. To simulate the dispatcher for allocating the process to CPU.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Information Technology Laboratory II

TEACHING SCHEME		EXAMINATION SCHEME		CREDIT SCHEME	
Practical:	**2 Hours/Week**	**Term Work:**	**25 Marks**	**Theory**	**Credits**
		Practical:	**50 Marks**		
Tutorial:	**1 Hour/Week**			**Practical:**	**1**
				Tutorial	**1**
Total	**3 Hour/Week**		**75 Marks**		**2**

Course Objectives:

1) Understand web environment for building the application.
2) Implement web application.
3) Implement Servlet.
4) Implement Java Messaging Services.
5) Implement Java Mail API.

Prerequisite:

1) Core Java 2) Scripting languages.

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the lifecycle of web application.
2. Implement session management using servlet.
3. Apply standard and custom tags of JSP.
4. Design competitive web application which will work real web environment.
5. Implement Java Messaging Services.
6. Apply Java Mail API.

Unit I **06 Hours**

Introduction to Servlet: Web Application Basics, Architecture and challenges of Web, application. Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml).

Unit II **06 Hours**

Session Management and Servlet Chaining: Handling Request and Response Initializing a Servlet, Accessing Database, Servlet Chaining, Session Tracking & Management, dealing with cookies, Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, sharing information using scope object Controlling concurrent access User Authentication, Filtering Request and Response, Programming Filter, Filter Mapping, Servlet Listeners.

Unit III **06 Hours**

Java Server Pages: Standard Tags: Basic JSP Architecture, Life Cycle of JSP (Translation, compilation), JSP Tags and Expressions, Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects.

Unit IV **06 Hours**

Java Server Pages: Custom Tags: Tag Libraries, JSP Expression Language (EL), Using Custom Tag, JSP Capabilities Exception Handling Session Management Directives JSP with Java. Introduction to struts.

Unit V **06 Hours**

Java Messaging Services: JMS Architecture, Point-to-Point Messaging Domain, Publisher/Subscriber, Messaging Domain, JMS API, JMS Queue.

Unit VI **06 Hours**

Java Mail API: SMTP, POP, IMAP, MIME, NNTP, sending mail, receiving mail, mail with attachment, forward email, delete email.

Textbooks

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book: HTML, JavaScript, PHP, Java, Jsp, XML and Ajax, Black Book Paperback – 1 January 2009, Kogent Learning Solutions Inc.
2. Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development, Packt Publication, Elder Moraes.
3. Headfirst Servlets and JSP: Passing the Sun Certified Web Component Developer Exam 2nd Edition, Bryan Basham, Kathy Sierra, Bert Bates.

Reference Books

1. Beginning Java EE 7, Appress Publication, Antonio Goncalves.
2. Java EE 7 Essentials: Enterprise Developer Handbook 1st Edition, Headfirst Publication, Arun Gupta.
3. J2EE: The complete Reference Paperback, Jim Keogh.

List of Laboratory Exercise:

1. Maintain record of students and perform CRUD functionality.
2. Write a program to redirect a request using a dynamic approach.
3. Write a program to pass the data using session.
4. Write a servlet to remove spam.
5. Maintain the record of faculty member using jsp action tags and directives.
6. Design a tag to perform the necessary editing in a given report.
7. Design reusable components of the form using taglib.
8. Implement sending and receiving mail utility using Java Mail API.
9. Implement Java Message Service queue.
10. Understand working of framework – struts- case study.

Project Based Learning Assignments

Note:- *Students in a group of 3 to 4 shall complete any one project from the following list

1. Implement assignment and project submission system.
2. Implement a program to issue Leaving Certificate, Transcripts and Bonafede certificate to student
3. Implement a program to assign problem statement for practical examination in secured environment.
4. Design a template for NBA report.
5. Design an application for Feedback Management System.
6. Design application to maintain track of research paper with indexing per year.
7. Create message and mail communication of given message.
8. Design a post customized as per social media platform.
9. Design an interface to collect job opportunities and disseminate to eligible student
10. Design a project to track details of Industrial Training.

B.Tech.

(Information Technology)

Semester-V

HUMAN COMPUTER INTERACTION

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	04	University Examination	60		
Practical:	-	Internal Assessment	40	Lecture	04
		Term Work	--	Practical	-
		Practical / Oral	--		
Total	04	Total	100	Total	04

Course Objective:

To gain theoretical knowledge and practical experience in the fundamental aspects of designing and implementing user interfaces.

Prerequisite:

Basic computer knowledge

Basic HTML knowledge

Basic Software Engineering knowledge

Course Outcomes: On completion of the course, students will have the ability to:

1. To learn foundations of Human Computer Interaction.
2. To understand Graphical User Interface.
3. To identify Design Process.
4. To learn Screen Designing.
5. To understand Models and Theories of HCI.
6. To learn Web Interface Designing.

Unit I INTRODUCTION	**08 Hours**
What is HCI, History of HCI, Computer Devices, Difference between Humans and Computers, User Interface, Benefits of User Interface, Good Design, Benefits of Good Design	
Unit II THE GRAPHICAL USER INTERFACE	**08 Hours**
Popularity of Graphics, The concept of Direct Manipulation, Graphical System,Characteristics,Web User-Interface Popularity, Characteristics, Principles of User Interface. Design Thinking. Stages of Design Thinking.	
Unit III DESIGN PROCESS	**08 Hours**
Human Interaction with Computers, Models of Interaction: Frameworks, Ergonomics, Styles, Elements, Interactivity. Human Characteristics, Human Considerations. Design rules: principles, standards, guidelines, rules. Golden rules.	
Unit IV SCREEN DESIGNING	**08 Hours**
Design goals-Screen planning and purpose, organizing screen elements, Ordering of screen data and content-screen navigation and flow, Information retrieval on web-statistical graphics	
Unit V MODELS AND THEORIES	**08 Hours**
HCI Models, Cognitive models, Communication and collaboration models, Hypertext, Multimedia and World Wide Web.	

Unit VI WEB INTERFACE DESIGN	08 Hours
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays andVirtual Pages, Process Flow – Case Studies, Game Designing, Application designing.	

Textbooks
1. Ben Shneidermann, “Designing the user interface”,Third edition, Pearson Education Asia
2. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, ―Human Computer Interaction‖, 3rd Edition, Pearson Education, 2004
Reference Books
1. Wilbert O Galitz ,”The essential guide to user interface design”, ,Wiley Drdeam Tech
2. Alan Dix, janetFincay, GreGoryd, Abowd, Russell Bealg, “Human Computer Interaction”, Pearson Education
List of Assignments
1. Describe User interface with it’s benefits.
2. Enlist and explain characteristics of Graphical User Interface.
3. State design rules in Design process.
4. How to design screen with proper planning? Explain.
5. Explain HCI models.
6. Describe and design web interface.
Project Based Learning
1. Design E-Shopping system
2. Design E-government service system
3. Design E-Hotel reservation system.
4. Design E-Banking System
5. Design Mechanism for an Augmented Reality Interface
6. Design Mechanism for Virtual Reality Interface

Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture	04	**University Examination**	60	**Lecture**	04
Practical:	02	**Continuous Assessment**	40		
		Termwork	25	**Practical**	01
		Oral	25		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Overview	
The course provides an overview of the fundamentals of Machine Learning. The basic components needed to design a model to solve the problem, are covered.	
Prerequisite:	
Fundamental understanding of statistics.	
Introduction to Python.	
Course Outcomes: On completion of the course, students will have the ability to:	
1. Understand the fundamentals of probability and statistics.	
2. Implement the clustering using unsupervised learning.	
3. Apply the classification techniques.	
4. Apply the regression techniques.	
5. Apply the regularization for balancing the bias and variance.	
6. Apply the model for decision-making.	
Unit I	**08 Hours**
Introduction to Artificial Intelligence & Machine Learning	
Introduction to AI, ML, AI- Scope, Application, Environment, Probability Density Function, Normal Distribution, Standard Deviation, Regression Coefficient. Hypothesis Testing, Loss Functions. Introduction to supervised and unsupervised learning.	
Unit II	**08 Hours**
Unsupervised Learning	
Clustering, Feature Extraction, Spurious Correlation, K-Means clustering, KNN, Dimensionality Reduction, Principal Component Analysis, Multidimensional Scaling.	
Unit III	**08 Hours**
Classification Algorithms	
Classification Algorithms- Naïve Bayes, Logistic Regression, Support Vector Machine, Decision Tree, **Result validation of Classification** – Precision, Recall, F-Measure, MAP, R-Curve.	
Unit IV	**08 Hours**
Regression algorithm	
Linear Regression, Lasso Regression, Ridge Regression, Random Forest **Regression Loss Function** – Mean Average Error, Mean Standard Error LogCosh, Huber, Quantile Loss	
Unit V	**08 Hours**
Regularization and Gradient Descent	
Cost functions, regularization, feature selection, hyper-parameters, and more complex statistical optimization algorithms like Gradient Descent and its.	
Unit VI	**08 Hours**

Bagging, Boosting, and stacking	
Bagging Advanced supervised learning algorithms -Combining classification and regression algorithm, Trade-off between bias and variance, bootstrapping, and aggregating (also known as "Bagging") to reduce variance. Random Forest algorithm, reduction in a correlation. Boosting and Stacking Advanced supervised learning algorithms –Boosting algorithm to reduce variance and bias. Design the case-specific model.	
Textbooks	

1 Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition, Andreas Müller, Sarah Guido
2 Data Science from Scratch: First Principles with Python 2nd Edition, Joel Grus
3 Machine Learning in Action, Manning Publication, Peter Harrington
4 Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media Publication, First Edition, AurelienGeron.
5 Python Machine Learning, Packt Publication, Sebastian Raschka, Vahid Mirjalili.
Reference Books
1 Pattern Recognition and Machine Learning, Author: Christopher M. Bishop, Springer Publication.
2 Machine Learning for Hackers: Case Studies and Algorithms to Get You Started Authors: Drew Conway & John Myles, O'Reilly Media Publication.
List of Assignments
1. Identify the association between dependent and independent variables.
2. Apply the clustering techniques using unsupervised learning.
3. Apply dimensionality reduction using PCA
4. Apply Naïve Bayes classification algorithms.
5. Apply the KNN algorithm for the classification.
6. Implement Linear Regression Algorithm.
7. Implement the SVM Algorithm for Regression.
8. Apply regularization for avoiding overfitting.
9. Calculate the Gradient descent for the given algorithm.
10. Design a model for applying a combination of the algorithms.
Project Based Learning
1. Compare The effect of features over the output for the standard dataset (like Dataset at Kaggle).
2. Calculate the distribution, normalization, and outlies to maximize the effect of the training.
3. Compare the classification of the standard algorithm on the common dataset and check the consistency for the different datasets.
4. Apply Bagging for combining the effect of the various algorithm.
5. Implement the classification techniques for detecting spam content.
6. Apply the pre-processing techniques to explore insights of the Dataset.
7. Apply the regression approaches to predict the behaviour of a given stock.
8. Implement all optimization algorithms for any classification or regression algorithm.
9. Design a model to accurately classify the given video on YouTube based on the Metadata.
10. Design the model resilient to the effect of the number of Epochs.

A group of 3-4 students shall complete any one of the projects listed above.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

COMPUTER ORGANIZATION AND ARCHITECTURE

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03	University Examination	60	Lecture	03
Tutorial:	01	Internal Assessment	40	Tutorial	01
		Term Work	--	Practical /Oral	--
		Practical/Oral	--		
Total	04	Total	100	Total	04

Course Objective:

1. To learn the low-level design and working of computer/processor
2. To learn parallel computing architectures and platforms

Prerequisite:

Digital Electronics, Microprocessor Architecture, Structured Programming

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the recent trends in Computer Architecture
2. Understand various hardware design tools and platforms with case studies
3. Understand the design techniques of control unit of a processor
4. Understand the basic design of a processor and memory technologies
5. Understand different multiprocessor architectures
6. Understand different parallel processing architectures and concepts underlying.

Unit	Hours
Unit I – Recent Advances	**04 Hours**
Technology trends in Computer Architecture, Performance Metrics, Improving performance, Moore's law, Cluster Computing, Cloud Computing, Quantum Computers, Hardware support for Operating Systems, Hardware Transactional Memory with OS support (HTMOS), GPU vs TPU	
Unit II – Digital Logic Design, Simulation and Debugging with HDLs	**10 Hours**
Case Study of Hardware Description Languages: A) VHDL B) Verilog C) SystemVerilog D) SystemC Case Studies of HDL Simulation and Debugging tools like ModelSim, Xilinx etc.	
Unit III – Control Unit Design	**08 Hours**
Hardwired Control Unit, Micro-programmed Control Unit design, Recent Trends	
Unit IV – Processor and Memory Design	**08 Hours**
Basic design of a Processor, Control path, Data path Cache memory: Working principle, Mapping functions, Replacement algorithms, Cache coherence, Examples, Atomic Memory, UFFO storage, UltraRAM, 3D NAND, Intel Optane memory, Recent Trends	

Unit V – Multiprocessor Architectures	**06 Hours**
Shared memory – Distributed Memory multiprocessor architectures, Message-Passing Multiprocessors, Dataflow machine architecture Supercomputer architecture, Recent Trends	
Unit VI – Parallel Computing and Programming	**12 Hours**
Pipelining, Data and Control Hazards, Stalls, RISC/Pentium-4 Pipeline, Complex Pipelines, Out-of-order Execution, Dynamic Scheduling, Tomasulo Algorithm, Register renaming, Register Scoreboarding, Basic compiler techniques for exposing instruction-level parallelism, Vector processors, Array processors, VLIW architecture, Multithreaded architecture, GPU Computing architecture, Nvidia Maxwell, CUDA, Writing a simple parallel algorithm, Parallel Programming languages, OpenMP, MPI, Pthreads, Amdahl's Law, Gustafson-Barsis's Law, Karp-Flatt Metric, isoefficiency, Recent Trends	

Textbooks

1. Computer Organization and Architecture, William Stallings, Prentice Hall
2. Computer Organization and Embedded Systems, Hamacher&Zaky, McGraw Hill
3. Advanced Computer Architecture, Kai Hwang, Tata McGraw Hill
4. Fundamentals of Logic Design, Charles Roth & Larry Kinney, Cengage Learning
5. The Verilog: Hardware Description Language, Thomas &Moorby, Extra Materials
6. Advanced Computer Architecture and Parallel Processing, Rewini& Barr, Wiley Publications

Reference Books

3. Computer Organization and Design: The Software/Hardware Interface, David Patterson, Elsevier
4. Fundamentals and Standards in Hardware Description Languages, Jean Mermet, Springer Science
5. Parallel Computers: Architecture and Programming, V.Rajaraman&C.Murthy, Prentice Hall India
6. Introduction to Parallel Computing: From Algorithms to Programming, Roman Trobec, Springer

Project Based Learning

1. Case studies in recent trends in Computer Architecture
2. Case studies in Hardware Description Languages and Simulators
3. Recent Trends in Control Unit Design
4. Case studies in recent Memory Technologies
5. Case studies in recent trends in Multiprocessor Architectures
6. Case studies in recent trends in Parallel Computing

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

ADVANCED DATABASE SYSTEMS

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	03	University Examination	60	Lecture	03
		Internal Assessment	40		
Practical	02	Term Work	25	Practical	01
		Practical	25		
Total	05	Total	150	Total	04

Course Objective:

1. Exploring the working of large scale and emerging database management systems
2. Study and analysis of query processing and query optimization in distributed and parallel databases

Prerequisite:

Student should be well aware of database management systems, analysis of data structure and algorithms with sufficient programming experience

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the working of distributed database management system
2. Understand the processing and optimization of distributed queries
3. Understand the architecture and query processing in parallel database management system
4. Understand the concepts of advanced transaction management
5. Understand the concepts of different information retrieval systems
6. Understand the structure and significance of Big Data and NoSQL Databases

Unit	Hours
Unit I - Distributed databases: Architecture and Design	**06 Hours**
Distributed data processing,What is a DDBS; Advantages and disadvantages of DDBS, Problem areas Distributed DBMS Architecture: Transparencies in a distributed DBMS,Distributed DBMS architecture, Global directory issues, Distributed Database Design: Alternative design methodologies and strategies, Distributed design issues, Types and role of Fragmentation, Types and role of replication, Data allocation	
Unit II - Distributed query processing and optimization	**06 Hours**
Distributed Query processing: Problem of query processing, Distributed query, Query decomposition, Distributed Query Processing Methodology, translation global queries to fragment queries Distributed Optimization: Objectives of query optimization, Factors governing query optimization, Ordering of fragment queries, optimization of join operation, Load balancing, Distributed query optimization algorithms	
Unit III - Parallel Database Management System	**06 Hours**
Introduction: Types of parallelism in database systems, Parallel Query Processing, multiprocessor architectures, parallel relational operators, parallelism in main-memory DBMS, parallel handling of integrity constraints, Integrated I/O parallelism Parallel Query Processing and Optimization: Inter-query parallelism, intra-query parallelism, intra-operation parallelism, inter-operation parallelism, objectives of parallel query optimization, parallel query optimization, load balancing, parallelism in join queries, testing the quality of query optimization	

Unit IV – Advanced concepts in Transaction Management	**06 Hours**
Transaction Management: ACID properties, pessimistic locking, optimistic locking, flat transactions, nested transactions, deadlock detection and management and their algorithms, Recovery Methods Concurrency control and Reliability in Distributed Dtabases: Concurrency control in centralized database systems vs Concurrency control in DDBSs, Distributed concurrency control algorithms, Deadlock management, Reliability issues in DDBSs; Types of failures, Reliability techniques, Commit protocols, Recovery protocol	
Unit V –Advanced Querying and Information Retrieval	**06 Hours**
Decision Support Systems, Data Analysis and OLAP, Data Mining, Data Warehousing, Information Retrieval Systems Database Tuning and Performance: Benchmarking, TPC benchmarks, object oriented benchmarks, TP Monitors, TPC and Wisconsin benchmarks, performance measurement, and performance tuning	
Unit VI - Big Data and NoSQL Databases	**06 Hours**
What is NoSQL? Why NoSQL? History of NoSQL Databases, Features of NoSQL, Types of NoSQL Databases, Query Mechanism tools for NoSQL, CAP Theorem Big Data - Introduction, Types, Characteristics, Testing, Examples, Introduction to Hadoop, MongoDB- Introduction, Architecture, Features, Data Modelling in MongoDB	

Textbooks

1. Database System Concepts, Seventh Edition, AviSilberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. Data Warehousing: Concepts, Techniques, Products and Applications, 3rd Edition, C.S.R. Prabhu, PHI Learning Pvt. Ltd.
3. Stefano *Ceri and* Giuseppe *Pelagatti*, “Distributed databases principles and systems”, Tata McGraw Hill

Reference Books

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. & Fowler, Wiley Publications
2. M. Tamer Özsu and Patrick Valduriez, “Principles of Distributed Database Systems”, Springer Science & Business Media, 3rd edition

List of Assignments

1. Compare query processing in RDBMS with DDBMS
2. Analysis of parallel sort and parallel join operations
3. Analysis of Lucene web search engine
4. Comparison of different NoSQL databases types
5. Analyse comprehensive aspects of factors that drive the MongoDB vs SQL decision
6. Study of Hadoop as a big data tool

List of Laboratory Exercises

1. Installation of MongoDB
2. MongoDB Create Database with primary key
3. MongoDB Query Document using find(), Sort(), Limit() method

4. MongoDB Count(), Remove() , Update(), Document() Functions
5. MongoDB administration functions
6. Installation of Cassandra environment
7. Cassandra - Shell Commands
8. Cassandra Table Operations
9. Cassandra Keyspace Operations
10. Cassandra CURD Operations
Project Based Learning 1. MongoDB Security, Monitoring & Backup
2. MongoDB Indexing
3. Creating User & add Role in MongoDB
4. Streaming Twitter Data
5. MongoDB Replication
6. Analysis of FB data

Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

MOBILE APPLICATION DEVELOPMENT

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Lecture**	**04**
Practical	**02**	**Internal Assessment**	**40**		
		Term Work	**25**	**Practical**	**01**
		Practical	**25**		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Objective:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experience-

1. To help students to gain a basic understanding of Android application development.
2. To create simple Android Applications.
3. To understand how to publish, deploy and monetize Mobile Applications.

Prerequisite:

1. Java or object-oriented programming experience.
2. Application Development with JavaScript.
3. Application Development with cross platform.
4. Knowledge about Impressive User Interface features.

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the features and architectures of mobile applications.
2. Apply essential Android Programming concepts.
3. Design user interface development using Android Screen Elements and Layouts
4. Develop Android applications related to mobile related server-less database like SQLite.
5. Create ISO Mobile application using Swfit and Xcode.
6. Deploy and maintain the Android Applications.

Unit I	**08 Hours**
Introduction to Mobile Application Development: Introduction to Mobile Applications and Device Platforms, The Mobile Application Development Life Cycle, Mobile application developing frameworks and Tools, The Mobile Application Front-End, The Mobile Application Back-End. Key Mobile Application Services, Mobile OS Architectures-Kernel Structure-Comparing and Contrasting architectures of Android, iOS and Windows.	
Unit II	**08 Hours**
Android Development Framework: Android OS design and Features, Android development framework, Android SDK features, best practices in Android programming, Types Android tools, Installing and running applications on Android Studio. Android application components: Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc., Android Application Lifecycle: Activities, Activity lifecycle, activity states, monitoring state changes, Services, Intents, Receiving and Broadcasting Intents, Permissions.	
Unit III	**08 Hours**
Android User Interface Components and Layouts: Android SDK, Android virtual Devices (AVDs), Emulators, Dalvik Virtual Machines, Difference between JVM and DVM, Android installation and	

configuration steps. Creating Adaptive and responsive user interfaces, Introduction to Android views and layouts, Editable and non-editable Text Views, Retrieving data from users, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, View versus View Groups. **Layouts** – Build in Layout Classes such as Linear, Relative, Grid and Table Layouts, Fragments Fragment Life Cycle, Testing the user interface.	
Unit IV	**08 Hours**
Activity and Multimedia with Databases: Crating Private and Shard Preferences, Adding, Deleting and Updating Preferences, Working with Files and Directories, Creating SQlite Database, Storing, Updating and Deleting Database Records. Closing and Deleting SQLite Database. Study Andrios's Content Providers, Modify Content Providing Data Improving Applications using Content writing.	
Unit V	**08 Hours**
iOS Fundamental: Introduction to iOS, iOS Architecture, Frameworks, Application Life cycle, Features. Concepts of Swift, Features of Xcode, Navigator, Editor Utility, Tools. **iOS Application start up**: Application Templates, Concept of Storyboard, Hello World Application, Features and working approaches, Debugging Database, Preference, SQlite webservices and RESTful Web Services.	
Unit VI	**08 Hours**
Publishing Android Application: Performance Improvement of Android Application: Performance Parameters, Profiling Tools, Rendering and Layout, Garbage Collection and Memory Leaks, Best Practices, Testing Android applications. Preparing for Publishing: Signing, Versioning and Publishing the Android Application to the Android Market.	

Textbooks

1. Android programming for Begineers, Horan,John, Packet Publication,2015, ISBN:978-1-78588-326-2
2. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
3. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
4. J. F. DiMarzio, "Android: A Programmers Guide", McGraw Hill Education (India) Private Limited.1st Edition,2008.
5. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
6. Unlocking Android Developer's Guide By Frank Ableson and Charlie Collins and RobiSen, Manning Publication Co.

Reference Books

1. Valentino Lee, Heather Schneider, Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, April 2004, ISBN-13: 978-0131172630
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
3. Beginning Android, Mark L Murphy, Wiley India Pvt Ltd, Dreamtech Press 2009.

4. Android Application Development All-in-One For Dummies, Barry Burd, For Dummies, 2015.
5. Android Programming: The Big Nerd Ranch Guide), by Bill Phillips, Chris Stewart, Kristin Marsicano, Big Nerd Ranch Guides Publishing, 2017.
6. Head First Android Development 2e: A Brain-Friendly Guide, Dawn Griffiths , David Griffiths., O'Reilly Publishing ,2017.
7. Professional Android, by Reto Meier, Ian Lake, Wrox Publishing, 2018.
8. Beginner's Guide to IOS 11 App Development Using Swift 4: Xcode, Swift and App Design Fundamentals, by SerhanYamacli, Createspace Independent Publication , 2018.
9. Android Wireless Application Development By Lauren Darcey and Shane Conder, Pearson Education, 2nd Edition.

List of Assignments

1. Explain the basic terms related to Android system.
2. Identify the tools and software required for developing an Android application.
3. Describe the steps to configure the given Android Development environment.
4. Describe the user interface for given Android application.
5. Write the query to perform given operation.
6. Describe Application life cycle in detail with an example.

List of Laboratory Exercises

1. Create "First Android Application" that will display "**BVDUCOEP-PUNE**" in the middle of the screen in the green color with White background.
2. Develop an application that uses GUI components, Font and Colours.
3. Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated, login button should remain disabled.
4. Developing of an application for data persistence.
5. Create an application that will change color of the screen, based on selected options from the menu.
6. Create an application that will display toast (Message) on specific interval of Time.
7. Create a background application that will open activity on specific Time.
8. Write an Android application for calculator.
9. Implement an application that creates an alert upon receiving a message.
10. Create simple app for Iso OS phone.

Project Based Learning

1. Create sample application with Check username and password only. On successful login, go to the next screen and on failing login, alert user using Toast. Also pass username to next screen.
2. Write an Android application to convert into different currencies for example, Rupees to dollar.
3. Create and Login application as above. On successful login, open browser with any URL.
4. Developing of simple game.
5. Write an application to mark the daily route of travel in map.
6. Write an android application to count library overdue.
7. Create the MP3 player like application with service.
8. Develop one Application, Which Contains Specific User Interface and design Interface.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

INFORMATION TECHNOLOGY LABORATORY-III

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Practical	**02**	**Term Work**	**25 Marks**	**Practical**	**01**
Tutorial	**01**	**Practical**	**25 Marks**	**Tutorial**	**01**
Total	**03**	**Total**	**50 Marks**	**Total**	**02**

Course Objective:

To acquire programming skills in core Python to develop various applications.

Prerequisite:

Understanding of basic programming knowledge and oops concepts.

Course Outcomes: On completion of the course, students will have the ability to:

1. To acquire programming skills in core Python.
2. To implement Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python
4. To develop the ability to write database applications in Python
5. Elaborate exception handling in various applications.
6. Demonstrate regular expressions in Data mining applications.

Unit	Hours
Unit I : Introduction to Python	**06 Hours**
Install Python and Environment Setup • First Python Program • Python Identifiers, Keywords and Indentation • Comments and document interlude in Python • Command line arguments • Getting User Input • Python Data Types • What are variables? • Python Core objects and Functions • Number and Maths	
Unit II : List, Ranges & Tuples in Python	**06 Hours**
Introduction • Lists in Python • More about Lists • Understanding Iterators • Generators, Comprehensions and Lambda Expressions: - Introduction, Generators and Yield, Next and Ranges • Understanding and using Ranges • More About Ranges • Ordered Sets with tuples	
Unit III :Python Dictionaries and Sets	**06 Hours**
Introduction to the section • Python Dictionaries • More on Dictionaries • Sets • Python Sets Examples	
Unit IV :Input and Output in Python	**06 Hours**
• Reading and writing text files • writing Text Files • Appending to Files and Challenge • Writing Binary Files Manually • Using Pickle to Write Binary Files	
Unit V : Exceptions	**06 Hours**
• Errors in Python • Compile-Time Errors • Runtime Errors • Logical Errors • What is Exception? • Handling an exception • try….except…else • try-finally clause • Argument of an Exception • Python Standard Exceptions • Raising an exceptions • User-Defined Exceptions	

Unit VI : Python Regular Expressions	**06 Hours**
What are regular expressions? • The match Function • The search Function • Matching vs searching • Search and Replace • Extended Regular Expressions • Wildcard	

Textbooks

Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.

Reference Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010

List of Laboratory Exercises

1. Write a program to implement Arithmetic Operations
2. Write a program to implement Built-in Functions
3. Write a program to implement Loops
4. Write a program to implement Data Types
5. Write a program to implement Strings
6. Write a program to implement Classes and Objects
7. Write a program to implement Built-in Modules
8. Write a program to implement Constructors and Inheritance
9. Write a program to implement File Operators

Project Based Learning

1. Guess the Number Game
2. Rock, paper, scissors
3. Hangman
4. Countdown Timer
5. Password Generator
6. QR code encoder / decoder
7. Tic-Tac-Toe
8. Binary Search
9. Minesweeper
10. Sudoku Solver
11. Photo manipulation in Python
12. Markov Chain Text Composer
13. Pong
14. Snake
15. Online Multiplayer Game
16. Web Scraping Program
17. Weather Program
18. Code a Discord Bot with Python - Host for Free in the Cloud
19. Space invaders game

Syllabus for Unit Tests:

NA

B.Tech.

(Information Technology)

Semester-VI

CLOUD COMPUTING

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Lecture	04
		Internal Assessment	40		
Practical	02	Term Work	25	Practical	01
		Oral	25		
Total	06	Total	150	Total	05

Course Objective:

This course aims at giving students a knowledge of Cloud computing along with its applications in terms of the following

- Understanding the systems, protocols, and mechanisms to support cloud computing.
- Understanding the architecture of cloud computing
- Discuss Cloud Platforms in Industry
- Understanding cloud computing applications.
- Discuss Cloud Security and various challenges

Prerequisite:

- Computer Networks
- Operating System-I
- Information Security

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the Concept of Cloud Computing
2. Understand the Virtualization Techniques and its need.
3. Analyse various types of clouds and its Architecture.
4. Illustrate the fundamental concepts of cloud computing and understand their use in different scientific applications.
5. Analyse and understanding of advanced concepts in Cloud Computing.
6. Understanding of cloud security techniques.

Unit I	**08 Hours**
Introduction: Definition, Historical Developments, Computing Platforms and Technologies. Building cloud computing environments, Principles of Parallel and Distributed Computing: Parallel versus Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, and Technologies for Distributed Computing.	
Unit II	**08 Hours**
Virtualization: Characteristics, Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.	
Unit III	**08 Hours**
Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Economics of Clouds, Open Challenges, Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, And Microsoft Azure.	

Unit IV	**08 Hours**
Cloud Applications: Scientific Applications in – Healthcare, Biology, Geo-Science; Business Applications in– CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	
Unit V	**08 Hours**
Advanced Topics in Cloud Computing: Energy Efficiency in Clouds, Market Based Management of Clouds, Federated Clouds / InterCloud, Third Party Cloud Services.	
Unit VI	**08 Hours**
Understanding Cloud Security: Securing the Cloud, The security boundary, Security service boundary, Security mapping, Securing Data, Brokered cloud storage access, Storage location and tenancy, Encryption, Auditing and compliance, Establishing Identity and Presence, Identity protocol standards	

Textbooks

1. Mastering Cloud Computing, Buyya R, Vecchiola C, Selvi S T, McGraw Hill Education (India), 2013.
2. Cloud Computing Bible, Barrie Sosinsky ,Wiley Publishing Inc. 2011
3. Cloud Computing from Beginning to End by Ray J Rafaels
4. Cloud Computing for Dummies by Judith S. Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper

Reference Books

1. Buyya R, Broberg J, Goscinski A, "Cloud Computing - Principles and Paradigms", Wiley, 2011
2. Cloud Computing: Concepts, Technology & Architecture by Zaigham Mahmood, Ricardo Puttini, Thomas Erl

List of Assignments

- It consist of 10-12 tutorials based on above topics& case study on cloud service providers like AMAZON EC2, salesforce.com etc.

Project Based Learning

Developing application on Google AppEngine

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

SOFTWARE TESTING AND QUALITY ASSURANCE					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**		
		Internal Assessment	**40**	**Lecture**	**04**
Practical	**02**	**Term Work**	**25**	**Practical**	**01**
		Practical	**50**		
Total	**06**	**Total**	**175**	**Total**	**05**

Course Objective:

Study fundamental concepts of software testing and its application in various scenarios with the help different testing strategies, methods and tools.

Prerequisite:

Knowledge of Software Engineering, Software Project Management

Course Outcomes: On completion of the course, students will have the ability to:

1. Provide knowledge about fundamentals of software testing
2. Design specific and measurable test cases to ensure coverage
3. Apply black box testing techniques
4. Know various levels of testing
5. Apply automation tools for testing process
6. Understand notion of quality through software quality models

Unit	Hours
Unit I Software Testing – Concepts	**08 Hours**
Quality revolution, software quality, testing as a process, purpose of testing, principles of testing, error, fault, defect and failure, defect life cycle, notion of software reliability, verification and validation, white box and black box testing, static testing and dynamic testing. Test plan, test management, test execution and reporting, test team organization and management.	
Unit II White Box Testing Techniques	**08 Hours**
Need of white box testing, static white testing techniques: peer review, inspections, code walkthrough, formal technical reviews, test adequacy criteria Structural testing – code coverage testing, code complexity testing, mutation testing, debugging, design of test cases, instrumentation and tool support.	
Unit III Black Box Testing Techniques	**08 Hours**
Need of black box testing, static black box testing, requirement analysis, test case design criteria, requirement based testing, positive and negative testing, boundary value analysis, decision tables, equivalence partitioning, state based or graph based testing, cause effect graph based, error guessing, documentation testing, domain testing, design of test cases, instrumentation and tool support.	
Unit IV Testing Techniques	**08 Hours**
Levels of testing: unit testing, integration testing, system testing, acceptance testing, usability and accessibility testing, configuration testing, compatibility testing, GUI testing, regression testing, web-based system testing, non-functional testing techniques.	

Unit V Software Test Automation	**08 Hours**
Manual testing, test automation, terms used in automation, Process Model for Automation, automated testing tools and case studies, factors for choosing a particular tool, an overview for the major functional testing tools, overview of test management and bug tracking tools.	
Unit VI Software Quality Assurance	**08 Hours**
Software quality, quality attribute, quality assurance, quality control and assurance, methods of quality management, cost of quality, quality management and project management, software quality metrics-TQM, Six Sigma, ISO, SQA Model.	

Textbooks

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing – Principles and Practices, Pearson Education, 2011.

Reference Books

1. Ron Patton, Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007. AU Library.com
2. Dorothy Graham, Rex Black, Erik Van Veenendaal, "Foundations of Software Testing, Fourth Edition, Cenage publication
3. Kshirasagara Naik, Priyadarshi Tripathy: Software Testing and Quality Assurance, Wiley India 2012
4. M.G. Limaye: Software Testing-Principles, Techniques and Tools – McGraw Hill, 2009

List of Laboratory Exercises

1. To Prepare Test Plan for the implemented system under test. The Test Plan shall be based on System Requirement Specification. The Test plan consists of following issues.
   a. Purpose of the test. /Location and schedule of the test.
   b. Test descriptions. /Pass and Fail Criteria.
2. Take any system (e.g. ATM system) and study its system specifications and write test cases
3. To perform Unit testing especially indicating the traced Independent data paths, Control paths and Error handling paths. Prepare control flow graphs for the unit under test. Compute the Cyclomatic complexity of the unit.
4. To perform Data Flow testing for the Program Segments by identifying the Definition-Use chain and type of data flow anomaly.
5. Design test cases for testing of any E-commerce web site.
6. To perform Black-Box Testing for all the units contained in the architectural segments using Equivalence Partitioning, Boundary Value Analysis and Orthogonal Array testing methods.
7. Creating a test report using BugZilla tool.
8. To perform Web Based Testing for Web Application incorporating Selenium testing tool.

Project Based Learning

Students shall construct a test plan for their mini projects and write test cases for testing of the same. Student shall test their project functionality using any appropriate automation testing tool.

Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

DATA WAREHOUSING AND DATA MINING					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture	**03**	**University Examination**	**60**	**Lecture**	**03**
Tutorial	**01**	**Internal Assessment**	**40**	**Tutorial**	**01**
		Total	**100**	**Total**	**04**

Course Objective:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques

Prerequisite:

Basic concepts of DBMS

Course Outcomes: On completion of the course, students will have the ability to:

1. Design a Data warehouse system and perform business analysis with OLAP tools.
2. Apply suitable pre-processing and visualization techniques for data analysis
3. Apply frequent pattern and association rule mining techniques for data analysis
4. Apply appropriate classification techniques for data analysis
5. Apply appropriate clustering techniques for data analysis
6. Understand WEKA tool.

Unit I Data Warehousing, Business Analysis And On-Line Analytical Processing (OLAP)	**08 Hours**
Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.	
Unit II Data Mining – Introduction	**08 Hours**
Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.	
Unit III Data Mining - Frequent Pattern Analysis	**08 Hours**
Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns	
Unit IV CLASSIFICATION	**08 Hours**
Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.	
Unit V CLUSTERING	**08 Hours**
Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints,	

Outlier analysis-outlier detection methods.	
Unit VI WEKA TOOL	**08 Hours**
Datasets – Introduction, Iris plants database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.	

Textbooks

Jiawei Han and Micheline Kamber, ―Data Mining Concepts and Techniques‖, Third Edition, Elsevier, 2012

Reference Books

1. Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016
2. K.P. Soman, Shyam Diwakar and V. Ajay, ―Insight into Data Mining Theory and Practice‖, Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, ―Data Mining: Practical Machine Learning Tools and Techniques‖, Elsevier, Second Edition.

Project Based Learning

1. Data Warehouse Design for E-commerce Environments.
2. Data Warehouse Project for Music Data Analysis.
3. Data Warehouse Project for B2B Trading Company.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

QUANTITAITVE TECHNIQUES, COMMUNICATION AND VALUES

Teaching Scheme		**Examination Scheme**		**Credits**	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Theory**	**04**
Practical	**--**	Internal Assessment	**40**	**Practical**	**--**
Total	**04**	Total	**100**	**Total**	**04**

Course Pre-requisites: The students should have knowledge of

1	Basic mathematics, reasoning and comprehensive ability
2	Communication process, soft skills
3	Leadership qualities, ethics, etiquettes and values

Course Objective:

The **Quantitative Techniques, Communication and Values** aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The communication and values section focuses on the aspects of communication and soft skills such as grooming personality for leading team, presentation, business communication which would enable graduates to project themselves as a professionals in the corporate sector and/or otherwise.

Course Outcomes: The student will be able to

1	Solve the aptitude test in the recruitment and competitive exam by applying short techniques and solve the question in less amount of time
2	Apply the short mnemonics and techniques to solve the questions of logical reasoning in the placement and competitive exam in lesser time.
3	Develop the verbal ability to communicate effectively using suitable vocabulary and proper sentence pattern
4	Understand the concept of soft skills and its implication at workplace
5	Build up the ability to study employment business correspondences and its proper implications
6	Understand business ethics, etiquettes and values and apply them in the professional ventures.

Course Content:

Unit-I	**QUANTITATIVE APTITUDE**: Number system, Percentage, profit and loss, Simple Interest and Compound Interest, Ratio, Proportion and Average, Mixture and Allegation, Time, Speed & Distance, Time & Work , Permutation & Combination, Probability, Pipes and Cisterns	**08 Hrs**
Unit-II	**NON-VERBAL REASONING:** Coding, Decoding, Number series, Blood relation Directions, cubes &dices , Data Interpretation, Data Sufficiency, Set Theory & Syllogisms, Matching, Selection & Arrangement, Clocks & Calendars, Visual Reasoning, Input, Output & Flow Chart.	**08 Hrs**
Unit-III	**VERBAL REASONING:** Sentence Patterns, Sentence correction and spotting errors, Vocabulary, antonyms and synonyms and analogy, Phrasal Verbs, idiomatic expressions, reading comprehension, closest, sentence rearrangement and theme detection	**08 Hrs**
Unit-IV	**SELF AWARENESS AND SOFT SKILLS DEVELOPMENT:** Concept of SWOT, Importance of SWOT, Individual & Organizational SWOT Analysis, Soft skills, meaning, need and importance, difference between soft skills and hard skills, life skills and personal skills, Leadership skills,-Importance ,Types, Attributes of good leader Motivational theories	**08 Hrs**

	and leadership ,Emotional intelligence in personal and professional lives its importance need and application, Team Building and conflict resolution Skills ,Problem solving skills, Time Management and Stress Management Skills Pareto Principle(80/20) Rule in time management, Time management matrix, creativity and result orientation, working under pressure, stress management	
Unit-V	**COMMUNICATION AND HONING EMPLOYMENT SKILLS:** Communication process, Non-verbal codes in communication, importance of LSRW in communication, Barriers to communication, Principles of effective Technical writing, Email writing and Netiquettes, **Letter writing** – formal letters, job application letter, cover letter, structure of technical report writing, Building Resume and CV, Tips to build an effective Resume Group discussion, Skills required for Group Discussion Interview skills, Ways of handling telephonic interviews, Importance of body language, grooming &etiquettes for getting right impression in PI&GD , Extempore, Introduction to PowerPoint presentation, Structure & flow of presentation,	**08 Hrs**
Unit-VI	**BUSINESS ETHICS, ETIQUETTES AND VALUES:** The Importance of Ethics and Values in Business World, Respect for Individuality and diversity at workplace values of a good manager Key features of corporate etiquette, Corporate grooming & dressing, etiquettes in social & office Setting-Understand the importanceof professional behaviour at the work place, Corporate social responsibility (CSR) its importance and need.	**08 Hrs**

Internal Assessment:

	Unit Test – I	UNIT – I, II, III
	Unit Test – II	UNIT – IV, V, VI

Reference Books:

1	Quantitative Aptitude by R. S. Agarwal published by S. Chand
2	The Book of Numbers by Shakuntala Devi
3	A Modern Approach To Logical Reasoning by R. S. Agarwal published by S. Chand
4	A New Approach to Reasoning Verbal & Non-Verbal by InduSijwali
5	Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition
6	Communication Skills by Sanjay Kumar, Pushp Lata, published by Oxford University press, second edition
7	Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press
8	Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd
9	Soft Skills by Meenkashi Raman, published by Cengage publishers
10	Soft Skills by Dr. K Alex published by Oxford University press
11	Soft skills for Managers by Dr. T. KalyanaChakravarthi and Dr. T. LathaChakravarthi published by biztantra

Project Based Learning Topics:

1	Form a model for spoken and written communication skills which avoid grammar mistakes and common errors.
2	Develop various activity models for enriching and developing vocabulary.
3	Preparing strategies by using SWOT and TWOS analysis.
4	Analysing differences between Soft Skills, Hard skills, and Personal skills.
5	Develop Bruce Tuchman’s Team Building Models with classmates/Teammates.
6	To study different personalities of Leaders from various sectors and find out their attributes and success stories.

7	Preparing a model for Time Management Skills and Stress Management and conduct activities for effective implementation of it.
8	Form a model to develop LSRW and communication Skills.
9	Conduction of mock interview and practice GD activities to build competencies for actual selection process.
10	Prepare a model for evaluating Values and Ethics of Good Managers.
11	Prepare a model of dress codes and attire for different professional situations Corporate etiquettes and its implications.
12	Develop some good activities to understand the importance and need of Corporate social responsibility (CSR).

AGILE METHODOLOGIES

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Lecture**	**04**
		Internal Assessment	**40**		
		Total	**100**	**Total**	**04**

Course Objective:

To prepare students for software development using agile methodology

Prerequisite: Software Engineering

Course Outcomes: On completion of the course, students will have the ability to:

1. Differentiate traditional project development methodology and Agile methodology.
2. Identify the roles and responsibilities of agile practitioners in agile projects
3. Apply requirement engineering practices behind several specific agile methodologies.
4. Define the core practices behind Scrum framework.
5. Understand the role of design principles in agile software design.
6. Define the core practices behind Extreme Programming framework.
7. Describe implications of functional testing, unit testing, and continuous integration.

Unit I	08 Hours
Introduction: Agile Software Development, Traditional Model vs. Agile Model, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agile Documentations: Agile Drivers, Overview of Feature driven development, Lean Software Development	
Unit II	**08 Hours**
Agility and Requirements Engineering (RE): Impact of Agile Processes in RE–Current Agile Practices, Overview of RE Using Agile , Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Abstraction Model, Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modelling and Generation, Concurrency in Agile Requirements Generation.	
Unit III	**08 Hours**
Agile Scrum Framework: Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study, Kabana case study	
Unit IV	**08 Hours**
Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control; Agility and Quality Assurance: Agile Interaction Design, Agile approach to Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.	

Unit V	**08 Hours**
Extreme Programming (XP): XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges; Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study	
Unit VI	**08 Hours**
Agile and Testing: The Agile lifecycle and its impact on testing, Test driven development– Acceptance tests and verifying stories, writing a user acceptance test, Developing effective test suites, Continuous integration, Code refactoring. Risk based testing, Regression tests, Test automation.	

Textbooks

1. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", First International Edition, Prentice Hall.
2. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", International Edition, Pearson.

Reference Books

1. David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results" , Prentice Hall, 2003
2. Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer, 2009.
3. James Shore and Shane Warden, "The Art of Agile Development", O'Reilly Media, 2007
4. Cohn, Mike, "User Stories Applied: For Agile Software Development", Addison Wisley, 2004.

Project Based Learning:

Students are encouraged to decide one project in the group (of min 2 to max) and applications of agile methodologies shall be demonstrated by team :

1. For example "solve the traveling salesman problem (TSP) using a algorithm in the context of an XP project".
2. Develop sprint backlog for for project under consideration.
3. Develop a Kabana board for complete project per week.
4. Write a report and demonstrate the project using Extremes practices in software development
5. Write a report and demonstrate the project using Scrum practices in software development
6. Student database management projects in which the stories, sprints and action items can be created or updated weekly.
7. Library management project in which the stories, sprints and action items can be created or updated weekly.
8. Online appointment booking project in which the stories, sprints and action items can be created or updated weekly.

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

INFORMATION TECHNOLOGY LABORATORY - IV

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Practical	**02**	**Term Work**	**25**	**Practical**	**01**
Tutorial	**01**	**Practical**	**50**	**Tutorial**	**01**
Total	**03**	**Total**	**75**	**Total**	**02**

Course Objective:

To acquire programming skills in core Python to develop applications in various domain.

Prerequisite:

Understanding of basic python programming and OOPs concepts

Course Outcomes: On completion of the course, students will have the ability to:

1. To acquire programming skills in Python Multithreaded Programming.
2. To acquire database management with python
3. To develop the skill of data science using python
4. To develop the ability of Data Visualization using Python
5. To develop the ability to implement Graphical User Interface
6. To develop the ability to implement Django Web Framework in Python

Unit I : Python Multithreaded Programming	**06 Hours**
What is multithreading? • Difference between a Process and Thread • Concurrent Programming and GIL • Uses of Thread • Starting a New Thread • The Threading Module • Thread Synchronization :- Locks , Semaphore • Deadlock of Threads • Avoiding Deadlocks • Daemon Threads	
Unit II : Using Databases in Python	**06 Hours**
Python MySQL Database Access • Install the MySQLdb and other Packages • Create Database Connection • CREATE, INSERT, READ Operation • DML and DDL Oepration with Databases	
Unit III : Data Science Using Python	**06 Hours**
•Numpy: Introduction to numpy , Creating arrays , Indexing Arrays , Array Transposition , Universal Array Function , Array Processing , Array Input and Output	
Unit IV Pandas	**06 Hours**
What are pandas? • Where it is used? • Series in pandas • Index objects • Reindex • Drop Entry • Selecting Entries • Data Alignment • Rank and Sort • Summary Statics • Index Hierarchy • Matplotlib: Data Visualization • Python for Data Visualization • Welcome to the Data Visualization Section • Introduction to Matplotlib	
Unit V : Graphical User Interface	**06 Hours**
• GUI in Python • Button Widget • Label Widget • Text Widget	

Unit VI : Django Web Framework in Python	**06 Hours**
• Introduction to MVC and MVT architecture in Web development • Django folder structure and flow of control	

Textbooks

1. Fluent Python: Clear, Concise, and Effective Programming , by Luciano Ramalho
2. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Sarah Guido and Andreas C. Muller

Reference Books

1. Python Cookbook: Recipes for Mastering Python 3, by David Beazley and Brian K. Jones

List of Laboratory Exercises

1. Write a program to implement threads (Multithreaded Programming).
2. Write a program to implement Databases (MySQL, MongoDB)
3. Write a program to implement Handle and store Two-dimensional data
4. Write a program to manipulate structured data.
5. Write a program to implement GUI application
6. Implement web applications using Django Web Framework

Project Based Learning

1. Automating boring Stuff Using Python (ex. Automate LinkedIn connections using Python)
2. Python Text to Speech and Vice-Versa (ex. Convert Speech to text and text to Speech, Build a Virtual Assistant Using Python)
3. Crawl Wikipedia pages with python
4. E-commerce website project
5. Build a blockchain using python
6. Python Django Projects (ex. Weather app ,Voting system)
7. Twitter Sentiment Analysis using Python
8. Website Blocker using Python
9. Python Language Translator
10. Desktop Notifier Python App
11. Creating Notepad using Python

Syllabus for Unit Tests:

NA	

B.Tech.

(Information Technology)

Semester-VII

B.Tech (IT) Semester-VII
Subject: Project Planning and Management

TeachingScheme	**ExaminationScheme**		**CreditAllotted**
Theory :03Hrs/ Week	**EndSemesterExamination**	**:60Marks**	**Theory :03**
	InternalAssessment	**:40Marks**	**Practical:0**
	Total Marks: 100		**Total Credits: 03**

CourseObjectives:

1) To make them understand the concepts of Project Management for planning to execution of projects

2) To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.

Course Prerequisites:

Students should have knowledge of

Object Oriented Software Engineering

Course Outcome:

Students will be able to:

1)Understand the basic concepts of project management.

2) Apply selection criteria and select an appropriate project from different options.

3) Write work break down structure for a project and develop a schedule based on it.

4) Identify opportunities and threats to the project and decide an approach to deal with them strategically.

5) Use Earned value technique and determine & predict status of the project.

6) Capture lessons learned during project phases and document them for future reference

UNIT-I	**Project Management Foundation:**	**(6 Hours)**
	Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Project management in various organization structures, Project Lifecycle and IT development, Agile Project Management	
UNIT-II	**Project Human Resource Management and Stakeholder Management**	**(6 Hours)**
	Introduction, Organization and Project Planning, Formal Organization , Project Team, Multidisciplinary Teams, Project Environment, Project Leadership, Leadership Styles, Ethics in project, Role of project manager, IT Governance	

UNIT-III	**Project Planning and Scheduling:**	**(6 Hours)**
	Work Breakdown structure (WBS) and linear responsibility chart, Interface Co-ordination and concurrent engineering, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques. PERT, CPM, GANTT chart, Introduction to Project Management Information System (PMIS)	
UNIT-IV	**Planning Projects:**	**(6 Hours)**
	Crashing project time, Resource loading and levelling, Goldratt's critical chain, Project Stakeholders and Communication plan Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impact matrix. Risk response strategies for positive and negative risks	
UNIT-V	**Executing and Controlling**	**(6 Hours)**
	Team Management, Communicating and Engaging with all stakeholders of the project, Controlling project earned value techniques for measuring your completed work, Using milestone for measurement, change request and scope creep	
UNIT-VI	**Closing the Project:**	**(6 Hours)**
	Customer acceptance; Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report; doing a lessons learned analysis; acknowledging successes and failures; Project management templates and other resources; Managing without authority; Areas of further study	

AssignmentList:

1)	Explore the various Agile Models
2)	Create a SRS of a system under development
3)	Prepare a project plan of a system using applicable tool
4)	Discuss the applications and limitations of Gantt chart.
5)	**Conduct Risk analysis for system under development**

TextBooks:

1)	Prasanna Chandra; Projects- Planning, Analysis, Selection, Financing, Implementation and Review',VI Edition, Tata Mc Graw Hill, 8th Edition 2015.

ReferenceBooks:

1)	Jack T. Marchewka,Information Technology Project Management,4th edition Wiley India,2009
2)	John M. Nicholas,Project Management for Business and Technology,3rd edition Pearson Education

Web Services					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture:	**04 Hours/Week**	**University Examination:**	**60 Marks**		
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Theory**	**04**
		Term Work	**25 Marks**	**Practical**	**01**
		Practical	**25 Marks**		
		Total	**150 Marks**	**Total**	**05**

Course Objective:

To Understand Web Services with different technologies and applications.

Prerequisite:

Distributed Computing, XML, HTTP, TCP/IP concepts.

Course Outcomes: On completion of the course, students will have the ability to:

1. Create and consume Web services
2. Implement with appropriate framework components in creation of web services solution
3. Reuse of XML schemes
4. Understand the principles of SOA
5. Understand Web Services Building Blocks
6. Security and configuration issues for enterprise systems

Unit	Hours
Unit I :- Introduction	**08 Hours**
Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.	
Unit II :- Architecture	**08 Hours**
Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services.	
Unit III :- Document Structure	**08 Hours**
Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging. Brief Overview of JSON – JSON Schema, JSON Web Service functionality, differences between SOAP and JSON.	

Unit IV :- WSDL introduction	**08 Hours**
Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.	
Unit V :- UDDI Architecture	**08 Hours**
Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation	
Unit VI :- Security Considerations	**08 Hours**
SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.	

Textbooks
1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.
Reference Books
1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
3. Java Web Services, D.A. Chappell & T. Jewell, O"Reilly, SPD.
4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann
List of Assignments
1. Explain How Web Services Work
2. Explain Application Programming Interface Types & Example
3. Explain Web Services Architecture
4. Explain SOAP web service
5. Explain RESTful web services.
6. Explain Web Services Description Language with Example
List of Laboratory Exercises
1. Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius and vice a versa.
2. Write a program to implement the operation can receive request and will return a response in two ways. a) One - Way operation b) Request – Response

3. Write a program to implement business UDDI Registry entry.	
4. Develop client which consumes web services developed in different platform.	
5. Write a JAX-WS web service to perform the following operations. Define a Servlet / JSP that consumes the web service.	
6. Define a web service method that returns the contents of a database in a JSON string. The contents should be displayed in a tabular format.	
7. Define a RESTful web service that accepts the details to be stored in a database and performs CRUD operation.	
8. Implement a typical service and a typical client using WCF.	
9. Use WCF to create a basic ASP.NET Asynchronous JavaScript and XML (AJAX) service.	
10. Demonstrates using the binding attribute of an endpoint element in WCF.	
Project Based Learning 1. Rapid Document Conversion example pdf to word, excel to word 2. Email system 3. Website Development 4. Serverless web App 5. Real time data processing applications. (blood bank , attendance system etc) 6. chat bots	
Syllabus for Unit Tests:	
Unit Test -1	Unit - I, Unit - II, Unit - III
Unit Test -2	Unit - IV, Unit - V, Unit - VI

Business Intelligence

TEACHING SCHEME		EXAMINATION SCHEME	CREDIT SCHEME	
Lecture:	4 Hours/Week	**End Semester Examination:** 60 Marks	**Theory**	4
Practical:	2 Hours/Week	**Continuous Assessment:** 40 Marks		
		Termwork: 25 Marks	**Practical:**	1
		Practical: 25 Marks		
		Total : 150 Marks	**Total Credits: 5**	

Course Overview

This course provides an overview of the field of Business Intelligence and its applications in modern organizations. Students will learn the basics of data warehousing, data mining, and predictive analytics, and explore various tools and technologies used for BI.

Prerequisite:

1. Basic understanding of database management systems
2. Knowledge of statistics and data analysis
3. Basic programming skills in any language.
4. Understanding of data structures, algorithms and computer science fundamentals

Course Outcomes:

1. Understanding of BI concepts: student will gain an understanding of the concepts of business intelligence and how it helps organizations make data-driven decisions.
2. Data Analytics: Students will learn how to collect, process, and analyse large amounts of data from various sources, such as databases, spreadsheets, and other data sources.
3. Data Warehousing: Students will learn about the concepts of data warehousing and how to design and implement a data warehouse to support business intelligence.
4. Data Mining: Students will learn how to apply data mining techniques to identify patterns, relationships, and insights in data.
5. Business Intelligence Tools: Students will learn how to use various BI tools to extract insights from data.
6. Problem Solving: Students will learn how to apply BI techniques and tools to solve real-world business problems.

Unit	Hours
Unit I: Introduction and Data Pre-processing:	**06 Hours**
Introduction: Challenges of decision making, what is business intelligence (BI)? Need for BI. Drawing insights from data: DIKW pyramid, levels of decision making. **Data Pre-processing**: Data quality, Pre-processing operations: combining values into one, sub setting, sorting, transforming scale, determining percentiles, removing noise, removing inconsistencies, transformations, standardizing, normalizing min-max normalization, z-score standardization.	
Unit II: Data Warehousing and Enterprise reporting:	**06 Hours**
Data Warehousing: What is a data warehouse, need for a data warehouse, architecture, data marts, OLTP vs OLAP, Multidimensional Modelling: Star and snowflake schema, Data cubes, OLAP operations, Data Cube Computation and Data Generalization, Data Lake **Enterprise Reporting:** Metrics, Measurement, Measures, KPIs, Dashboards, Reports, Scorecards	

Unit III Inferential Statistics:	**06 Hours**
Inferential Statistics: Role of probability in analytics, probability distributions and their characteristics. Need for sampling, generating samples, sampling, and non-sampling error. Sampling Distribution of Mean, Standard Error. Estimation: Point and Interval Estimates, Confidence Intervals, level of confidence, sample size, ETL (extract, transform and load), regression analysis, market basket analysis, analysis of variance (ANOVA), and chi-square tests.	
Unit IV Data Modelling, visualization.	**06 Hours**
Data Modelling and visualization: Logic driven modelling, data driven modelling, basic what-if spreadsheet models, Role of visualization in analytics, techniques of visualization. data modelling and visualization in financial analysis. **Data Visualization using Tools:** Introduction to tools for visualization, data import, and management, data type and operations, Different types of data visualizations, dashboards, data storytelling, understanding the concepts of dynamic/interactive data visualization and report generation.	
Unit V: Time Series Analysis and Forecasting:	**06 Hours**
Introduction to Time Series Analysis and Forecasting: Time series patterns, forecast accuracy, moving averages and exponential smoothing, casual models, using regression analysis for forecasting, ARIMA models. **Prescriptive/Optimization Analytics:** Overview of simulation and risk analysis, Linear Optimization Models (linear programming), Integer Linear Optimization models (integer programming), Non-linear optimization models (portfolio theory), Decision Analysis.	
Unit VI: Business Intelligence Applications:	**06 Hours**
Big data, Three Vs of big data, Big data applications, Data analytics, business analytics, ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing, BI Applications in Logistics and Production, Role of BI in Finance, BI Applications in: Stock market analysis, Forensics, Banking.	
Textbooks	

1. "Data Science for Business" by Foster Provost and Tom Fawcett, published by O'Reilly Media.
2. "Business Intelligence: A Managerial Approach" by Fred S. Siebert, published by Pearson.
3. "Business Intelligence: The Savvy Manager's Guide" by Dylan Jones, published by Apress.
4. “Fundamentals of Business Analytics”, by R. N. Prasad, Seema Acharya, Wiley-India
5. “Business Analytics for managers”, Wolfgang Jank

Reference Books

6. "Data Warehousing for Dummies" by Thomas C. Hammergren, published by John Wiley & Sons.
7. "Data-Driven: Creating a Data Culture" by Hilary Mason and DJ Patil, published by John Wiley & Sons.

List of Assignments

1. Create a presentation demonstrating the features and functionality of any BI tool.

2. Design a galaxy schema for a set of business processes of a chosen organization and document the schema design along with a detailed explanation of the business processes and their interrelationships.
3. Conduct Hypothesis Testing and Chi-square test on a given dataset to test the significance of the data and draw conclusions based on the results obtained
4. Perform what-if analysis on a given dataset to identify potential outcomes and optimize decision-making. Document the analysis process and share the results.
5. Utilize Hive for data analysis in a Big Data environment, including data manipulation, transformation, and querying. Document the analysis process.
6. Conduct analysis using various OLAP cube operations, including drill-down, roll-up, slice-and-dice, and pivoting.
7. Create a dashboard for an organization that showcases the relevant data and KPIs. Include visualizations, graphs, and tables that highlight the key performance indicators.
8. Perform regression analysis on a dataset to predict the value of the dependent variable.
9. Conduct prescriptive/optimization analysis on a suitable dataset to identify optimal solutions that optimize the desired outcomes.
10. Case Study: Select any application of Business Intelligence and prepare analysis report.

Syllabus for Unit Tests:	
Unit Test -1	Unit - I, Unit - II, Unit - III
Unit Test -2	Unit - IV, Unit - V, Unit - VI

Elective-I Software Architecture		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDIT SCHEME**
Lectures: 4 Hours / Week	End Semester Examination : 60 Marks	Theory : 04
	Continuous Assessment : 40 Marks	
	Total: 100 Marks	Total: 04

Course Pre-requisites:

Software Engineering, Object-oriented Programming

Course Objectives:

Course objective is to understand the need, design approaches for software architecture and develop appropriate architectures for various case studies

Course Outcomes:

The students will be able to

1.	Describe the Fundamentals of software architecture, qualities, and terminologies.
2.	Express the analysis and design of a system using UML.
3.	Apply object-oriented design techniques for behavior modeling.
4.	Create UML package, component, and deployment diagrams to express the architectural structure of a system
5.	Select appropriate architectural styles.
6.	Apply principles of software architectures for enterprise application development.

Topics covered

UNIT - I	**Software Architecture:** Definition, Architecture and Agile, Requirements and software architecture: Quality attributes NFRs and FR, Software Architecture and Components, Multiple views of software architecture.	**(06 Hours)**
UNIT - II	**Software architecture using UML diagrams**: Overview of the UML Notation, Static Modelling	**(06 Hours)**
UNIT -III	**Behaviour modelling:** UML Sequence diagram and Activity diagram State diagram,	**(06 Hours)**
UNIT -IV	**UML component, Package, and deployment diagram:** Implementation architecture: component diagram, Hardware architecture deployment diagram	**(06 Hours)**
UNIT - V	**Architectural Styles:** Documenting Software Architectural Patterns Abstract Data Types and Object-Oriented, Main Program and Subroutine, Databases, Layered Systems, Client Server n-Tier, Interpreters, Pipes and Filters, Event-Based, Process Control, MVC style	**(06 Hours)**
UNIT -VI	**Software Architecture Case Study:** Client/Server Software Architecture Case Study: The design of a client/server system that consists of a bank server and several ATM clients. The design of the banking service is an example of a sequential object-oriented design. **Service-Oriented Architecture Case Study:** Online Shopping System	**(06 Hours)**

Sample list of projects for project based learning:	
1.	Draw the behavioral view diagram : State-chart diagram, Activity diagram for thermostat cooling system
2.	Draw the behavioral view diagram : State-chart diagram, Activity diagram for thermostat boiler system
3.	Draw implementation view diagram: Component diagram for the library management system.
4.	Draw implementation view: component dagram forElectronic Cash Counter/Point of sale
5.	Draw deployment diagram for the safe home system.
6.	Draw deployment diagram for the E-shopping system.
7.	Perform static modeling for web based Leave Management Tool.
8.	Perform static modeling for web based student attendance Management Tool
Text Books:	
1.	Hassan Gomaa, "Software Modeling and Design: UML, Use Cases, Patterns, and Software Architectures", Cambridge University Press; Illustrated edition (21 February 2011), ISBN-10: 0521764149
2.	Bernd Bruegge Allen H. Dutoit "Object Oriented Software Engineering using UML,patterns and Java", Third Edition, Pearson Education
3.	G. Booch, J.Rumbaugh, J. Jacobson, The Unified Modeling Language –User Guide Addison – Wesley
Reference Books:	
1.	Bass, L., P. Clements, & R. Kazman, "Software Architecture in Practice", 2 Ed, Prentice-Hall.
2.	Kai Qian Jones, Software Architecture Design Illuminated, Bartlett Publishers Canada, 2010
3.	R.S Pressman, Software Engineering: A Practitioner's Approach, 5/e, Mc Graw Hill International Edition
4.	Ion Gorton, Essentials of software Architecture , Second Edition, Springer-verlag, 2011
Syllabus for Unit Test:	
Unit Test -1	UNIT – I ,II and III
Unit Test -2	and UNIT – IV ,V and VI

Elective-I: Information Retrieval

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Theory**	**04**
		Internal Assessment	**40**		
Practical	**02**	**Term Work**	**25**	**Practical**	**01**
		Oral	**25**		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Objective:

This course aims at giving students a knowledge of Information Retrieval along with its applications in terms of the following:

- To understand the basics of Information Retrieval.
- Learn to evaluate information retrieval systems
- To understand the theoretical basis behind the standard models of IR (Boolean, Vector-space)
- To understand the use of performance evaluation metric for IR
- To understand the standard methods for Web indexing and retrieval

Prerequisite:

- Students must have the minimal concept of Data Base Management Systems
- They must also have the concept of different types of algorithms used for searching data
- They must also have the minimal knowledge of Natural language such as thesaurus, synonyms etc. to understand the concept of retrieving the textual information because text is the main data type used in Information Retrieval Systems

Course Outcomes:

On completion of the course, students will have the ability to:

1. Describe the objectives of information retrieval systems.
2. Describe models like vector-space, probabilistic and language models to identify the similarity of query and document
3. Understand relevance feedback in vector space model and Boolean retrieval model
4. Understand query, document, and phrase translation.
5. Design the method to build inverted index.
6. Design and implement a recommender system.

Unit I Introduction to information retrieval systems:	**08 Hours**
Goals and history of IR, Objectives of Information Retrieval Systems, The impact of the web on IR, Data vs Information Retrieval, Logical view of the documents, Relationship to Database Management Systems, Architecture of IR System	

Unit II Basic IR Models: Classes of Retrieval Model, overview of text retrieval model: Boolean retrieval model, Term weighting mechanism – TF, IDF, TF-IDF weighting, Cosine Similarity, Vector space model	
Unit III Text properties, operations and preprocessing:	**08 Hours**
Tokenization, Text Normalization, Stop-word removal, Morphological Analysis, Word Stemming (Porter Algorithm), Case folding, Lemmatization, Word statistics (Zipf's law, Heaps' Law), Index term selection, Inverted indices, Positional Inverted index,	
Unit IV Text Categorization:	**08 Hours**
Categorization algorithms: Rocchio, nearest neighbor, and naive Bayes. Applications to information filtering and organization	
Unit V Text classification & Text clustering	
The text classification problem, Naive Bayes text classification, k- nearest neighbors, Support vector Machine, Feature Selection, Vector-space clustering, K-means algorithm	
Unit VI Evaluation of IR:	**08 Hours**
Performance metrics:Precision, Recall, F-Measure, MAP (Mean Average Precision), Known-item Search Evaluation, Evaluations on benchmark text collections. **Recommender System:** personalization, Collaborative filtering recommendation, Content-based recommendation	
Textbooks:	
1.Introduction to Information Retrieval. Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schuetze, Cambridge University Press, 2007. 2. Modern Information Retrieval. Baeza-Yates Ricardo and Berthier Ribeiro-Neto. 2nd edition, Addison-Wesley, 2011. 3. Information Retrieval: Implementing and Evaluating Search Engines. Stefan Buttcher, Charlie Clarke, Gordon Cormack, MIT Press, 2010.	
Reference Books:	
1.Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009. 2. Introduction to Information Retrieval. Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schuetze, Cambridge University Press, 2007.	
List of Assignments	
1.Introduction to information retrieval 2.Implementation of inverted index 3.Implementation of Boolean retrieval model 4.Study of various data structure for fast accessing of the data(Hash table,B-trees,sparse lists)	

5.To find out cosine similarity using Tf and IDf 6..Study of Zip's law .: Statistical and Mathematical study	
Project Based Learning	
1. Implementation of various classification algorithm on text. 2. Implementation of various Clustering algorithm on text 3. Implementation of sremming Porter stemmer algorithm.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Elective-I: User Experience

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture:	**04 Hours/Week**	**University Examination:**	**60 Marks**		
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Theory**	**04**
		Term Work	**25 Marks**	**Practical**	**01**
		Oral	**25 Marks**		
		Total	**150 Marks**	**Total**	**05**

Course Objective:

This course aims at giving students a knowledge of

- User Interface and Experience
- Trends in UX
- Emerging Technologies in UX

Prerequisite:

- Basic knowledge about concept of Human Computer Interaction
- Basic knowledge designing languages and tools

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the Concept User Interface and Experience
2. To understand the user's interaction with the environment, people and culture. To take part in different UX domains and societies
3. Exploring different user research methodologies ensuring appropriate solution
4. The tools for user research become familiar
5. Practice to learn the tools required to design wireframes and prototypes.

Unit I	**06 Hours**
Introduction to UX Design Evolution of UX Design, Processes and Methodologies, Tools and Technology in UX Design, Multiple Domains and Trends in UX Design	
Unit II	**06 Hours**
Technology in experience design Technology for digital experience, Technological feasibility and viability, Details of Internet of Things, Augmented reality and virtual reality, ATM, KIOSK.	
Unit III	**06 Hours**
UX Design Advance: UX methodologies, Heuristic evaluation, Understanding product UX lifecycle.	
Unit IV	**06 Hours**
UX & Digitalization Understand by case studies how technology and digitalization is transforming different industry segments BFSI, manufacturing, retail, automotive, media, FMCG, logistics, oil & gas.	

Unit V	**06 Hours**
Business, UX & Design management Business UX : Understanding How a UX approach can help any business, The Business Value of UX Design, Strategy building, Aspects of key guidelines in UX business	
Unit VI	**06 Hours**
Design Management: What is design management, Different types, Taking Charge of Processes and People The Evolution of Design Management, Areas of Design Management, Why Does Design Management Matter?, Where Does Design Management Fall Within Businesses?	

Textbooks

1. Sketching the User experiences - Bill Buxton
2. Augmented Reality: Principles and Practice - Dieter Schmalstieg

Reference Books

1. Augmented Reality: An emerging technologies guide - Gregory Kipper and Joseph Rampolla

List of Assignments

1. Describe aspects of user interaction and cognition as they relate to UX.
2. Explain the role and importance of Standards, Technologies, and Guidelines in the UX process.
3. Describe methods including experiment design, application, and the ethical process
4. Select and apply appropriate methods for analysing a design
5. Select and apply the relevant descriptive statistical tests associated with UX Engineering;
6. Analyse and critique UX work, experimental studies, and computer interfaces
7. Analyse problems associated with different designs and suggests solutions for their resolution.

Project Based Learning

- Select any current example and apply appropriate methods for analysing designs

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

ELECTIVE-I: STORAGE AREA NETWORK					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Theory**	**04**
Practical	**02**	**Internal Assessment**	**40**		
		Term Work	**25**	**Practical**	**01**
		Oral	**25**		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Objective:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experience-.

1. Ability to demonstrate the storage area networks and their products Ability to provide the mechanisms for the backup/recovery.

Prerequisite:

1. Computer Networks, Operating System, Cloud Computing.

Course Outcomes: On completion of the course, students will have the ability:

1. To understand Storage Area Networks characteristics and components.
2. To study the basics of Intelligent Storage Systems.
3. To use, interpret and examine various SAN technologies.
4. To evaluate different SAN management strategies to fulfill business continuity requirements.
5. To classify the applications as per their requirements and select relevant SAN solutions.
6. To apply Security and management concepts/techniques for Storage Infrastructure.

Unit I	**08 Hours**
Introduction to Storage System : Storage Area Networks Architecture Overview: Creating Network for storage; Hardware devices: Fibre Channel Switch, Host Bus Adaptors, Putting the Storage in SANs, Fabric Operation from a hardware perspective, SAN hardware considerations, Evolution of storage architecture, key data center elements, virtualization, and cloud computing, virtual storage provisioning.	
Unit II	**08 Hours**
Data Protection and Intelligent disk subsystems: Intelligent Disk Subsystem - architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID and different RAID levels. Compare and contrast integrated and modular storage systems. **Intelligent Storage Systems:** Components of an Intelligent Storage System, Types of Intelligent Storage Systems. Fibre Channel Storage Area Networks - Fibre Channel: Overview, The SAN and Its Evolution, Components of FC SAN, NAS, and IP-SAN.	

Unit III	**08 Hours**
Storage Networking technologies and Virtualization: Fibre Channel SAN components, connectivity options, and topologies including access protection mechanism 'zoning", FC protocol stack, addressing and operations, Network Attached Storage (NAS) - components, protocol and operations. **Virtualization**: Definition of Storage virtualization: Implementation Considerations: Storage virtualization on Block or file levels; Storage virtualization on various levels of the storage network; Symmetric and Asymmetric storage virtualization in the network.	
Unit IV	**08 Hours**
Backup, Archive, and Replication : Information availability and business continuity solutions in both virtualized and non-virtualized environments. Business continuity terminologies, planning and solutions, Clustering and multipathing architecture to avoid single points of failure, Backup and recovery - methods, targets and topologies, Data de-duplication and backup in virtualized environment, Fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection.	
Unit V	**08 Hours**
Cloud Computing Characteristics: Definition of Cloud computing, Characteristics of Cloud computing, Cloud Enabling Technologies, Cloud Service Models, Cloud Deployment Models, Cloud Computing Infrastructure, Cloud Challenges and Cloud Adoption Considerations. Steps involved in transitioning from Classic data center to Cloud computing environment Services and deployment models, Cloud infrastructure components, Cloud migration considerations.	
Unit VI	**08 Hours**
Securing and Managing Storage Infrastructure: Framework and domains of storage security along with covering security. Implementation at storage networking. Security threats, and countermeasures in various domains Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle management (ILM) and storage tiering, Cloud service management activities.	
Textbooks	
1. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516	
2. Information Storage and Management,Author :EMC Education Services, Publisher: Wiley ISBN: 9781118094839	

3. EMC Education Services, “Information Storage and Management”, Wiley India Publications, 2009. ISBN: 9781118094839.

Reference Books

1. Ulf Troppens,Wolfgang Muller-Friedt,Rainer Wolafka, Storage Networks Explained Wiley Publication.
2. Paul Massiglia, Richard Barker, "Storage Area Network Essentials: A Complete Guide to Understanding and Implementating SANs Paperback", 1st Edition, Wiley India Publications, 2008
3. G. Somasundaram, Alok Shrivastava, Information Storage and Management, EMC Education services, Wiley Publication.
4. Marc Farley : Building Storage Networks, 2nd Edition, Tata McGrawHill, Osborne, 2001.
5. Meeta Gupta : Storage Area Network Fundamentals, 2nd Edition, Pearson Education Limited, 2002.

List of Laboratory Exercises

1. Configuring a Storage Area Network (SAN) using iSCSI technology.
2. Setting up a Network Attached Storage (NAS) environment.
3. Implementing a storage tiering strategy in a SAN environment.
4. Investigating the use of compression and deduplication in a SAN environment.
5. Exploring the use of Storage Virtualization techniques in a SAN environment
6. Studying the role of Storage Resource Management (SRM) tools in a SAN environment.
7. Evaluating the security features of SAN and implementing secure data access
8. Studying the impact of network topology on SAN performance.
9. Exploring the use of flash storage in a SAN environment and evaluating its performance.

Project Based Learning

1. Evaluating the performance of SAN using various benchmarking tools.
2. Configuring and using Snapshots and Remote Replication in a SAN environment.
3. Investigating the impact of network congestion on SAN performance and implementing congestion control techniques.
4. Implementing a backup and recovery strategy in a SAN environment.
5. Studying the role of object storage in a SAN environment and evaluating its performance.
6. Exploring the use of cloud storage services in a SAN environment and evaluating their performance.
7. Evaluating the impact of network latency on SAN performance and implementing optimization techniques.
8. Evaluating the impact of different caching algorithms on SAN performance.
9. Implementing disaster recovery and business continuity in a SAN environment.
10. Evaluating the impact of different types of disk arrays on SAN performance.

Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Subject : Information Technology Laboratory –V

Teaching Scheme	Examination Scheme	Credit Allotted
Practical : 02 Hrs/Week	**Term Work:25 Marks**	**Total Credits: 01**
	Prat/Oral : 25 Marks	
Total: 02 Hours	**Total: 50 Marks**	

Course Objectives:

To provide students foundation knowledge of DevOps environment, supportive automation tools, scripting language and hands on assignments to understand the DevOps workflow.

Course Prerequisites:

Students should have prior knowledge of software development life cycle, basics of cloud computing and Linux operating system.

Course Outcome:

Students will be able to:

1) Understand the benefits of DevOps over other software development processes
2) Interpret working of the DevOps workflow
3) Apply cloud computing services in DevOps environment
4) Implement Linux commands in DevOps environment
5) Implement Shell scripting for DevOps
6) Perform various Git commands associated with version controlling

UNIT-I	**Introduction to DevOps**	
	DevOps: concepts, history of DevOps, objectives, difference between DevOps and traditional Software Development Life Cycle and Agile Model, benefits of working in a DevOps environment, roles, responsibilities and skills of a DevOps Engineer	
UNIT-II	**DevOps Architecture**	
	Continuous Development, Continuous Integration, Continuous Testing, Continuous Deployment, Continuous Monitoring, Continuous Feedback, Continuous Operations, DevOps Pipeline, DevOps principles, overview of DevOps Automation Tools, Benefits of the DevOps lifecycle	

UNIT-III	**Cloud Computing Services**	
	Concept, Cloud Computing services, DevOps linking with cloud computing, Public Clouds: Amazon Web Services, Microsoft Azure, Google Cloud Services AWS: AWS DevOps Architecture, AWS CloudFormation, AWS EC2, AWS CloudWatch, AWS CodePipeline	
UNIT-IV	**LINUX Basic and Admin**	
	Linux OS Introduction, Importance of Linux in DevOps, Linux Basic Command Utilities, Linux Basic Command Utilities, Linux Administration, Environment Variables, Networking, Linux Server Installation, RPM and YUM Installation	
UNIT-V	**Shell Scripting for DevOps**	
	Introduction, Variables, Flow Controls, Loops, Functions, Lists, Manipulating Strings, Reading and Writing Files, Positional Parameters	
UNIT-VI	**Version Control with Git**	
	Version control architecture- introduction, features, benefits Source code management, Virtual private network, Types of version control systems. Git: Git Installation, commonly used commands in Git, Git workflow, Git branching and Merging, Working with Remote repository	

Assignment List:

1)	Open free tier account for AWS and launch EC2 instance of t2.micro.
2)	Create AMI and take EBS snapshot of EBS volume.
3)	Configure AWS CloudWatch
4)	Launch EC2 instance and attach EBS volume to instance
5)	Create user and group of a user and assign permission to them.
6)	Create a new file using Vi editor and combine file using Linux command and apply links on that file (hard links and soft links).
7)	Write shell script for calculator function. And understand the difference between different types of variables (environmental, special, and local variable).
8)	Write shell script for the httpd server to launch one application (create html file on web server).
9)	Create git repository and manage branches using branching strategies.
10)	Solve merge conflict problem and understand the difference between pull, fetch and revert command by creating new git remote repository.

Text Books:

1)	Jennifer Davis and Ryn Daniels, Effective DevOps, O'Reilly Publisher, 2022
2)	Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation" by Jez Humble and David Farley:

Reference Books:

1)	The Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win" by Gene Kim, Kevin Behr, and George Spafford
2)	Infrastructure as Code: Managing Servers in the Cloud" by Kief Morris

B.Tech.
(Information Technology)
Semester-VIII

Information Security					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture:	**04 Hours/Week**	**University Examination:**	**60 Marks**	**Theory**	**04**
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**		
		Term Work	**25 Marks**	**Practical**	**01**
		Practical	**25 Marks**		
Total : 06 Hours/Week		**Total**	**150 Marks**	**Total**	**05**

Course Objective:

1. To understand the basics of Information Security
2. To know the legal, ethical, and professional issues in Information Security
3. To know the aspects of risk management
4. To become aware of various standards in this area
5. To know the technological aspects of Information Security

Prerequisite:

Fundamentals of Computer Networks

Course Outcomes: On completion of the course, students will have the ability to:

1. Discuss the basics of information security
2. Illustrate the legal, ethical and professional issues in information security
3. Understand Information Security Policies.
4. Become aware of various security threats.
5. Design and implementation of security in OS and web applications.
6. Understand current trends in information security.

Unit	Hours
Unit I INTRODUCTION	**08 Hours**
Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms. Critical Characteristics of Information, Components of an Information System, Securing the Components, Balancing Security and Access. Need of Information Security, Basic Principles of Confidentiality, Integrity, Policies, Procedures, Guidelines, Standards Administrative Measures and Technical Measures, People, Process, Technology	
Unit II SECURITY ELEMENTS	**08 Hours**
Authorization and Authentication - Types, Policies and techniques, Security Certification, Security Monitoring and Auditing, Security Requirements Specifications, Security Policies and Procedures, Firewalls, IDS, Log Files, Access Control, Trusted Computing and multilevel security, Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors, Security awareness, training , Email and Internet use policies.	
Unit III INFORMATION SECURITY POLICIES	**08 Hours**
Introduction to Information Security Policies, Importance and need of Policies, Data security consideration, Backups, Archival storage and disposal of data,	

Intellectual Property rights and Policies, Incident Response and Forensics, Management Responsibilities.	
Unit IV SECURITY THREATS	**08 Hours**
Threat Management: Threat Modelling, Sources of security threats, Threat identification, Threat Analysis, Target Assets and vulnerabilities, Consequences of threats, E-mail threats, Web threats, Threat awareness Intruders and Hackers, Insider threats, Risk Assessment, Forensic Analysis, Vulnerability sources and assessment tools.	
Unit V SECURITY IN OS and WEB APPLICATIONS	**08 Hours**
Windows and Linux security: Types of Audits in Windows Environment, Server Security, Active Directory (Group Policy), Anti-Virus, Mails, Malware, End point protection, Shadow Passwords, SUDO users, etc. **Web Application Security:** OWASP, Common Issues in Web Apps, What is XSS, SQL injection, CSRF, Password Vulnerabilities, SSL, CAPTCHA, Session Hijacking, Local and Remote File Inclusion, Audit Trails, Web Server Issues, etc	
Unit VI CURRENT TRENDS	**08 Hours**
Current Trends in information Security, Cloud Computing: benefits and Issues related to info Sec. Standards available for InfoSec: Cobit, Cadbury, ISO 27001, OWASP, OSSTMM, etc - An Overview, Certifiable Standards	

Textbooks

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003
2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", Prentice Hall, 2008.

Reference Books

1. Nina Godbole, Information Systems Security-Security Management, Metrics, Frameworks and Best Practices, Wiley, 2009
2. Swiderski, Frank and Syndex, "Threat Modeling", Microsoft Press, 2004.

List of Experiments

1. Write a program to Analyze Cyber Threats and Attacks in Data Traffic
2. Write a program to examine Security Attack Impact on User Privacy
3. Write a program for Assessing Correlation of multi-layered Security Approaches and Protocols
4. Write a program for Network visualization Strategies for Attack Detection
5. Write a program for analysis of Normal and Abnormal Network Pattern in Traffic
6. Write a program to implement SQL injection
7. A case study on security in web application
8. A case study on latest trends in information security

Project Based Learning	
1. Graphical Password Authentication System using Intuitive Approach	
2. Online Transaction Fraud Detection using Backlogging on E-Commerce Website	
3. Secure File Sharing Using Access Control	
4. Blockchain-based Transaction and Settlement System	
5. Blockchain based Personal Identity Security System	
6. Signature verification System using Python	
7. Electronic Voting System using Blockchain	
8. Three Level Image Password Authentication	
9. Android Text Encryption Using Various Algorithms	
10. E Authentication System Using QR Code & OTP	
11. Detecting Phishing Websites Using Machine Learning	
12. Card Payment Security Using RSA	
13. Detecting Data Leaks via Sql Injection Prevention on an E-Commerce	
14. School Security System (SSS) using RFID	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

INTERNET OF THINGS					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture	**04**	**University Examination**	**60**	**Theory**	**04**
Practical	**02**	**Internal Assessment**	**40**		
		Term Work	**25**	**Practical**	**01**
		Practical	**25**		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Objective:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experience-

1. To Provide a strong foundation of fundamentals of Internet of Things and need of IoT Security.
2. To design and implement application of IoT using various sensors.
3. To detailed understanding of present scope of Internet of Things with case studies.

Prerequisite:

1. Computer networking, Embedded systems, Cloud Computing.

Course Outcomes: On completion of the course, students will have the ability:

1. To understand the fundamentals about IoT.
2. To understand the working of Embedded IoT devices.
3. To use IoT protocol to upload sensor data and to control devices.
4. To study the basics of Cloud Platforms for IOT and supporting services.
5. To apply Security concepts/techniques for IoT applications.
6. To design and implement IoT system for real time applications.

Unit I	**08 Hours**
Introduction to Internet of and Things (IoT): Understanding IoT fundamentals, IOT Architecture and protocols, IoT World Forum (IoTWF) standardized Architecture, Physical design of IoT, Logical Design of IoT, Various Platforms for IoT, Overview of IoT components and IoT Communication Technologies and Models, IoT Communication API‟s, IoT Issues and Challenges- Planning, Costs and Quality ,Security and Privacy, Risks, Interdependencies of IoT and cloud computing, Web of things.	
Unit II	**08 Hours**
Embedded IoT devices: Sensors and actuators for IoT applications, IoT components and implementation, IoT system building blocks ,Programming of NodeMCU and Raspberry PI, Implementation of IoT with Edge devices, Reading sensor data and transmit to cloud, Controlling devices through cloud using mobile application and web application, Types and configurations of gateways, Specifications of IoT gateways, RFID	

Unit III	**08 Hours**
IoT PROTOCOLS: IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah, Network Layer/ Internet layer: IP versions, Constrained Nodes and Constrained Networks, Transport layer protocols, Application Layer Protocols: Hypertext transfer protocol (HTTP), Systematic HTTP access methodology, Web Socket, Constrained application protocol CoAP), Message Queue Telemetry Transport Protocol (MQTT), XMPP, DDS, AMQP CoAP and MQTT.	
Unit IV	**08 Hours**
Cloud Platforms for IOT: Virtualization concepts and Cloud Architecture,Cloud computing, benefits,Cloud services — SaaS, PaaS, IaaS, Cloud providers & offerings, Study of IOT Cloud platforms, ThingSpeak API and MQTT, Interfacing ESP8266 with Web services. Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.	
Unit V	**08 Hours**
IoT Security: Vulnerabilities Security Requirements and Threat Analysis, Misuse Cases, IoT Security Components, Key Management, Update Management, Challenges in IoT security, Tomography, and Layered Attacker Model, Identity Management and Establishment, Access Control, and Secure Message Communication, Security Models, IoT Security Protocols. Security in Service Management,	
Unit VI	**08 Hours**
IoT Applications and case study Broad categories of IoT applications: Consumer IoT, Commercial IoT, Industrial IoT, Infrastructure IoT, Military Things (IoMT), IoT applications in home, infrastructures, other IoT electronic equipments, Industry 4.0 concepts. **IoT Case studies**: Home automation with IoT, River water pollution monitoring, Smart city street light control and monitoring, Health care monitoring, Voice Apps on IoT device.	
Textbooks	
1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, ISBN: 0: 0996025510, 13: 978-0996025515.	
2. Raj Kamal, Internet of Things: Architecture and Design Principle" , ISBN-13: 978-93-5260-522-4, McGraw Hill Education (India) 2017.	
3. Lyla B. Das, "Embedded Systems: An Integrated Approach" Pearson , ISBN: 9332511675, 9789332511675	
4. Orchestrating and Automating Security for the Internet of Things: Delivering Advanced Security Capabilities from Edge to Cloud for IoT, by Anthony Sabella, Rik IronsMclean, Marcelo Yannuzzi, Publisher: Cisco Press, Release Date: June 2018,ISBN:	

9780134756936
5. Securing the Internet of Things, Shancang Li Li Da Xu, Syngress, 2017, Elsevier, ISBN: 978-0-12-804458-2
6. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.
Reference Books
1. Internet of Things: A Hands-on Approach, By Arshdeep Bahga and Vijay Madisetti Lee, Heather Schneider, Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, April 2004, ISBN-13: 978-0131172630
2. Lyla B. Das, "Embedded Systems: An Integrated Approach" Pearson , ISBN: 9332511675, 9789332511675
3. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill HigherEducation.
4. Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations ", ISBN: 9781498723183, CRC Press, 2016. 6.
5. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012.
6. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012, ISBN:978-1-119-99435-0.
7. David Hanes, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press, ISBN-13: 978-1-58714-456-1, ISBN-10: 1-58714-456-5, 2017.
List of Assignments
1. With neat diagram, explain simplified IOT architecture.
2. Getting started with NodeMCU, Arduino with ESP8266 and ESP32 in the Arduino IDE.
3. Familiarization with the concept of IOT, Arduino / Raspberry Pi and perform necessary software installation.
4. Explain with neat diagram, The oneM2M IoT Standardized Architecture.
5. Identify and analyse the security and privacy issues in IoT, particularly the issue of securing its wireless system.
6. List out the different IOT applications and importance of IOT in present scenario.
List of Laboratory Exercises
1. Excercise on Eclipse IoT Project.
2. Exercise on smart object API Gateway service reference implementation in IoT 3. Toolkit.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Experiment on HTTP-to-CoAP semantic mapping Proxy in IoT Toolkit.
6. Experiment on application framework and embedded software agents for IoT Toolkit.
7. Study and Configure Raspberry Pi.
8. Installing Windows 10 IoT Core on Raspberry Pi.

9. Experiment on connectivity of Rasberry Pi with existing system components.	
10. IoT based Web Controlled Home Automation using Raspberry Pi	
11. Implementation of Interfacing Raspberry Pi with RFID.	
Project Based Learning	
1. Internet of things enabled real time water quality monitoring system.	
2. Controlling Raspberry Pi with WhatsApp.	
3. Smart city IoT applications	
4. Turn your smartphone into an IoT device using the IBM Watson IoT platform cloud-hosted service.	
5. Implement a communication technology for IoT enable devices in a home network.	
6. Fingerprint Sensor interfacing with Raspberry Pi.	
7. Building Google Assistant with Raspberry Pi.	
8. Design a system to control the traffic signals through IOT	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

DATA ENGINEERING

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture:	**03 Hours/Week**	**University Examination:**	**60 Marks**		
Practical:	**--**	**Internal Assessment:**	**40 Marks**	**Theory**	**03**
				Practical	**--**
		Total	**100 Marks**	**Total**	**03**

Course Objective: Get a concise overview of the entire data engineering landscape

Prerequisite: Concepts of Querying, Data Warehousing, Data mining

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the data architecture and data engineering life cycle
2. Understand the source systems
3. Deduce various data storage systems for data engineering
4. Understand the ingestion phase of data engineering life cycle
5. Interpret the transformation and serving phase of data engineering life cycle
6. Recognise the future of data engineering

Unit I Data engineering described	**06 Hours**
What is data engineering? Data engineering skills and activities, data engineers inside an Organisation, What is the data engineering life cycle? The data life cycle versus the data engineering life cycle, Designing good Data Architecture	
Unit II Source systems	**06 Hours**
Data generation in source systems: How is data created? Source systems in detail, source systems practical details, Undercurrents and their impact on source systems	
Unit III Storage	**06 Hours**
Raw ingredients of data storage, Data storage systems, Data engineering storage abstractions, Big trends in storage	
Unit IV Ingestion	**06 Hours**
What is data injestion? Why to injest data? Key engineering considerations for the injestion phase, batch injestion consideration, message and stream injestion consideration	
Unit V Transformation and serving	**06 Hours**
Queries, modelling and transformations Serving data for Analytics machine learning and reverse ETL: General considerations for serving data, analytics, machine learning, ways to serve data for analytics and machine learning, reverse ETL	
Unit VI Security privacy and the future of data engineering	**06 Hours**
Security and privacy: People, Processes, Technology The future of data engineering: Decline of complexity and rise of easy to use data tools, The cloud scale data OS and improved interoperability, Enterprisey data engineering, Moving beyond the modern data stack towards the live data stack	

Textbooks

1. Joe Reis, Matt Housely, “Fundamentals of Data Engineering: Plan and Build Robust Data Systems”, O’Reilly publication, 1st Edition, 2022
Reference Books
1. Tobias Macey, “97 Things Every Data Engineer Should Know: Collective Wisdom from the Experts”, O'Reilly Media, 2021
2. Andreas Kretz , “The Data Engineering Cookbook Mastering The Plumbing Of Data Science”, 2019
List of Assignments
1. Compare the types of Data Architectures
2. Case study of data engineering using AWS
3. Case study of SAPRK as an ETL tool
4. Study of any one data ingestion tool and its architecture
5. Analysis of security in data engineering: Threats, Challenges, Considerations and best practices
6. Comparison of storage mechanism for various types of data engineering scenarios
Project Based Learning Implement any of the following or similar project using any data engineering tools such as but not limited to: SPARK, AZURE, AWS, Python etc
1. Predicting flight delays
2. Data pipeline
3. Creating a data lake
4. Creating an enterprise data hub
5. Streaming analytics on fraud detection
6. In-game events auto-adjustment of complexity levels, target advertising, etc
7. Dataset analysis for any application such as airline, twitter, etc

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

ELECTIVE-II: SEMANTIC WEB MINING

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	**04**	**University Examination**	**60**	**Theory**	**04**
Practical	**02**	**Internal Assessment**	**40**		
		Term Work	**25**	**Practical**	**01**
		Oral	**25**		
Total	**06**	**Total**	**150**	**Total**	**05**

Course Objective:

1. Understand a detailed overview of the data mining process and techniques, specifically those that are relevant to Web mining.
2. Understand the basics of Information retrieval and Web search with special emphasis on web crawling.
3. Apply the use of machine learning approaches for Web Content Mining.
4. Understand the role of hyper links in web structure mining.
5. Learn the various aspects of web usage mining.

Prerequisite:

1. Concepts of data mining, Concepts of Web Technology/Web Engineering

Course Outcomes: On completion of the course, students will have the ability:

1. Build a sample search engine using available open source tools.
2. Identify the different components of a web page that can be used for mining
3. Apply machine learning concepts to web content mining.
4. Implement Page Ranking algorithm and modify the algorithm for mining information.
5. Design a system to harvest information available on the web to build recommender systems.
6. Analyse social media data using appropriate data/web mining techniques and modify an existing search engine to make it personalized.

Unit I : Introduction	**08 Hours**
Introduction – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval Models-Relevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming. The Syntactic and the Semantic Web, Logics of the Semantic Web. The world of the semantic web-WWW-Meta data-Search engine-Search engine for traditional web-Semantic web-Search engine for semantic web-Traditional web to semantic web.	
Unit II : Semantic Web Technology	**08 Hours**
RDF,- Elements of RDF, Basic Syntax and Fundamental rules of RDF-Aggregation-Distributed information-RDFS-core elements of RDFS-Ontology-Taxonomy-Inferencing based on RDF schema. **OWL**: OWL syntax, OWL and RDF semantics, OWL document, Using OWL to	

define classes-Set operators-Enumerations-Define properties, ontology, matching-Three faces of OWL-Validate OWL. **Swoogle:** FOAF-Semantic markup-Issues-prototype system-Design of Semantic web search engine-Discovery and indexation-prototype system-case study.	
Unit III : Web Content Mining & Semantic Web Services	**08 Hours**
Web Content Mining – Supervised Learning – Decision tree - Naïve Bayesian Text Classification -Support Vector Machines - Ensemble of Classifiers. Unsupervised Learning - K-means Clustering - Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-Based Clustering - Evaluating Classification and Clustering – Vector Space Model – Latent semantic Indexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification. Introduction to web services- SOA, Limitations of web services. Semantic web services-OWL-S-Upper ontology-WSDL-S,OWL-S to UDDI mapping ,Design of the search engine, implementations.	
Unit IV : Web Link Mining	**08 Hours**
Link mining, common link mining tasks, link-based object ranking Web Link Mining – Hyperlink based Ranking – Introduction -Social Networks Analysis- Co-Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search - Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A Basic Crawler Algorithm-Implementation Issues- Universal Crawlers- Focused Crawlers- Topical Crawlers-Evaluation - Crawler Ethics and Conflicts - New Developments	
Unit V : Structured Data Extraction	**08 Hours**
Structured Data Extraction: Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning ·- Automatic Wrapper Generation: Problems - String Matching and Tree Matching - Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages- Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analysing Web Social Networks.	
Unit VI : Web Usage Mining & Semantic Web Applications	**08 Hours**
Web Usage Mining - Click stream Analysis -Web Server Log Files - Data Collection and Pre-Processing - Cleaning and Filtering- Data Modelling for Web Usage Mining - The BIRCH Clustering Algorithm -Affinity Analysis and the A Priori Algorithm – Binning. Discovery and Analysis of Web Usage Patterns – Modelling user interests –Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering- Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models . Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.	

Textbooks

1. Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-Centric Systems and Applications)”, Springer; 2nd Edition 2009.
2. GuandongXu,Yanchun Zhang, Lin Li, “Web Mining and Social Networking: Techniques and Applications”, Springer; 1st Edition.2010.
3. “Thinking on the Web” - Berners Lee, Godel and Turing, Wiley inter science, 2008.
4. “Social Networks and the Semantic Web”, Peter Mika, Springer, 2007.
5. Foundations of Semantic Web Technologies, by Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Publisher: Chapman and Hall; 1st edition (August 6, 2009).
6. Semantic Web Programming, by John Hebeler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, and Mike Dean (Foreword). Publisher: Wiley; 1 edition (April 13, 2009).

Reference Books

1. Zdravko Markov, Daniel T. Larose, “Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usage”, John Wiley & Sons, Inc., 2007.
2. Soumen Chakrabarti, “Mining the Web: Discovering Knowledge from Hypertext Data”, Morgan Kaufmann; edition 2002.
3. Adam Schenker, “Graph-Theoretic Techniques for Web Content Mining”, World Scientific Pub Co Inc , 2005.
4. Min Song, Yi Fang and Brook Wu, “Handbook of research on Text and Web mining technologies”, IGI global, information Science Reference – imprint of :IGI publishing, 2008.

Journals

1. Journal of Web Semantics, Elsevier, http://www.elsevier.com/wps/find/journaldescription.cws_home/671322/description
2. International Journal On Semantic Web and Information Systems,IGI Global, https://www.igi-global.com/journal/international-journal-semantic-web-information/1092
3. Semantic Web – Interoperability, Usability, Applicability, http://www.semantic-web-journal.net/

Resources

1. W3C Semantic Web Activity, http://www.w3.org/2001/sw/
2. semanticweb.org, http://semanticweb.org
3. SemWebCentral, http://www.semwebcentral.org/
4. W3Schools, http://www.w3schools.com/
5. John F. Sowa's Ontology pages: http://www.jfsowa.com/ontology/
6. The Semantic Web in Ten Passages, http://www.dfki.uni-kl.de/~boley/sw10pass/sw10pass-en.htm

List of Laboratory Exercises	
1. Discuss the Meta-Search and Web Spamming concepts in detail.	
2. Determine the location of a resource with the help of ontologies and reasoning using router	
3. Steps in designing a search engine. Take a case study of designing your own search engine.	
4. Design a crawler program to list out the URL's on the page, modify the program for again crawl those founded URL's to find more URL's using High speed computer (Hint : call the **crawl_site** function to **crawl** a **URL**.).	
5. Write a Script/ program to perform Analysis of User's Browsing Behavior and Their Categorization Using Markov Chain Model.	
6. Applications of Semantic Web, Web Search Agents	
Project Based Learning	
Study, Analysis, Design, Development, Testing and Launching of a Search Engine This project should be distributed among groups of 5 students each, with any of the task defined above.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Elective-II: Social Analytics in Digital Marketing

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		**Marks**		**Credits**
Lecture:	**04 Hours/Week**	**University Examination:**	**60 Marks**		
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Theory**	**04**
		Term Work	**25 Marks**	**Practical**	**01**
		Oral	**25 Marks**		
		Total	**150 Marks**	**Total**	**05**

Course Objective:

This course aims at giving students a knowledge of

- Social Media Analytics
- Digital Marketing

Prerequisite:

- Basic knowledge of Social media sites/ apps
- Basic knowledge of Digital Marketing tools

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand the Concept of Social media
2. Understand the concept of Social media analytics
3. Analyse various types of social media platforms.
4. Understanding the concept of Digital marketing
5. Analyse and understanding use of social media analytics in digital marketing
6. Understanding the effectiveness of different social media tools/apps in social media analytics

Unit I	06 Hours
Introduction to Social Media Analytics (SMA): The social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas	
Unit II	**06 Hours**
Network fundamentals and models: The social networks perspective - nodes, ties and influencers, Social network and web data and methods. Graphs and Matrices- Basic measures for individuals and networks. Information visualization	
Unit III	**06 Hours**
Making connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity. Web analytics tools and techniques: Clickstream analysis, A/B testing, online surveys, Use of Google Analytics; Web crawling and Indexing; Natural Language Processing Techniques for Micro-text Analysis	

Unit IV	06 Hours
Facebook Analytics: Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Postperformance on FB, Use of Facebook Business Manager; Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube Twitter etc	
Unit V	**06 Hours**
Processing and Visualizing Data, Influence Maximization, Link Prediction, Collective Classification. Applications in Advertising and Game Analytics (Use of tools like Unity30 / PyCharm). Introduction to Python Programming, Collecting and analyzing social media data; visualization and exploration	
Unit VI	**06 Hours**
Analyzing Social media campaign: Analyzing the social media of any ongoing campaigns and present the findings.	

Textbooks

1. Mathew Ganis, Avinash Koihrkar :Social Media Analytics IBM Press
2. Jim Sterne Social Media Metrics Wiley

Reference Books

1. Oliver Blanchard Social Media ROI Que Publishing Latest 4
2. Marshall Sponder, Gorah F. Khan Digital Analytics for Marketing Routledge 2017 / 1st 5
3. Marshall Sponder Social Media Analytics McGraw Hill Latest 6
4. Tracy L. Tuten, Michael R. Solomon Social Media Marketing Sage 2

List of Assignments

1. Enlist and describe different social media platforms.
2. Describe the use of social media for any business
3. Describe the different types of data commonly found on social platforms
4. Understand the ethical sensitivities in obtaining and operating on social data
5. Use a social platform API to obtain data and understand the structure of those data
6. Explain and discuss the importance of Social Media Analytics.
7. Evaluate effectiveness of different social media campaigns using various analytical tools.
8. Examine how different industries across the globe are using social media analytics

Project Based Learning

1. Analyzing the social media of any ongoing campaigns and present the findings.

Syllabus for Unit Tests:

Unit Test -1	Unit - I, Unit - II, Unit - III
Unit Test -2	Unit - IV, Unit - V, Unit - VI

Elective-II: Management Information System

Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Theory	04
		Internal Assessment	40		
Practical	02	Term Work	25	Practical	01
		Oral	25		
Total	06	Total	150	Total	05

Course Objective:

This course aims at giving students a knowledge of Information Management along with its applications in terms of the following:

- To understand the basics of Management Information System.
- Learn to evaluate information Management systems
- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To provide the theoretical models used in database management systems to answer business questions.

Prerequisite:

- Students must have the minimal concept of Data Base Management Systems
- They must also have the concept of different types of algorithms used for searching data
- To knowledge of DBMS

Course Outcomes: On completion of the course, students will have the ability to:

1. Describe the objectives of Management information systems.
2. Relate the basic concepts and technologies used in the field of management information systems
3. Outline the role of the ethical, social, and security issues of information systems
4. Understand query, document, and phrase translation.
5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization
6. Design and implement a recommender system.

Unit I Management information system in a digital firm**:**	**08 Hours**
Goals and history of MIS, Objectives of Management Information System, MIS concept - Definition –Role of the MIS.System View of Business, Process of MIS.Development of MIS within in organization.	
Unit - System analysis and design**:** **Implementation and controlling of management** Information System Approach and Introduction to Information System. Management as a control system. Impact of the MIS-MIS and the user. Need for system analysis. System analysis of a new requirements. System analysis of the existing system	

Unit III Technology of information system**:**	**08 Hours**
Data process- Transaction and application process Information system process; Unified communication and network. Computer Operation Of Manual Information System.Conversion of manual to Computer Based System. Resources and Components of Management information System.	
Unit IV Data base management system**:**	**08 Hours**
Objectives of data base approach. Characters of database Management systems Integration and Automation of Business Function and Developing. Components of DBMS packages. Data models.	
Unit V - Management Information system applications	
MIS applications, DSS – GDSS - DSS applications in E enterprise. Types of Applications. Features of Management System. e, E-communication, Business Process Engineering.Inout Output Design.	
Unit VI Architecture AND Design of IS:	**08 Hours**
Architecture Development and maintenance of Information System, Factor of Success and failure, Value and Risk of MIS.	
Textbooks:	
1. Management Information Systems: Managing the Digital Firm" by Kenneth C Laudon. 2. "Management Information System: Conceptual Foundations - Structure and Development" by Gordon Davis and Margrethe Olson 3. "Management Information Systems: Managerial Perspectives" by D P Goyal	
Reference Books:	
1. Jawadekar, W.S., "Management Information Systems", Tata McGraw Hill Private Limited, New Delhi, 2009 2. Mahadeo Jaiswal, Monika Mital: "Management Information System", Oxford University Press, New Delhi, 2008.	
1.Introduction to Management information System 2.Explain Types of Information. 3. Discuss Why do we need Computer Based System 4. Steps to Avail Management Information Systems (MIS) Assignment Help By Academic Expert. 5. Computer Operation Of Manual Information System. 6. Architecture Development and maintenance of Information System,	
Project Based Learning	
1. Implementation Management as a control system 2. Implementation Transaction and application process Information system	

3. Implementation Resources and Components of Management infortemmation System.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

Elective-II Cyber Security					
Teaching Scheme		**Examination Scheme**		**Credit Scheme**	
	Hours/Week		**Marks**		**Credits**
Lecture:	**04 Hours/Week**	**University Examination:**	**60 Marks**		
Practical:	**02 Hours/Week**	**Internal Assessment:**	**40 Marks**	**Lecture**	**04**
		Term Work & Oral	**50 Marks**	**Practical**	**01**
		Total	**150 Marks**	**Total**	**05**

Course Objective:

To understand threats and vulnerabilities to security.

To understand Information security models

To understand laws for cyber security

This programme aims to help the learners to navigate the foundations and skills necessary to build a career in the field of cyber security.

Prerequisite:

Basics of security

Knowledge of networking

Course Outcomes: On completion of the course, students will have the ability to:

1. Understand Information security and it's threats.
2. Understand cyber vulnerability and network security
3. Discuss authentication tools and information security models
4. Implement various security methods for web and mobiles.
5. Understand cyber crimes
6. Understand cyber security laws

Unit I Introduction to Information Security and Potential Threats	**08 Hours**
Introduction to Cyber Space, Cyber Security and Information Systems, Cyber Attacks and their Classification, Types of Malware and Threats.	
Unit II Cyber Vulnerability and Network Security	**08 Hours**
Assessment of Vulnerability, Intrusion Detection and Prevention Systems, Internet Protocols, Operating System Security and Network Security.	
Unit III User Authentication Tools and Information Security Models	**08 Hours**
User Authentication Methods, Information Security Models and Security Mechanisms, Biometric Systems and Biometric Authentication Processes.	
Unit IV Web and Mobile App security Methods	**08 Hours**
Web Security and Email Security, Security of Mobile Devices and Cloud Space, Social Media Security and IoT Security	
Unit V Cyber Crimes and Digital Forensic Science	**08 Hours**
Cyber Crimes, Scams and Frauds, Digital Forensic Investigation Methods, Cyber Trails, Branches of Digital Forensics, Reporting, Management of Evidence	
Unit VI Laws for Cyber Security	**08 Hours**

Jurisdiction of Cyber Crime, Information Technology Act 2000 and its Amendments, Validity of Digital Communication Evidences (Call Records /Emails/SMS), RBI Act and IPR Act	

Textbooks

1. William Stallings, Computer Security: Principles and Practices, Pearson 6 Ed, ISBN 978-0-13-335469-0
2. Nina Godbole, Sunit Belapure , Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiely India Pvt.Ltd, ISBN- 978-81-265-2179-1

Reference Books

1. Bruice Schneier , Applied Cryptography- Protocols, Algorithms and Source code in C, Algorithms, Wiely India Pvt Ltd, 2nd Edition, ISBN 978-81-265-1368-0.
2. CK Shyamala et el., Cryptography and Security, Wiley India Pvt. Ltd, ISBN-978-81-265-2285-9.

List of Experiments

1. Write a program to perform web security audit.
2. Write a program for Biometric authentication process.
3. Write a program to examine SQL injection attack.
4. Write a program to perform online and offline attacks of password cracking.
5. Evaluate network defense tools for DOS attack.
6. Evaluate network defense tools for IP spoofing.
7. A Case study on Cyber Crime.
8. A Case study on scams and Frauds.

Project Based Learning

1. Keylogging
2. Packet Sniffing
3. Breaking Caesar Cipher
4. SQL Injection
5. Hacking an Offline Device
6. Encrypting Images
7. Online Fund Transfers with DES Encryption
8. Detection and Intimation of Theft
9. Card Payment Security Using RSA
10. Detecting Data Leaks via Sql Injection Prevention on an E-Commerce

Syllabus for Unit Tests:

Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

Subject : ITL-VI		
Teaching Scheme	**Examination Scheme**	**Credit Allotted**
Theory : 00 Hrs/Week	**End Semester Examination : 00 Marks**	**Theory :00**
Practical : 02 Hrs/Week	**Internal Assessment : 50 Marks**	**Practical : 01**
	Term Work:25 Marks	
	Practical : 25 Marks	
Total: 02 Hours/Week	**Total :100 Marks**	**Total Credits: 01**

Course Objectives:
1) Design solution to deploy the application.
2) Apply the configuration management mechanisms.
Course Prerequisites:
Students should have knowledge of
Agile methodology, Basic Linux
Course Outcome:
Students will be able to:
1) Understand the Agile using DevOps
2) Apply Amazon AWS for containerization.
3) Analyze monitoring and logging using Kibana
4) Implement the CICD approach.
5) Perform the configuration management with Ansible.
6) Apply the kubernetics for Orchestration.
…

UNIT-I	**Dev Ops Essentials**	**(08 Hours)**
	Introduction to advances in Dev Ops, Linux commands and bash scripting which are frequently used by DevOps engineers.	
UNIT-II	**Containerization**	**(08 Hours)**
	Introduction to Containerization, concepts of docker and the di-erence between docker and VM. commands in docker and deployment of a monolithic application using Docker with AWS VM using AWS ECS service. setup and configure jobs on Jenkins	

UNIT-III	**Monitoring and logging**	**(08 Hours)**
	containerise applications at scale. Handling scalability issues with web applications by configuring load balancers, deciding server's geographical location, Application Monitoring using Kibana/ELK cluster. Site Reliability.	
UNIT-IV	**CICD**	**(08 Hours)**
	Automated Testing using Selenium and Jetkins, continuous integration, Tool, Applications using Maven, SonarQube. Continuous deployment using Amazon AWS.	
UNIT-V	**System Provisioning and Configuration Management**	**(08 Hours)**
	Introduction to Configuration Management via tools like Ansible and Terraform.	
UNIT-VI	**Orchestration using Kubernetes**	
	Orchestrate multiple docker containers using an orchestration tool like Kubernetes. Installation, component, architecutre, creating deployment, volumes, secret and creation of CICD pipeline involving kubernetes.	**(08 Hours)**

Assignment List:

1)	Implement all Linux command by deploying on VM
2)	Use Amazon AWS for containerization.
3)	Create Azure Pipeline
4)	Deploy the application using Nexus.
5)	Deploy Application using SonarQube.
6)	Use Amazon AWS for
7)	Implement Kibana for monitoring and logging.
8)	Implement the configuration management using Ansible.
9)	Deploy Docker Container app using Kubernetics.
10)	Design and deploy project using Microsoft Azure.

Text Books:

1)	DevOps Tools from Practitioner's Viewpoint Deepak Gaikwad, Willey.
2)	Docker for Developers: Develop and run your application with Docker containers using DevOps tools for continuous delivery Richard Mcguire, Pact.
3)	Hands-on DevOps with Linux, Mitesh Soni, bpb.

Reference Books:

1)	AWS Certified DevOps Engineer - Professional Certification and Beyond: Pass the DOP-C01 exam and prepare for the real world using case studies and real-life examples, Adam Book.
2)	Automated Deep Learning Using Neural Network Intelligence: Develop and Design PyTorch and TensorFlow Models Using Python, Ivan Gridin.
3)	Agile Model-Based Systems Engineering Cookbook: Improve system development by applying proven recipes for effective agile systems engineering , Dr. Bruce, Pacto

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY) Pune.

Faculty of Engineering & Technology
Programme : B. Tech (IT) (2021 Course)
Course Structure & Syllabus
(Choice based credit systems-2021)
B.Tech (IT) Semester I to VIII

1.

Sr. No	Parameter/ Dimensions	Department Responsible
1	Executive Summary	Electrical
2	Curriculum Concept	Civil
3	Curriculum Preamble	Civil
4	Curriculum salient features	BSH
5	Curriculum Details	
5.1	Courses-Theory/Practical's/Tutorials/Units/Co-mapping and Engagement , University exam and internal assessment	Computer
5.2	Credit Concepts- Equivalence	Mechanical
5.3	Vocational Courses - Objective, Hrs./Cr/Methodology, Assessment type, Record, Format for credit allotment/ Credit certificate/ Singing authorities.	ECE
5.4	Industry Taught Courses - Objective/Credit/Hrs. methodology, Approval format for expenditure, Request format for experts, Acceptance, Agreement time table, Display, Assessment - Theory/ Practical, Record, Bill format, Payment record.	ETC
5.5	NPTEL Courses - Objective- Methodology As sessment- Certificate- Credit certificate -Competent authority - Record.	Electrical
5.6	Projects (I & II) - Objective- Hrs./Credit, Description of stage I & II, Assessment evaluation, Format for TW evaluation and oral evaluation.	Mechanical
5.7	Social activity, assessment format, credit allotment, credit certificate	IT
5.8	Research paper	Chemical
5.9	Internship	Chemical

Executive summary

Students pursuing engineering studies need to be well equipped and state of art with the latest technological trends and industrial requirements. To produce the students with high caliber and technically sound, enrichment in the curriculum content and various quality initiatives are needed. This is possible only when the students undergo studies with an updated and evolving curriculum to match global scenario.

Curriculum Development History

- In ambits of Deemed University- 2000
- Curriculum of SPPU Accepted
- First Revision in 2004
- Second Revision in 2007
- Third Revision in 2011
- Fourth Revision in 2014
- Fifth Revision in 2018 was expected

The proposed curriculum is developed to inculcate the advanced engineering skills to cope up with upcoming industrial and societal needs. Students will be imparted with advanced contents from respective field and innovative delivery methods.

To inculcate the advanced engineering skills and knowledge, branch specific courses have been introduced from the Sem – I itself. There are total 38 theory courses, 4 vocational courses, 3 MOOCs, 2 projects, technical research paper writing, no. of application software courses, no. of practical based courses, 6 Industry taught courses along with 60 days exclusive internship have been incorporated in the curriculum with 230 credits and 6500 Marks.

There will be collaboration with the prominent industries to execute the vocational courses. These industries will deliver the content and execute the hands-on session to inculcate the required engineering skills of particular course. Also, one course per semester will be entirely delivered by the expert/s from the industry of respective field for which blended teaching learning will be adopted.

Students will apply the knowledge of respective courses and develop the prototype/ model as a part of project based learning.

To give the experience of technical writing and research article, students have to develop the two projects in pre final and final year respectively and shall submit the research article to reputed journal for publication. This will inculcate research aptitude among students and will enhance the research profile of institute also. Incorporation of various practical based courses in respective discipline, will give hands on experience to students to understand the engineering concept in better way. Nowadays all practices and process in the field are being computerized and automated. Hence, it was pertinent to increase software content in the curriculum. It was demand from the industry that every engineer should be conversant with Software/Programming/Data analysis and automation process. Hence, courses to such as C, C++, Python, Machine Learning, Artificial Intelligence are added in curriculum of all discipline. Students who wish to develop their career in the IT field, significant courses related to computational engineering and application software have been incorporated in the curriculum of each discipline.

National Education Policy is insisting the Online and Digital Education and Ensuring Equitable Use of Technology. To inculcate the self-learning approach amongst the students, proposed curriculum has introduced Massive Open Online Courses to all the students to provide an affordable and flexible way to learn new skills, advance the career and deliver quality educational experiences at scale.

2. Curriculum Content

- Curriculum derived from Latin word ‘Currere’, which means a race course or runway on which one runs to reach a goal.
- Curriculum is the instructional and educative programme by following students achieve their goals, ideals and aspirational life.
- Curriculum is a standards based sequence of planned experiences,

  which students practice and achieve proficiency in content and applied learning skills
- Its confidence building process
- Its total learning experience of the individuals
- Its interactive system of instructions and learning with specific goals , contents, strategies, measurements and resources.
- The desired outcome of curriculum is successful transfer / development of knowledge, skills, and attitude.
- Curriculum should lead to transformation of student to contributory member of the society

We tried to develop curriculum , which will meet these concepts.

Curriculum is the outline of concepts to be taught to students to help them meet the content standards. **Curriculum** is what is taught in a given course or subject. It refers to an interactive system of instruction and learning with specific goals, contents, strategies, measurement, and resources. It is a course of study that will enable the learner to acquire specific knowledge and skills. A **curriculum** consists of the "roadmap" or "guideline" of any given discipline. Both the philosophy of teaching of the instructors as well as of the educational institution serve as two of the principles upon which a curriculum is based.

In Engineering, a **curriculum** is the combination of instructional practices, learning experiences, and students' performance assessment that are designed to bring out and evaluate the target learning outcomes of a particular course. It is the goals, assessments, methods, and materials used to teach a particular skill or subject and includes thinking under "skill.". The curriculum needs to be planned and designed in such a way so as to sequentially improve students' knowledge and skills.

Placement is an important parameter and outcome of a good curriculum, which satisfy the need of good placement. The written curriculum is a plan of what is to be taught so that the student gets good placement. For this , a variety of technical and non-technical courses that are required to complete a specific degree so as to help the student for placement are included in the curriculum. In addition to technical knowledge , it should also include social behaviors as well as content and thinking skills.

Overall, the curriculum should be such that it should develop a student in a good job seeker, good entrepreneur and also a good human being.

All the above aspects are taken care in the curriculum of **B. Tech-2021** course. This will develop different abilities in a student.

3. Curriculum Preamble

The curriculum 2021 is formed such that it will develop different abilities in a student. It a combination of blended teaching learning process in which both online and offline teaching is a part of the curriculum. In order to develop affection towards the discipline a student has selected, core discipline courses are included right from first year. This will also help to give the overall idea about the branch
/ discipline to the student.

Interaction with the industry is increased in this curriculum by introducing two new concepts –

1. **Vocational Course** and 2. Industry Taught Course.

Vocational Course (VC), a student will able to develop a specific skill set from the relevant people/ agency from the industry. This will add in gaining new skill sets required by the industry. Such Vocational Courses are included from Semester III to Semester VI of the curriculum. Department also design vocational course relevant for the discipline, which add practical knowledge to students. The vocational courses should be discipline specific. 4 vocational courses and 8 credits are integrated with curriculum.

Industry Taught Courses (ITC) are the courses which will be taught by the people from industry who are experts in the relevant field, either partially or fully. This will provide a scope to students to gain the latest knowledge as used in industry and also to have direct one on one interaction with the industry. This will develop a confidence among the students. Such teaching by industry experts will be as per their availability, if required online and other than official college hours also. Thus, there is a blend of online and offline teaching, knowledge from academicians as well as from industry. Total six Industry Taught Courses are included in the curriculum.

Industry Internship of 60 days at the end of Semester VI integrated with curriculum, will also add to the interaction with the industry. A student will avail his training in industry or on site or in any design office or research organization as allotted to him/by the institute. A separate logbook will be maintained by the student during this period duly signed daily by the competent authority.

Project Based Learning is a part of almost each course of the curriculum. Small projects on relevant topics will be allotted to the students as a part of term-work of that course. This will inculcate the habit of applying the knowledge learnt to solve practical problems.

Two Projects are included in two stages, one in third year (Sem V and Sem VI) and the second in final year (Sem VII and Sem VIII). Improvement in Research, thinking ability and application of theoretical knowledge to develop practical ideas is the main purpose of these projects.

Publication of a research paper is the outcome expected from the Project work and as a motivation, separate credits are allotted for this. Students are expected to write research article based on Project-I in standard journals in final year. Guide for Project -I will help in writing the research article.

To develop the self studying, self-learning skills, each student has to join the **MOOC/NPTEL** courses and will get the certification of the respective course. This will also give him/her a chance to get the knowledge from teachers from well known institutes of national repute. Three such MOOC/NPTEL courses are included each in Semester III, Semester V and Semester VII and separate credits are allotted to it.

Various new courses are introduced in the curriculum thereby introducing the current and latest technology to students. Basic Science and Engineering Science course contents are designed to match the requirement of the specific disciplines.

Number of software related to that branch/ discipline are included as part of the curriculum. This will help the students to get good placement.

Few soft courses are introduced to non-circuit branches. This will give a soft feel to such branches and also to inculcate confidence among the students.

In addition to technical abilities, a student needs to be developed as a good human being. For this, he will complete social activities in Semester IV and Sem VIII.

Thus Curriculum-2021 satisfies the requirements of National Education Policy- 2021.

"Knowledge, Skill, Behavior" are the three attributes that are inculcated in a student when he completes his B.Tech. course under Curriculum-2021.

Recommendations considered

- UGC- Quality mandate
- National Education Policy (NEP)

- AICTE model curriculum
- Curriculum of International Universities
- Curriculum of Indian Universities
- Feedback from HR of industries called for placements
- Market perception

Methodologies Adopted In Designing Curriculum (2021-22)

- 19 Basic Points for design of Curriculum
- Listing of common points (credits, marks, No. of courses, common courses, industry taught courses, vocational Programmes etc.)
- Conducted series of meetings
- Conducted in depth one on one discussions with HoDs
- Planned three workshops,
- Eminent experts from Industry, IITs, IISER, NIT, SPPU, Central Universities were invited for workshops
- First workshop - Course structure, Titles of courses, Industry taught courses, Vocational Courses.
- Second workshop - Content of first and second year courses
- Third workshop - Content of third and fourth year courses- (Planned)

4. Salient features

- Total 250 contact hours teaching are incorporated.
- Credit based 38 theory courses being offered to achieve global standards of quality.
- Curriculum offers practicals to more than 80 % (~ 30 theory courses) theory courses.
- Total 230 credits (6500 marks) are offered for the entire B. Tech. programme.
- Theory courses contains 60% of courses and 20% to practical courses.
- Tutorials (6 Credits), online courses (6 Credits), vocational courses (6 Credits), projects (18 Credits), internship (3 Credits), Research Publication (2 Credits) and social activities assigned (4 Credits) contains remaining 20% of credits
- Blended education policy is adopted considering its importance. 20% courses are taught in online mode.
- Incorporation of 6 industry taught courses is one of the important and strategic step.
- Adopting 4 vocational Programmes in cooperation with industries, renowned agencies, universities will improve skillsets of our students.
- 60 days industrial internship to meet the requirements of industry.
- Including of 2 projects to enhance technical skills & self learning.
- Research paper based on Project-I will inculcate research aptitude among students.
- Project based learning practically for all courses will enhance the ability of application of knowledge and problem solving aptitude.
- NPTEL/ MOOC courses in online mode are introduced as integrated part of the course structure.
- To understand social responsibility and social activities of weightage of 4 credits are integrated part of the course structure.
- Quantitative Techniques and communication courses are introduced to enhance the analytical ability of students and address employability.
- Wide range of elective courses have been offered to provide the choice, to explore the knowledge in their domain of interest.

Salient Features

Sr. No.	UGC (Quality mandate)/ NEP2020- Recommendations	Curriculum (2021-22)
1	Learning Outcome-based Curriculum Framework (LOCF)	a) Programme outcomes and course outcomes are being made ready
2	Imparting Life Skills to Students.	a) Quantitative techniques b) Communication skills c) Bridging gap with Industry by vocational courses d) Self learning by NPTEL/PBL/Two projects
3	Social and Industry Connect	a) 6 Industry taught courses b) 4 Vocational courses c) 60 days internship d) Time and credits for social activities
4	Promotion of Research and the Creation of New Knowledge.	a) Research publications based on projects b) Project based learning
5	Blended Education	a) 15% courses in online mode b) NPTEL/MOOC courses in online mode
6	Technology Enabled Learning/Self Learning	a) NPTEL/MOOCS
7	Software Applications	a) Programme specific softwares and Software application Courses

5. Curriculum Details

5.1. Courses-Theory/Practical's/Tutorials/Units/Co-mapping and Engagement

Courses-Theory/Practical's/Tutorials/Units/Co-mapping and Engagement, University exam and internal assessment

The B.Tech. 2021 offers Credit and Outcome based curriculum with total 230 credits, required for graduation with a Bachelors' degree (B.Tech). The Under- Graduate Programme (B.Tech) is of four years duration i.e of eight semesters (two semesters/year).

Engagement of Courses:

The courses in revised curriculum structure of B.Tech. program are categorized under Core courses, Elective courses, Engineering Science courses and Basic Science courses. These courses are taught to students by engaging them through lectures, practical or tutorials by respective course coordinators. From semester I to VI, there are five (lecture engaged and assessed) courses and in semester VII and VIII there are four (lecture engaged and assessed) courses which are mandatory. All the courses have varying hours of engagement and credits. Theory lecture engagement varies between 3 hours to 4 hours/week, practical engagement varies between 2 hours to 4 hours/week for the respective courses. The contents of every course is divided into six units. Each unit can be covered in 6 hours or 8 hours depending on the total allotted hours/week of lecture engagement for the respective course. Some courses are solely practical oriented. These courses will be only engaged through laboratory sessions.

Outcome Based Curriculum:

Planning and realization of teaching and learning related to outcome-based curricular model requires that initial element shall be an outcome. It serves as a basis for defining modes of evaluation and validation of outcomes. The curriculum defines the Course Outcomes (COs) and course objectives for every course. The outcomes are assessed through various activities and evaluation of learner's performance in various examination schemes i.e Theory/Practical/Oral/Term work.

Credit Calculation:

The course credits are computed based on the teaching hours per week for that course using the formula as mentioned below.

Credits earned by the Student = Credits earned in Theory (Th) + Credits earned in Practical (P) / Oral (O) + Credits earned in Tutorial (T)

Here, as mentioned above, the credit assignment for Th/P/O/T of any course is based on number of teaching hours of that course. It is as mentioned here:

Number of Credits for Theory (Th) courses = Number of classroom teaching hours per week for that course (1:1 correspondence)

Number of Credits for Practical (P) / Oral (O) courses = Number of laboratory hours per week for that course / 2 (0.5:1 correspondence)

Number of Credits for Tutorial (T) courses = Number of tutorial hours for that course (1:1 correspondence)

Example: If a course has 4 hours of classroom teaching, 2 hours of laboratory session and 1 hour of tutorial, then the credits assigned for that course will be 4(Th), 1(P/O) and 1(T) respectively.

Examination Pattern:

A) University Examination (UE)

The pattern for theory examination is of 60:40, where the learner can earn 60 Marks (maximum) through University Examination (UE) and 40 marks (maximum) are assigned for Internal Assessment (IA). For the UE of Practical/Oral assessment, the total marks allotted are 50. The laboratory assessment is divided into three assessment heads viz. Term work (TW), Practical
(P) and Oral (O). The students will be assessed through TW or P or O or combination of any of these for the courses that have practical assessment. 25 Marks are assigned to TW/P/O each, so when a learner is assessed for practical through TW and P heads, he/she will be assessed for 50 marks.

B) Internal Assessment (IA)

The Internal Assessment (IA) for the respective courses will be performed through Unit Tests (UT) and Assignments. Total two UTs of 20 marks each will be conducted and the average marks of these two UTs will be considered. Similarly, course coordinators will design the class assignments in terms of exercises, case studies, real world problems or mini projects, which the learners have to submit from time-to-time, as mentioned by the deadline of each assignment. While designing the assignment, the course coordinators will provide the assessment criteria to the learners and maximum score (marks) for the assignment as well. If there are multiple assignments, then the average of score (from score attained in all assignments) will be calculated and considered as IA marks. This way, the learner will be assessed for 20 marks (maximum) for assignments.

Hence, total marks for UT and assignments are 20 each and so, IA will be of 40 marks. The score for IA is calculated as:

IA Score attained by learner (Max 40) = Average Score attained in UTs (Max 20) + Score attained in Assignments (Max 20)

5.2. Credit Concept: Equivalence

In CBCS 2021 Course structure, the allotment of credits are as follows: Theory

class of 1 hour: 1 Credit

Practical class of 2 hours: 1 Credit Tutorial

class of 1 hour: 1 Credit

Project, Research Paper & Social Activity: 1 Credit

5.3. Vocational course

Vocational learning opportunities play a important role in skill development and employability of student. Vocational courses are ways of implementation of theoretical knowledge in the practice.The importance of vocational development can largely be summed up as the difference between theoretical knowledge vs. practical skills. The vocational courses are based on the teaching of practical skills. These courses are designed to introduce the manual skills in the professional education in addition to the theory. These courses will serve as bridge courses for professional growth and career improvement.

Aims & objectives of vocational courses:

- To provide students with technical knowledge and skills necessary for progressive education in engineering profession.
- To give a better understanding of the emerging of technology.
- To train the student with necessary skills leading to skilled personnel who will be enterprising and self-reliant.
- To enhance the skill of students for becoming self-sustained engineer.
- To reduce the mismatch between the demand and supply of skill man-power.

In this curriculum at B.Tech Programme, there are four vocational courses introduced i.e. in Semester III, IV, V and VI. The courses offered at these semesters are as per the requirement of the programme.

Methodology:

The vocational courses shall be conducted in association with the companies through MoUs. The candidate shall be provided training in the industries in respective area. The training can also be given by the company experts in the college with appropriate infrastructure. Departments can design vocational programme/course as per employability skills for an engineer of respective discipline required. The student shall have to attend the training sessions for at least 4 hours per week. The training sessions shall be organized on weekends or on the extended hours of the college timing.

A faculty-in-charge will be appointed to monitor the functioning of the vocational course as well as monitor the performance of the student for the said course.

The student has to maintain proper record of the training attended throughout the semester and submit the report on the work carried out. The record has to be checked and signed by the faculty –in-charge.

Assessment:

The assessment of the performance of the candidate for the vocational courses shall be in the form of term work and oral. The term work and oral carry 50 marks. The candidate performance shall be evaluated based on the training undertaken by the candidate throughout the semester. Student shall give presentation of skills he learned through vocational courses followed by viva. External examiner for the same shall necessarily from relevant industry.

A total of 2 credits shall be allotted per vocational course per semester.

Certificate:

Every candidate shall be awarded a certificate after successful completion of the vocational course as per the rules & regulations.

The certificate shall be jointly signed by concerned authorities of college and the company.

5.4. Industry Taught Courses

PREAMBLE:

The concept of Industry Offered Courses enables bridging of technological gaps between students and state-of-the-art technologies used current in the industry.

OBJECTIVES: To

i. Impart the state-of-art technology course existing in the industry.

ii. Expose students to application of technologies adopted by industry.

iii. Train students for solving real-world projects in respective industries by applying technical knowledge gleaned from an industry expert

iv. Make students draw benefit from the experience of veterans from industry. Knowledge sharing by industry experts.

v. Align student's mind-set towards industrial environment through the instructor from industry. Provide industry instructor lead courses.

CREDIT/HRS.:

Percentage of Industry Taught Courses in the programme =......................%

METHODOLOGY:

A) A faculty shall be appointed as course co-ordinator. Roles and responsibilities of Course coordinator are as follows:

(i) Act as a liaison between identified Industry expert and department.

(ii) Arrange schedule of lectures in consultation with identified Industry expert.

(iii) Keep record of students' attendance.

(iv) Collect feedback from students and suggest changes and modifications in lecture delivery method by industry subject expert.

(v) Keep record of Unit Test Performance and Practicals along with experts.

(vi) Organise visit to the industry relevant to the course.

B) Execution:

(i) The Identified industry expert can conduct theory classes on weekends or as per convenience of Industry experts either through offline or online mode. The courses which are to be taught by expert from industry are already identified and confirmed in workshop-I

(ii) Practical sessions will be conducted by course coordinator. Panel of experts from Industry shall be identified to teach the course before the commencement of the respective semester and submitted for the approval of the Head of the Institution with financial layout.

BHARATI VIDYAPEETH
(DEEMED TO BE
UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE – 411043.

Approval format for Expenditure for Industry Taught Course

Date:

Name of the Department:

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1. Budgetary allocation for industry expert (As per Budget 2021-22) Please mention total amount (in Rupees) and other bifurcations, if made---------------- (to be filled at college level)
2. No. of Lectures (Industry offered Course wise / Subject wise) required with specific subjects:

Sr.No.	Title of the course	Name of Department	Semester	Work Load per week	Details of Industry Expert(s)				Total Remuneration
					Name & Designation of Expert	Name of the company	Contact Details	Honorarium per lecture	
1									
2									
3									

Recommendation for Course Coordinator
Recommendation for HoD Recommendation
for Principal

3. Total financial Outlay for honorarium of Faculty: (Industry taught courses-Subject wise): with number of lectures (in Hours) in UG sections

Sr. No.	Name of industry Expert	Honorarium	Financial Outlay (in rupees)
1			
Total			

Signature of HoD **Signature of Principal**

Request format-To Industry Expert

To

……

Subject: Industry Taught Course (ITC) for B.Tech (…..) , Sem-____

Dear Sir,

Greetings from Dept. of ________, Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune

Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune, BV(DU)COEP an AICTE approved institution, was established in the year 1983 and is a constituent unit of Bharati Vidyapeeth (Deemed to be University), accredited (3rd Cycle) with 'A+' grade by NAAC and NBA.

In the national arena, BV(DU)COE Pune has been among top 100 Engineering Colleges of India, consecutively for five years (99th ranking in 2020) by MHRD in June 2020. It has also been ranked 20th at national level by AICTE Internshala for internships. Our reputation as India's premier engineering institution is further enhanced by being honored with the Platinum category by AICTE-CII survey. College is proud to be ranked 11th across India by the prestigious magazine India Today. DATAQUEST a leading journal, ranked BV(DU)COEP in 3rd position amongst the Top 50 Private T - Institutes of India. The college ranked 17th position in the survey conducted by Times of India in 2019.

----Brief about dept-----

The course curriculum has a multi-dimensional approach, it not only implements a dynamic, qualitative, and evolved structure and syllabus, but also incorporates a good and healthy mix of theoretical and practical exposure. In this regards the institute promotes and encourages courses in line with industry expectations and forthcoming challenges which should ease the students for undergoing industry offered courses for practical exposure of applications of Education system. This is much required to bridge the gap between Industry and Academia and by promoting industry orientation for creating a complete industry ready professional.

To fulfil these objectives, curriculum design, which will be implemented from the academic year 2021-22, B.Tech. program includes 6 courses taught by industry experts. With reference to the subject mentioned above, we request you to teach…
….. Total…… number of lectures (60 min each) are required to be delivered. A blended learning, to be offered for the students through combining online or offline teaching wherever and whichever is best possible. Therefore, I request you to send acceptance letter, mode of teaching, convenient day and time slot to teach the said course. Enclosed please find herewith standard format for reply.

With Thanks and Regards,

Sign and stamp of Head, Dept of _______

Enclose:- Course content

Reply

To

The Principal

BV(DU)

COE,

Pune.

Subject: - Acceptance for delivering/ conducting lecture of the course ------------- of B.Tech(-----), Sem(----).

Ref.: - Your letter------------------- dated-

Dear Sir,

This has a reference of your letter mentioned above. It gives me immense pleasure to accept your invitation to deliver lectures in the said course. Following will be the time-table for the lecture.

Sr. No.	Title of Course	Time	Days						
			Mon	Tue	Wed	Thu	Fri	Sat	Sun

Sincerely

<Signature >

< Name of Expert>

BHARATI VIDYAPEETH
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Date:

AGREEMENT TIME-TABLE

Name of department:

Name of industry taught course:

Sr. No.	Day	Date	Time Slot

(Name & sign. of HOD with date & stamp) (Name & Sign. of Concerned Person)

Industry Taught Courses (Assessment- Theory/ Practical)

- One course coordinator should be appointed for the course. All documents related to assessment of the course will be maintained by the course coordinator.
- Total assessment of Industry Taught Course -Theory is of 100 Marks.
- Assessment of this course consists of Internal Assessment and End Semester Exam which carry 40 Marks and 60 Marks, respectively.
- Internal Assessment consists of assignments and mini projects.
- One real world project (mini project) is considered as part of Internal Assessment.
- Students should give presentation on given topic.
- Industry expert should set question papers.
- In case of practical exam, industry expert can take oral exam (may be online) and students will perform the experiments in the presence of course coordinator in the department.

**BHARATI VIDYAPEETH
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B.Tech (Brach Name) Sem __

Title of ITC: - __________

Record of Lecture Taken

Sr. No.	Lecture No.	Unit no.	Date of Conduction	Topic Covered	No. of Students Attended	Sign

BHARATI VIDYAPEETH
(DEEMED TO BE
UNIVERSITY)

Bill format for remuneration for Industry Taught Courses

(The bill should be submitted directly to the concerned department on or before 5th of every month)

1. Name of industry expert: ______________________________
   Company/Industry name:
2. Name of the Department: ______________________________
3. Remuneration for the Month: ______________________________
4.

Name of the Bank	Branch	A/C No.	IFSC

5. Contact Details: -

Email	Cell Phone No.

6. Details of lectures delivered:

Sr. No.	Title of the Course	Class	Date	No. of lectures	Total Remuneration (Rs./lecture)
	Total				

Date: ____________

____

Signature of the Industry expert

Certified that   has been appointed by the ----- dept as an industry expert for the course vide order No. ___________________________

dated. _________________________ has delivered _____ lectures/taken classes during the month/ Sem ______________________

and is entitled to honorarium of Rs. _____________________(@Rs. ------ /- per lecture/per day)

Course Coordinator: ____________________________

____

Signature of the Head of the Department with Seal Date:

Receipt: -

Received with thanks ₹-------- from BVDUCOE, Pune towards conduct of -------- lectures of the course ------------- of B.Tech(-------), Sem ---- --.

Signature of Industry Expert

BHARATI VIDYAPEETH
(DEEMED TO BE
UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE – 411043.

Payment Record
(Copy to be maintained in the Department)

Sr. No	Name of Department	Name of course	Name of Industry Expert	Name of company	Email	Mo. No	Address	Amount	Remark/ check number transaction id

Encl:
1) College voucher copy
2) NEFT/RTGS copy

5.5 MOOCs Implementation

To inculcate the self-learning approach amongst the students, proposed curriculum has introduced Massive Open Online Courses to all the students. It will provide an affordable and flexible way to learn new skills, advance the career and deliver quality educational experiences at scale.

Also, National Education Policy is insisting the Online and Digital Education and Ensuring Equitable Use of Technology.

A massive open online course (MOOC) is an online course aimed at large-scale interactive participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for the students, professors, and teaching assistants (TAs).

BV(DU)COE Pune is having active NPTEL local chapter-partnership. Proposed curriculum has introduced three MOOCs at B.Tech Sem – III, Sem V and Sem VII with following objectives.

1. To provide e-learning through online web and video courses in Engineering by experts in the country in that subject.
2. To develop self-learning attitude in students.
3. To provide platform for knowledge enhancement of student's as per their area of interest.
4. To update students with advanced technologies.
5. To make the students more employable.
6. To prepare the students for competitive exams like GATE and also for higher studies.

Methodology of Assessment:

- Department shall publish list of NPTEL courses in every semester. Student can refer selected one of them in respective semester.
- Considering pre-requisite, proposed curriculum has provided with the various subject baskets as per the courses available.
- Students need to enroll for the course in each academic year as mentioned in the structure.

- Students need to attend all online lectures and complete all assignments as per schedule for registered course.
- Student will register and appear for exam conducted by NPTEL and shall submit the copy of course completion certificate received after passing the exam for registered course.
- Accordingly, the credits will be allotted to the student for respective MOOCs.
- Students have the flexibility to attempt the said course during the entire B.Tech Programme to earn the credits of respective MOOCs.
- NPTEL courses relevant to respective branch are only expected to select by students. Credits will not be awarded if general/ non engineering courses opted.

5.6 Project I and II

Project Stage I Objectives:

Provide help to the students

- In generating a new idea or modify existing system for solving societal, industrial and/or institutional problem.
- In review of literature that aligns with new idea and/or existing systems and clearly defining the problem
- In developing a workflow process/methodology for the desired system.
- In designing various components of the system assembly
- In developing a CAD model of the desired system.
- In writing the technical report based on the work completed

Project Stage II Objectives:

Provide help to the students

- In fabrication of the experimental setup/new system and/or purchase of standard components
- In pilot run and/or validation of new system for its performance
- In modifying the system if required to improve its performance.
- In detailed parametric studies of the modified system and analyzing the results
- In writing the technical report, research article and/or filing a patent.

Particular	Hours per week	Credits allotted
Project I stage I	2	4
Project I stage II	2	4
Project II stage I	4	4
Project II stage II	4	6

Assessment & Evaluation:

For Project-I Stage I & II		
	Assessed through	**Marks**
Assessment Tools	Presentation 1	10
	Presentation 2	10
	Presentation 3	10
	Continuous Assessment by guide	10
	Final Project demonstration, presentation & viva voce (University Examination)	60
	Total Marks	**100**

For Project-II Stage I & II		
	Assessed through	**Marks**
Assessment Tools	Presentation 1	20
	Presentation 2	20
	Presentation 3	20
	Continuous Assessment by guide	20
	Final Project demonstration, presentation & viva voce (University Examination)	120
	Total marks	**200**

Minimum number of in-sem. project presentations: 03 Parameters for evaluation of project in University examination

1. Idea of Project/Topic
2. Technical content
3. Innovation
4. Experimentation/Model development/Software development/Simulation development etc.
5. Participation as an Individual
6. Research Potential
7. Project Hardware/Software
8. Fabrication/Model/Equipment development
9. Data Analysis
10. Attendance
11. Timely completion
12. Report writing
13. Presentation

Prepare a format for report card of indicating progress, assessment and progressive evaluation of the project. This progressive evaluation record (PER) is prerequisite for university examination.

Progressive Evaluation Record (PER) shall be submitted in the department at the end of the semester and made available at time of university examination.

Format for Internal Examination for Project- I & II B.Tech (------), Sem--------

Roll No.	PRN	Name of student	Term Work Marks			
			Presentation- I (10%)	Presentation- II (10%)	Presentation- II (10%)	Continuous Assessment by Guide (10%)

Format for University Examination for Project- I & II

Roll No.	PRN	Name of student	Parameter for assessment of project and marks for examination													Total out of 100	Any five parameters out of remaining
			Idea of Project/ Topic	Technical content	Innovation	Experimentation/Model development/ Software development/ Simulation development etc	Participation as an Individual	Research Potential	Project Hardware/ Software	Fabrication/Model/Equipment development	Data Analysis	Attendance	Timely completion	Report writing	Presentation		
			10	10	10	10	10	10	10	10	10	10	10	10	10		

Out of 13 parameters, parameters no. 1,3,4,6 & 8 are mandatory and may be considered for assessment of the project. Each parameter will carry 10 marks for Project-I & 20 marks for Project-II.

5.7 Social Activities for the Learners

A) Introduction

The prime objective of Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune is holistic development of students. The learner achieves the status as “whole” when he/she has not only achieved success in academics but also has succeeded in bringing the nation up by connecting with socially left-out elements and bringing ray of hopes into their lives. In this respect, the new curriculum encourages the learner on the social activities. In this case, student’s social activities are provided by the colleges, but not limited to them. Total of four credits assigned for these activities.

B) Objectives

a) To make people create balances, so they do not only focus on academic aspects, but there can also be other aspects to have in life.

b) To build better relationship with others.

c) To create great balance with the academic aspects.

d) To learn and understand society.

e) To develop the nature of help and enhance the ethical norms for behaviors.

f) Teamwork

C) Outcome of Social Activities:

The social activities make a good impact on learners. The learner:

a) Will be able to understand the needs of society.

It enables a learner to consider the perspective of other people and understand their needs by interacting with people from diverse backgrounds.

b) Will be able to understand different perspectives and engage other cultures.

Social events develop social skills and empathy—the outward-oriented dimensions of emotional intelligence (EQ). The interactions or conversations elicited by events helps students build relationships, understand different perspectives and engage other cultures. Social events provide an opportunity to expand one’s social circle.

c) **Will be able to maintain positive outlook towards life.**

With high adaptability to diverse situations and a good level of understanding of other's opinions, socially aware learners are less likely to indulge in negative behavior. They are also less vulnerable to stressful situations and have fewer chances of getting involved in undisciplined behavior. These students also have a more positive outlook on life.

d) **Will be able to maintain good emotional health.**

Social activities keep the learners sharp and mentally engaged, and this is important to prevent the onset of serious diseases like dementia or Alzheimer. Connecting with others helps keep you in a positive mood, which in turn wards off depression by improving physical health and maintaining good emotional health as well.

D) Sample list of Social Activities (not limited to them)

a) **Organizing Educational Camps**

Educational camps may be organized for the socially and economically week elements, especially in rural areas or even in the slum areas of the city, by making them aware of the importance of education and their own human rights.

b) **Tree Plantation Drive**

There are so many health benefits to having plants around – like fresher air, improved emotional state, and reduction of illness in and around the society. Tree plantation in this respect plays a crucial role. Just planting the tree is not enough but it should be made to grow to its extent.

c) **Offer Helping Hand for Martyrs Family by Fundraisers**

Soldiers fight for our country, securing our borders. They don't think of their family and sacrifice their lives for us, and what we do for them? Packages are announced every time after the death of our worriers but rarely reaches them. Families keep waiting for years. In this regard, few of these forgotten families can be visited and a small helping hand can be lend to them, to make them lead their further life peacefully. Fundraising in this respect, is a great student society social idea. It is incredible to see how people can bring positive change if they work together. The youth can make a team with an external organization to take part in a purposeful community event as mentioned above.

d) National Service Scheme

It will help in the overall personality development of a learner by participating in projects that benefit the community. This extra-curricular activity is sponsored by the Ministry of Youth Affairs and Sports.

e) Felicitations of People who have contributed to the society but now forgotten by the society

There are so many intellectuals in our society who have achieved great heights in their field, who are stalwarts in different field but never came into limelight, their contribution is not recognized. Few of these can be invited publicly or visited at individual level by making a team and felicitate to appreciate their contribution towards the society or nation. Some of these stalwarts may be like Anand Kumar who teaches underprivileged students for IIT-JEE without a penny, Shekhar Naik who is the Captain of Indian Blind Cricket Team, Ranjeet Singh Desale who even being a rural teacher, is awarded by UNESCO with Global Teacher Prize, Ritu Biyani who fought cancer, traveled across the country to spread awareness.

f) Street Play on Social Awareness

This is also typically known as “Nukkad Natak”. This form has been used to propagate social and political messages and to create awareness amongst the people regarding social issues. What is important is that the plays make the people think. The play is seen by many people of different age groups who then question and discuss the contents of the play. There have been several plays exposing the mechanism of black marketing and hoarding. Some talk of the use of political power for pressurizing people. Others highlight caste conflicts or ideas about hygiene and health. Street plays are also used to encourage literacy amongst villagers. Street plays on some of the topics like degradation of Indian media, hypocrisy, responsibility towards environmental concerns, brain drain, dilapidated educational structure, safety issues and rights for women. child labor, organ/human trafficking etc., can be thought of. The learners can participate in street play festivals like Manthan Mahotsav, the largest street play festival in India.

g) Poster Exhibition on Contributions of Heroes of India

The learners can organize an exhibition to not only display but explain the contribution of Indian Heroes who have been forgotten and remained in the book of history. Some of these inspiring heroes may be Mihir Sen, Khashaba Dadasaheb Jadhav, Anandibai Joshi – First woman doctor from India, Bhikaji Cama, Khudiram Bose, Baba and Prakash Amte etc. Such exhibitions make inspired, the youth of today's generation.

h) Waste Clean Drive

i) Educating literacy-poor societies about disposal of nature-harming objects

j) Distributing needful items for living in economically backward societies

k) Organizing early completion on national issues.

l) Cleaning of Public Places/ Traffic Management/ Police Mitra.

m) Organizing activities under engagement of people with Science and Technology.

Report of social activities conducted each student shall be prepared in standard format. Appropriate documentary evidences shall be part of report of students correspondence with respective authorities for social activities, permissions, certificates from Institutes/Organization/Local Government are essential documents for award of credits under this head.

E) Summary

Thus the interactions or conversations elicited by such social events help students to build relationships, understand different perspectives and engage other cultures and these events not only will uplift the moral of the society but also ignite minds of generations ahead to provide their support and enthusiastically participate in such activities. Such interactions will certainly provide an opportunity to expand their own social circle.

5.8 Internship

Internship of 60 days is incorporated as an integrated part of curriculum structure-2021. The primary objective of internship is to make students familiar with industry environment and to take up on- site assignment as trainees or interns in order to bridge the gap between theory and industrial practices. It is mandatory for students to undergo in-plant training after completion of semester VI in reputed industrial organization. The student shall submit the "Intern Certificate" issued by the industry organization as well as a technical report not exceeding 30 pages within the stipulated time to be eligible for making a presentation before the committee constituted by the department. On the basis of daily work carried out in the industry, student shall prepare a record book. This record book shall be checked and signed by his/her supervisor from the industry where he/she is doing internship on daily basis.

University examination carries 50 marks and after successful completion, student may be awarded 3 credits for the internship work. Standard format for record book shall be as below. Marks will be awarded out of maximum 50 and three credits will be given upon completion of internship towards the degree requirements, as per the regulations. Internship will ultimately assist students to apply theory learned in classroom to industrial practices so as to understand engineering/technical solutions in a global, economic, environmental and societal context.

5.9 Research paper publication

Research paper publication is one of the innovative features of programme curriculum- 2021.

1. It has been & introduced in 7th semester. Two credits are awarded for the same subject to publish of research paper. Student shall publish a research paper in peer reviewed/ Standard journal(not in paid journals) based on research work carried out for Project-I. Guide for Project-I shall be responsible for Writing manuscript, Selection of journal for publication, Submission of manuscript to the journal. Progress report of publication of research paper shall be prepared in standard format and submitted for the award of credits. Students shall be first author of research papers. No name either of faculty members except guide or other students shall be added without any contribution in research/project work. Format for progress report of research paper published (To be maintained by Guide). A departmental committee comprising of head of department, project guide, and one senior professor will review the progress of this activity periodically (not exceeding three months). The suggestions/comments offered by committee will be incorporated in due course of time to accomplish the task within a predetermined period.

2. Research paper publication as a integrated part of the course structure, will inculcate research aptitude among students. This will help there in seeking admissions in reputed International Universities for higher studies. Further, this research aptitude developed may enhance his employability also.

3. This activity is expected to generate 15 to 20 publication per year, which will enhance research profile of department and institute too.

4. Hence, there should be team of maximum 3 to 4 students per project except very exceptional projects. Prior permission to increase team size is essential.

Weekly progress report of the research paper publication. Title of

the project -

Name of the Guide -

Weekly schedule of meeting- Day------- Time-----

Student Details - Name--------- PRN------ Roll No.---

Sr. No.	Week No.	Date	Work completed/done by students per week

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

Faculty of Engineering & Technology
B.Tech. - Information Technology
Old Syllabus

College Information

Bharati Vidyapeeth University college of Engineering, Pune continued to take new strides towards evolving directions to further the growth and dissemination of scientific and technological knowledge.

The college established in 1983, is one of the oldest and largest Engineering Colleges in the state of Maharashtra. The college has well defined goals which are intensely practised and followed.

Their implementation encompass multi-faceted activities in the form of recruiting experienced faculty, organizing faculty development program, Identifying socio-economically relevant areas and emerging technologies. Constant review and upgradation of curricula, Upgradation of Laboratories, library and communication facilities, Collaboration with industries and research and development organizations, Sharing of knowledge, infrastructure and resources, training extension, testing and consultancy services and Promoting Interdisciplinary research.

The college has been ranked as 'A' grade Engineering college by the Government of Maharashtra. Meeting quality standards in education such as is been a motto of this institute. As a pedagogical effect, out of ten under graduate programmes being conducted, seven programmes eligible for accreditation are accredited by National Board of Accreditation(NBA).

The DATAQUEST - CMR conducts an annual survey of technical schools of India and publishes the list of best 100 technical schools in India. In the surveys, for the past seven years, the college has been consistently ranked among top 50 technical schools.

Another feather in Institute's cap is its selection for the grant of Rs. 4.0 Crore under Technical Education Quality Improvement Programme - II(TEQIP-II) by Ministry of Human Resource Development (MHRD) of Government of India supported by World Bank.

This Institute has been ranked to 45th position at all India level and 5th at the Western Region of AICTE in 2012.The Institute has been very sensitive to the human resource development and continues initiating new academic programmes. Presently it offers 09 undergraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Electronics and Telecommunication Engineering, Mechanical Engineering and Production Engineering.

The college offers 08 postgraduate programmes in the field of Civil Engineering,Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Mechanical Engineering and NanoTechnology.

Salient Features

Information Technology plays a vital role in the Software Development and Networking world. To fulfill this requirement for the society and nation, the Department runs an undergraduate programme viz B. Tech. (IT) and post graduate programme M. Tech(It). This course provides the engineering eduaction required to equip the students with broad range of skills in Information Technology. This is needed in order to meet the challenges of a diverse range of careers both at national and international levels.

The department of Information Technology has made substantial investments in its laboratories. The Department has specialized laboratories in Linux Operating Systems, Multimedia Computing and Software Engineering.

The Information Technology Student Association organizes various events and expert lectures on different platforms. Apart from giving thorough technical knowledge using the state-of-art technology, the students are taught communication skills and are given work experience on live projects. Also, in-plant training is included in the course to expose the students to latest It trends. Every year more than 50 companies approach to impart in-plant training to the students. The Companies include Medium/Small Scale, Large Scale companies & Government Organiztions. Some of the companies are Wipro, TCS, HCL, CDAC, Tata Johnson Control, HCL, Infosystems, DRDO, etc.

Research Grant recieved:

- The Department recieved a grant of 2.15 lacs by AICTE under RPS during 2006-07 for the project 'Fast Changing and High Non- Stationary Electroencephalograph Signal Analysis'.
- The Grant of Rs. 4.66 lacs was recieved during 2007-09 for the project, 'Brain-Computer Interface'. It was funded by AICTE under RPS.
- The Department recieved a Grant of Rs. 2.0 lacs by AICTE under SDP during year June 2008 for the workshop 'Real Time Applications of DSP and Image Processing'

Research Publication from Academic Year 2010-11 to 2014-15:

Type of Publication	No of Publication
International Journal	166
National Journal	10
International Conference	06
National Conference	05
Total	187

Mission

Providing a dynamic academia inline with industry to inculcate professional and skills.

Vision

"To be a premier source of competitive IT professional".

Program Educational Objectives

PEO 1 To develop skilled resource for industry pertaining to Information Technology solutions.

PEO2 To nurture individuals for demonstrating team abilities and alignment with technological upgrades.

PEO3 To enable graduates to exhibit social responsibilities by following ethical practices in professional pursuit.

Programme Outcomes

The Graduates Engineers will have the ability to

1. Apply logical and programming skills to solve computational problems.
2. Apply knowledge of mathematics, and computer science to analyze computer based information system.
3. Develop applications with appropriate consideration of societal needs.
4. Analyze relative merits of alternative software design approaches.
5. Demonstrate functional skills of modern IT tools and techniques for modeling and implementation.
6. Possess awareness of social and cultural impact of computing.
7. Apply software engineering methodologies for sustainable development.
8. Follow ethical and legal practices related to functioning of IT industry.
9. Perform as a team player to accomplish a common goal.
10. Convey technological concepts through significant documentation and presentation skills.
11. Apply management skills and techniques for creating time-bound projects.
12. Exhibit life long learning by upgrading to new IT practices and technology.

Sr. no.	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)						Credits		
		L	P / D	T	End Semester Exam	Continuous Assessment			TW	Total	TH	TW	Total
						Unit Test	Atten- dance	Assign- ments					
1.	Engineering Mathematics - I	3	-	1	60	20	10	10	-	100	4	-	4
2.	Fundamentals of Civil Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Graphics *	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Chemistry	4	2	-	60	20	10	10	25	125	4	1	5
5.	Fundamentals of Electrical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
6.	Professional Skill Development - I	2	-	-	50	-	-	-	-	50	2	-	2
7.	Programming Principles and Paradigms	-	2	-	-	-	-	-	50	50	-	1	1
	Total	19	10	1	350	100	50	50	150	700	20	50	50

* End Semester Examination of duration 4 hours

Sr. no.	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)						Credits		
		L	P / D	T	End Semester Exam	Continuous Assessment			TW	Total	TH	TW	Total
						Unit Test	Atten-dance	Assign-ments					
1.	Engineering Mathematics - II	3	-	1	60	20	10	10	-	100	4	-	4
2.	Fundamentals of Mechanical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Mechanics	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Physics	4	2	-	60	20	10	10	25	125	4	1	5
5.	Object Oriented Programming	3	2	-	60	20	10	10	25	125	3	1	4
6.	Professional Skill Development - II	2	-	-	50	-	-	-	-	50	2	-	2
7.	Workshop Technology	-	2	-	-	-	-	-	50	50	-	1	1
	Total	19	10	1	350	100	50	50	150	700	20	50	50

<u>Total Credits</u>

Semester - I = 25

Semester - II = 25

Grand Total = 50

ENGINEERING MATHEMATICS – I

TEACHING SCHEME

Lectures	:3 Hrs/week
Tutorial	:1 Hrs/week
Total	:4 Hrs/week

CREDIT

Theory	:3
Tutorial	:1
Total	:4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Total	: 100 Marks

Course Prerequisite

Students should have knowledge about

1. Matrix
2. Complex Numbers
3. Derivatives

Course Objectives

To develop an ability to use the mathematical techniques, skills and tools necessary for engineering practice.

Course Outcomes

At the end of this course, a student will be able to

1. solve the consistency of any type of system.
2. find the roots of equation, using DeMoivre's Theorem and to locate imaginary points using Argand Diagram.
3. apply Leibnitz rule to find n^{th} Derivative.
4. test Convergence and Divergence of infinite series.
5. compute a total derivative.
6. compute Maxima and Mininma of any functiion of two variables

Unit-I
(8 Hours)

Matrices

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Eigen values, Eigen Vectors, Cayley – Hamilton Theorem, Application to problems in Engineering .

Unit-II
(8 Hours)

Complex Numbers and Applications

Definition, Cartesian, Polar and Exponential Forms ,Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations, Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

Unit-III
(8 Hours)

Expansion of Functions and Differential Calculus

Differential Calculus : Successive Differentiation, n^{th} Derivatives of Standard Functions, Leibnitz's Theorem.

Expansion of Functions : Taylor's Series and Maclaurin's Series.

Unit-IV
(8 Hours)

Differential Calculus

Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.

Infinite Series

Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence.

Unit-V
(8 Hours)

Partial Differentiation and Applications

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables.

Errors and Approximations.

Unit-VI (8 Hours)

Jacobian

Jacobians and their applications, Chain Rule, Functional Dependence.

Maxima and Minima

Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.

Text Books

Applied Mathematics (Volumes I and II) by P.N. Wartikar and J.N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune 7th edition(1988).

Assignments

1. Rank , System of linear equations.
2. Complex Numbers.
3. Differential calculus and expansion of functions.
4. Indeterminate forms and infinite series.
5. Partial Derivatives, Euler's theorem on homogeneous functions.
6. Jacobians, Maxima and Minima of functions of two variables.

Reference Books

Advanced Engineering Mathematics by Peter V. O'Neil ,(Thomson Learning) 6th Edition (2007).

Advanced Engineering Mathematics, by M. D. Greenberg, (Pearson Education) 2nd Edition (2002).

Advanced Engineering Mathematics, by Erwin Kreyszig ,Wiley Eastern Ltd. 8th Edition (1999).

Higher Engineering Mathematics ,by B. S. Grewal ,(Khanna Publication, Delhi) 42nd Edition(2012).

Higher Engineering Mathematics , by B. V. Ramana, Tata McGraw- Hill, Edition(2012).

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF CIVIL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2 Hrs/week
Total	: 5 Hrs/week

CREDITS

Theory	: 3
Term work	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignments	: 10 Marks
Term work	: 25 Marks
Total	: 125Marks

Course Prerequisite

The Students should have the knowledge of

1.Concepts of units and conversions of units.
2.Basic knowledge of Chemistry
3.Basic knowledge of geography, concept of latitude and longitude.

Course Objective

To make student understand the scope and application of Civil Engineering.

Course Outcomes

Students will be able to

1. Describe the scope of Civil Engineering and role of Civil Engineer in Construction project.
2. Explain use of surveying instruments for land survey .
3. Explain principles of building planning and bye laws.
4. Describe types of foundations and their stability.
5. Explain methods of irrigation, types of dams, canals, and water and sewage treatment process.
6. Describe the components of infrastructure like roads, railways, bridges and airports.

Unit-I

(6 Hours)

Civil Engineering scope and applications

Civil Engineering scope, importance and applications to other disciplines of Engineering; Civil Engineering construction process and role of Civil engineer; Government authorities related to Civil Engineering; Types of structures based on loading , material and configuration; Building components and their functions; Civil Engineering materials: concrete, construction steel, bricks, flooring material and tiles, paints, plywood , glass and aluminum.

Unit-II

(6 Hours)

Surveying

Objectives , Principles and Classification of Surveying; Linear ,angular ,Vertical and area Measurements and related instruments.

Unit-III

(6 Hours)

Building planning and Bye laws

Site selection for residential building; Principles of building planning; Building bye laws-necessity, Floor Space Index, Heights , open space requirements, set back distance , ventilation and lighting, concept of carpet and built up area, minimum areas and sizes for residential buildings ; Concept of Eco friendly structures and Intelligent buildings.

Unit-IV

(6 Hours)

Foundations and Earthquakes

Function of foundation, concept of bearing capacity and its estimation, types of foundation and its suitability, causes of failure of foundation.

Earthquakes causes, effects and guidelines for earthquake resistant design, earthquake zones .

Unit-V

(6 Hours)

Irrigation and Water Supply

Rainfall measurement and its use in design of dams; Types of dams, canals, methods of irrigation and their merits and demerits; hydropower structures ;Water supply, drinking water requirements and its quality, water and sewage treatment flow chart.

Unit-VI

(6 Hours)

Jacobian

Roads- types of roads and their suitability, cross section of roads, meaning of terms ; width of roads, super elevation, camber, gradient ,sight distance, materials used for construction of roads.

Railways- Types of gauges, section of railway track, components of railway track, advantages.

Bridges : Components - Foundation , Piers, Bearings, Deck.

Airways- Components -Runway , Taxiway and Hangers.

Waterways: components- port, jetty, breakwater.

Text Books

(Following Exercises should be carried out.)

1. Study and use of prismatic compass and measurement of bearings.
2. Study and use of Dumpy level and reduction of levels by collimation plane method.
3. Area measurement by Digital Planimeter.
4. Drawing- plan and elevation of a residential bungalow.
5. Study of features of topographical maps.
6. Assignment on collection of information on Civil Engineering materials.
7. Assignment on types of foundations.
8. Assignment on unit 6.

Reference Books

1. Surveying Vol I - S.K. Duggal , Tata Mc Graw Hill Publication.
2. Built Environment – Shah , Kale, Patki, , Tata Mc Graw Hill Publication
3. Building Construction – Dr. B.C. punmia , Laxmi Publication
4. Irrigation and water Power Engineering , Dr. P.N. modi
5. Text book of transportation Engineering- Arora, Charotar Publishers.
6. Water supply and sanitary engineering-Rangawala, Charotar Publishers.
7. Assignment on types of foundations.
8. Assignment on unit 6.

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING GRAPHICS

TEACHING SCHEME

Lectures	: 4 Hrs/week
Practicals	: 2 Hrs/week
Total	: 6 Hrs/week

CREDIT

Theory	: 4
Practical	: 1
Total	: 5

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisites

Students should have basic knowledge of fundamentals of drawing.

Course Objectives

To apply fundamental principles of Engineering Graphics.

Course Outcomes

At the end of this course, a student will be able to understand

1. Different engineering curves and dimensions.
2. Differentiate first angle and third angle projection method in orthographic.
3. To interpret views of object and to draw by using Isometric Projection Method.
4. Projection of lines and its traces.
5. Projection of different planes
6. Projection of solids and its sections.

Unit-I (6 Hours)

Lines and Dimensioning in Engineering Drawing

Different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

Unit-II (6 Hours)

Curves used in Engineering Practice

Ellipse by Directrix-Focus method, Arcs of Circle method, Concentric circle method and Oblong method. Involute of a circle, Cycloid, Archimedean Spiral, Helix on cone, Loci of points- Slider Crank mechanisms.

Projections of Points and Lines and planes

Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines, Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP.

Unit-III (6 Hours)

Projection of Solids

Projection of prism, pyramid, cone and cylinder by rotation method.

Unit-IV (6 Hours)

Section of Solids

Types of section planes, projections of solids cut by different sections of prism, pyramid, cone and cylinder.

Unit-V (6 Hours)

Orthographic Projection

Basic principles of orthographic projection (First and Third angle method) . Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.

Unit-VI

(6 Hours)

Isometric Projections

Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

Term work

- Term work shall consist of Seven half-imperial size or A2 size (594 mm x 420 mm) sheets.
- Assignment 05 Problems on each unit in A3 size Drawing Book

Sheets

- Types of lines, Dimensioning practice, Free hand lettering, 1nd and 3rd angle methods symbol.
- Curves and loci of points
- Projections of Points and Lines and planes
- Projection of Solids
- Section of solids
- Orthographic Projections
- Isometric views

Text Books

1. "Elementary Engineering Drawing", N.D. Bhatt, Charotar Publishing house, Anand India,
2. "Text Book on Engineering Drawing", K.L.Narayana&P.Kannaiah, Scitech Publications, Chennai.
3. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi ,
4. "Engineering Drawing and Graphics", Venugopal K., New Age International Publishers.
5. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005
6. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005
7. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988

Syllabus For Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING CHEMISTRY

TEACHING SCHEME		**EXAMINATION SCHEME**	
Theory	: 4 Hrs/week	Theory	: 60 Marks
Practicals	: 2 Hrs/week	Term Work	: 25 Marks
Total	: 6 Hrs/week	Unit Test	: 20 Marks
CREDITS		Assignments	: 10 Marks
Theory	: 4	Attendance	: 10 Marks
Practical	: 1	Total	: 125 Marks
Total	: 5		

Course Prerequisites

Students should have basic knowledge of

Industrial use of water, crystal structure, fuels, corrosion, electrochemical cell and structure of organic molecules at Higher Secondary level of schooling.

Course Objectives

After completing this course the students will able to apply knowledge of Engineering Chemistry to different branches of engineering for better conceptual clarity and exploring emerging fields of technology and research.

Course Outcomes

At the end of this course, a student will be able to

1. Analyze the methods involved in improving quality of water for domestic and industrial purposes.
2. Express the crystal structure through X-ray diffraction technique to examine the internal structure of crystal.
3. Demonstrate the properties and applications of fossil fuels and derived fuels.
4. Define the fundamental principles of corrosion and methods used for minimizing corrosion.
5. Interpret the basic concepts of electrochemical techniques and its applications in society.
6. Develop the skills for correct stereo chemical assignment and interpretation in complex organic molecules.

Unit-I (8 Hours)

Water

Introduction, Hardness of water, Effect of hard water on boilers and heat exchangers: a) boiler corrosion b) caustic embrittlement c) scales and sludges d) priming and foaming Water softening methods for industrial purposes :a) Zeolite process b) Phosphate conditioning , Numerical based on the zeolite process.

Unit-II (8 Hours)

Material Chemistry

Crystallography

Unit cell, Laws of crystallography, Weiss indices and Miller indices, Crystal defects (point and line defects), X-ray diffraction – Bragg's Law and numericals.

Cement

Introduction of cement, Hydraulic/ Non-hydraulic cementing materials, classification of cement, chemistry of portland cement, chemical composition and compound constituents of portland cement, properties of cement and its applications.

Unit-III (8 Hours)

Fuels

Introduction, classification of fuels, calorific value of fuels, NCV and GCV, Determination of calorific values using Bomb calorimeter and Boys' gas calorimeter.
Theoretical calculation of calorific value of a fuel, Analysis of coal a) Proximate b) Ultimate analysis of coal, Numericals based on NCV, GCV.

Unit-IV (8 Hours)

Corrosion and its Prevention

Corrosion : Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, Electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment.
Methods of prevention of corrosion : Cathodic and Anodic protection, Metallic coatings, Electroplating, Hot dipping.

Unit-V (8 Hours)

Electrochemistry

Introduction, Arrhenius Ionic theory, Kohlrausch's law of independent migration of ions Laws of electrolysis: Faradays Laws, Ostwald's dilution law, Acids and Bases, concept of pH and pOH, Buffer solutions, Solubility Product, Redox Reactions.

Electrode Potential, electrochemical cell, concentration cell, reference Electrodes, Overvoltage, Conductometric Titrations, Fuel cells, Lead Acid Storage Cell and numericals based on the above articles.

Unit-VI (8 Hours)

Stereochemistry

Introduction, chirality, optical activity, Enantiomers, Diastereomers, projection formula of tetrahedral carbon- Newman projection, Wedge projection, Fischer projection,

Geometrical isomerism : cis and trans isomerism, E and Z isomers

Optical isomerism : Mesoform, the number of optical isomers for chiral molecules,

Conformations : conformations of ethane, conformations of n-butane.

Term work

Practicals

Any Eight experiments from the following

1. Estimation of hardness of water by EDTA method.
2. Estimation of chlorine by Mohr's method.
3. Determination of percentage of Ca in given cement sample
4. Determination of coefficient of viscosity by Ostwald's viscometer.
5. Study of Bomb calorimeter for determination of calorific value.
6. Determination of calorific value of gas fuel by using Boy's gas calorimeter.
7. Determination of dissolved oxygen in a water sample.
8. To determine the Molecular Weight of polymer.
9. Estimation of Copper from brass sample solution by Iodometrically.
10. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method.
11. To standardize NaOH solution and hence find out the strength of given hydrochloric Acid solution .
12. To determine Surface Tension of given liquid by Stalagmometer.
13. Study of corrosion of metals in medium of different pH.
14. To set up Daniel cell.
15. To determine pH of soil .
16. To determine Acidity of soil.

Assignments

1. Effect of hard water on boilers and heat exchangers.
2. Hydraulic/ Non-hydraulic cementing materials.
3. Analysis of coal a) Proximate b) ultimate analysis of coal.
4. Wet corrosion-mechanism, Electroplating, Hot dipping.
5. Geometrical isomerism :- cis and trans isomerism, E and Z isomers.
6. Fuel cells.

References / Text Books

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi.
2. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition (1979).
3. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988).
4. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955).
5. Engineering Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990).
6. Engineering Chemistry by Dara S. S. Chand Publications.
7. Fundamentals of Electrochemistry, V. S. Bagotsky (Ed) Wiley NY (2006).

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF ELECTRICAL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2 Hrs/week
Total	: 5 Hrs/week

CREDITS

Theory	: 3
Term Work	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignments	: 10 Marks
Term work	: 25 Marks
Total	:125 Marks

Course Pre-requisites :

The Students should have basic knowledge about

1. Mathematics
2. Physics

Course Objectives :

The course introduces fundamental concepts of DC and AC circuits, electromagnetism, transformer and measuring instruments to all first year Engineering students.

Course Outcomes:

At the end of this course, a student will be able to

1. Understand and apply knowledge of basic concepts of work, power, energy for electrical, mechanical and thermal systems.
2. Understand and apply knowledge of Kirchoff's laws and network theorems to solve electrical networks.
3. Describe construction, principle of operation, specifications and applications of capacitors and batteries.
4. Describe and apply fundamental concepts of magnetic and electromagnetic circuits for operation of single phase transformer.
5. Define basic terms of single phase and three phase ac circuits and supply systems.
6. Know and use electrical safety rules.

Unit-I
(6 Hours)

Basic concepts

Concept of EMF, Potential Difference, current, resistance, Ohms law, resistance temperature coefficient, SI units of Work, power, energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems.

Unit-II
(6 Hours)

Network Theorem

Voltage source and current sources, ideal and practical, Kirchoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem, Thevenin's theorem, Maximum Power Transfer theorem.

Unit-III
(6 Hours)

Electrostatics

Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction& working.

Unit-IV
(6 Hours)

Magnetic Circuit & Transformer

Magnetic effect of electric current, cross and dot convention, right hand thumb rule, concept of flux, flux linkages, Flux Density, Magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability, B-H curve, hysteresis loop, series-parallel magnetic circuit, composite magnetic circuit, Comparison of electrical and magnetic circuit.

Farady's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling.

Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct loading test.

Unit-V (6 Hours)

AC Fundamentals & AC Circuits

AC waveform definitions , form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar & rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3-ph AC Circuits.

Unit-VI (6 Hours)

Electrical Wiring and Illumination system

Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED) , Study of Electricity bill.

Term-work :

The term work shall consist of record of minimum eight exercises / experiments.

List of Experiments

1. Determination of resistance temperature coefficient
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Kirchoff's Laws
5. Verification of Maximum power transfer Theorem
6. Time response of RC circuit
7. Study of R-L-C series circuits for XL> XC , XL< XC & XL= XC
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Direct loading test on Single phase transformer
   a)Voltage and current ratios.
   b) Efficiency and regulations .
10. Study of a Residential (L.T.) Bill

Text Books :

1. A Textbook of Electrical Technology Volume- I – B.L.Theraja, S.Chand and Company Ltd., New Delhi.
2. . Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
3. Electrical Engineering- G. K. Mittal
4. Theory and problems of Basic Electrical Engineering- I. J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

Reference Books

1. Electrical Technology- Edward Hughes, Seventh Edition, Pearson Education
2. Elements of Electrical Technology- H. Cotton, C.B.S. Publications
3. Basic circuits analysis by John Omalley Shawn Mc Graw Hill.
4. Principles of Electrical Engineering by Del. Toro, PHI

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

PROFESSIONAL SKILL DEVELOPMENT - I

ENGLISH COMMUNICATION

TEACHING SCHEME

Lectures	: 2 Hrs/week
Total	: 2 Hrs/week

CREDITS

Theory	: 2
Total	: 2

EXAMINATION SCHEME

Theory	: 50 Marks
Total	: 50 Marks

Unit I: (5 hours)

Essential Grammar

Tenses: Basic forms and use, sentence formation (general & Technical), Common errors, Parts of speech through context, Direct and reported speech structures and voices.

Unit II: (2 hours)

Vocabulary Enrichment

Exposure to words from General Service List (GSL) by West, Academic word list (AWL) specific technical terms related to the field of technology. Phrases, idioms, significant abbreviations, formal (business) vocabulary.

Unit III: (3 hours)

Written Communication I

Letter Writing – Formal and Informal letter writing, Application letters, Report Writing-Academic and Business reports, Job application letter.

Unit IV: (2 hours)

Phonetics

Pronunciation, Reduction of MTI in spoken English, Question formation with emphasis on common errors made during conversation.

SOFT SKILLS

Unit I: (3 hours)

Communication Skill

a) Importance of effective communication, types of communication- verbal and non verbal, barriers of communication, effective communication

b) Listening Skills: Law of nature- Importance of listening skills, difference between listening and hearing, Types of listening.

Unit II: (3 hours)

Self Awareness & Self Development

a) Self Assessment, Self Appraisal, SWOT, Goal setting - Personal & career - Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting,

b) Career Planning, Personal success factors, Handling failure, Depression and Habit,

Unit III: (4 hours)

Interpersonal Relationship

Team work, Team effectiveness, Group discussion, Decision making - Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity

Unit IV: (2 hours)

Time Management

The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say “no” to Time wasters.

PROGRAMMING PRINCIPLES AND PARADIGMS

TEACHING SCHEME

Practical	:2 Hrs/week
Total	:2 Hrs/week

EXAMINATION SCHEME

Term Work	: 50 Marks
Total	: 50 Marks

CREDITS

Practical	: 1
Total	: 1

Course Prerequisite

The Students should have

1. Prior programming experience not required .
2. Understanding of computational logical aptitude is required.

Course Objective

1. To familiarize with the universal concepts of computer programming.
2. To get an overview of various programming languages.
3. To gain knowledge of various Operating systems and Software tools.
4. To write, compile and execute programs in C Language.

Course Outcomes

At the end of the course, a student will be able to

1. Understand the four Programming Paradigms.
2. Gain knowledge of various Operating Systems and Tools.
3. Understand basic Concepts of C - Programming languauge.
4. Implement different kinds of Array Data Structures.
5. Implement Structures and Pointers.
6. Implement File handling in C.

Unit-I

(6 Hours)

Introduction: Programming Paradigms and Design

Overview of the four programming paradigms: Imperative paradigm, Functional paradigm, Logic paradigm, Object-Oriented paradigm. Programming Approaches: Structured vs Non-structured Approach, Modular Programming, Top-Down Design, Bottom Up Design.

Programming Languages

Assembly Level Languages, Scripting Languages, High Level Languages.

Unit-II

(6 Hours)

Operating Systems

Concept of Computing , Introduction to Operating Systems : DOS, Windows 2000/XP and UNIX , Utilities associated with Operating Systems : File Management and Memory Management.

Tools

Linux environment , Cygwin , Edit plus, Eclipse IDE, SVN Repository, Latex , MS Access, My SQL, Applications of various protocols.

Unit-III

(6 Hours)

C Language Fundamentals

Character Set, Identifiers, Keywords, Data Types , Operators, Constants and Variables, Statements, Control Structures: Decision making, Branching and Looping.

C Functions

Function Prototypes, parameter passing , Call-by-Value, Call-by-Reference, Recursion, Storage Classes.

Unit-IV (4 Hours)

Arrays

One dimensional Array, Multi-dimensional Arrays, declaration of arrays and their applications, String Manipulation.

Unit-V (4 Hours)

Structures

Declaration of Structures, declaration of Unions, pointer to structure and Unions.

Pointers

Variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, linked list, pointers to functions, dynamic memory allocation

Unit-VI (4 Hours)

File Handling

File Operation: Creation, Copy , Delete, Update text files , binary files

Additional Features in C

Command line arguments , bitwise operators, enumerated data types, type casting, macros.

Text Books/ References

- Programming in C – Gottfried , Tata Mc Graw Hill.
- Programming in ANSI C- Balaguruswamy , Tata Mc Graw Hill
- Let us C - Yeshwant Kanetkar, BPB Publications.

List of Experiments

1. Perform comparative analysis of various types of programming languages.
2. Write a program for Simulation of calculator to perform addition, subtraction using assembly level language
3. Write program to design static web pages for department of I.T. using HTML.
4. Elaborate types of operating system considering user's environment along with its architecture.
5. Write commands to perform various functionalities using MSDOS
6. Write a report on current trends in IT using latex.

7. Write a program to display Fourier series of n numbers.
8. Implement call by value and call by reference approach to swipe the values of two numbers by using minimum number of variables.
9. Write a program to calculate probability of getting head, tell, head and tell, head or tell after flipping four different coins.
10. Maintain record of employee using structure. Perform insert, delete, and update functionalities on the same.
11. Write a program to store variables of different types at specified memory location.
12. Write a program to Copy contents of one file into another file .

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING MATHEMATICS – II

TEACHING SCHEME

Lectures	:3 Hrs/week
Tutorial	:1 Hrs/week
Total	:4 Hrs/week

CREDIT

Theory	:3
Tutorial	:1
Total	:4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Total	: 100 Marks

Course Prerequisite

Students should have basic knowledge about

1. Derivatives
2. Integration

Course Objectives

To develop an ability to use the mathematical techniques, skills and tools necessary for engineering practice.

Course Outcomes

At the end of this course, a student will be able to

1. solve the differential equations of first order and first degree.
2. form mathemtical model of rectilinear motion , electric circuit , fourier heat conduction, newton's law of cooling.
3. represent periodic function as fourier series.
4. evaluate definite Integral by DUIS Rule and to trace cartesian and polar curves.
5. transform the cartesian coordinates into spherical polar and cylindrical coordinate systems.
6. apply methods to find area and volume by double and triple integration.

Unit-I (8 Hours)

Differential Equations (DE)

Definition, Order and Degree of DE, Formation of DE, Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types.

Unit-II (8 Hours)

Application of Differential Equations

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems.

Unit-III (8 Hours)

Fourier Series

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis.

Integral Calculus

Reduction formulae, Beta and Gamma functions.

Unit-IV (8 Hours)

Integral Calculus

Differentiation Under the Integral Sign, Error functions

Curve Tracing

Tracing of Curves, Cartesian, Polar and Parametric Curves. Rectification of Curves.

Unit-V (8 Hours)

Solid Geometry

Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and

Unit-VI (8 Hours)

Multiple Integrals and their Applications

Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.

Assignments

1.Differential equations.
2.Aplication of differential equations.
3.Fourier series and Integral calculus.
4.DUIS and curve tracing.
5.Solid geometry.
6.Double and triple integrations, area and volume.

Text Books

Applied Mathematics (Volumes I and II) by P.N. Wartikar and J.N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune 7th edition(1988).

Reference Books

Higher Engineering Mathematics ,by B. S. Grewal ,(Khanna Publication, Delhi) 42nd Edition(2012).
Higher Engineering Mathematics , by B. V. Ramana, Tata McGraw- Hill, Edition(2012).
Advanced Engineering Mathematics by Peter V. O'Neil ,(Thomson Learning) 6th Edition (2007).
Advanced Engineering Mathematics, by M. D. Greenberg, (Pearson Education) 2nd Edition (2002).
Advanced Engineering Mathematics, by Erwin Kreyszig ,Wiley Eastern Ltd. 8th Edition (1999).

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF MECHANICAL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2 Hrs/week
Total	: 5 Hrs/week

CREDIT

Theory	: 3
Practical	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisites

Students should have the basic knowledge of Thermal Science.

Course Objectives

Students will get the basic knowledge of Mechanical Engineering systems.

Course Outcomes

At the end of this course, a student will be able to understand

1. the fundamentals of thermal engineering.
2. working of power producing and absorbing devices.
3. different energy sources and fundamental laws of heat transfer.
4. the basic properties of fluids and materials.
5. the different mechanical devices and mechanisms.
6. machine tools and manufacturing processes.

Unit-I

(8 Hours)

Thermodynamics

Heat, work and Internal Energy, Thermodynamic State, Process, Cycle, Thermodynamic System, First Law of Thermodynamics, Application of First Law to steady Flow and Non Flow processes, Limitations of First Law, PMM of first kind (Numerical Treatment), Second Law of Thermodynamics – Statements, Carnot Engine and Carnot Refrigerator, PMM of Second Kind (Elementary treatment only).

Unit-II

(8 Hours)

Introduction to I.C. Engines and turbines

Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines, Hydraulic turbines, steam turbines, gas turbines.(Theoretical study using schematic diagrams).

Introduction to refrigeration, compressors & pumps

Vapor compression and vapor absorption system, house hold refrigerator, window air conditioner. Reciprocating and rotary compressor, Reciprocating and centrifugal pump. (Theoretical study using schematic diagrams).

Unit-III

(8 Hours)

Energy Sources

Renewable and nonrenewable, solar flat plate collector, Wind, Geothermal, Wave, Tidal, Hydro power, Bio-gas, Bio-Diesel, Nuclear power.

Heat transfer

Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties, types of heat exchangers and their applications.

Unit-IV (8 Hours)

Properties of fluids

Introduction, Units of measurements, mass density, specific weight, specific volume and relative density, viscosity, pressure, compressibility and elasticity, gas laws, vapor pressure, surface tension and capillarity, regimes in fluid mechanics, fluid properties and analysis of fluid flow.

Properties of Materials and their Applications

Metals – Ferrous and Non-Ferrous, Nonmetallic materials, smart materials, Material selection criteria.

Unit-V (8 Hours)

Mechanical devices

Types of Belts and belt drives, Chain drive, Types of gears, Types of Couplings, friction clutch (cone and plate), brakes, Power transmission shafts, axles, keys, bush and ball bearings.

Mechanisms

Slider crank mechanism, Four bar chain mechanism, List of various inversions of Four bar chain mechanism, Geneva mechanism, Ratchet and Paul mechanism

Unit-VI (8 Hours)

Machine Tools

Lathe Machine – Centre Lathe, Drilling Machine – Study of Pillar drilling machine, Introduction to NC and CNC machines, Grinding machine, Power saw, Milling Machine.

Introduction to manufacturing processes and Their Applications

Casting, Sheet metal forming, Sheet metal cutting, Forging, Fabrication, Metal joining processes

List of experiments:

The Term Work shall consist of any Eight experiments of following list

1 Measurement of viscosity using Redwood viscometer.
2 Assembly and working of 4-bar, 6-bar, 8-bar planer mechanisms
3 Finding relation between input angle and output angle for various link lengths.
4 Study of domestic refrigerator & window air-conditioner
5 Demonstration of operations of centre lathe
6 Demonstration of operations on drilling machines
7 Demonstration of Two stroke and four stroke engine
8 Study of power transmitting elements: Coupling, Gears and bearings
9 Demonstration of pumps and compressor
10 Study and demonstration of different types of clutches.

References

1 Thermodynamics An Engineering Approach: Yunus A. Cengel and Michael A. Boles,McGraw-Hill, Inc,2005,6th edition.
2 Applied Thermodynamics for Engineering Technologists: T. D. Eastop and A. McConkey, 5th Edition, Prentice Hall.
3. I.C. Engines Fundamentals: J. B. Heywood, McGraw Hill, 3rd Edition, MacMillian
4 I.C.Engine : V.Ganeshan,Tata McGraw-Hill, 3rd edition.
5 Strength of Materials: H. Ryder, Macmillians, London, 1969, 3rd edition.
6 Mechanics of Materials: Johston and Beer TMH, 5th edition
7 Mechanisms and Machine Theory: Ambekar A.G., Prentice-Hall of India, 2007.
8 Theory of Machines: S S Rattan, Tata McGraw- Hill, 2nd edition.
9 A Textbook of production engineering: P.C. Sharma, S. Chand Publication, New Delhi, 2nd edition.
10 Fluid Mechanics & Fluid Power: D.S. Kumar, Katson Publishing Engineering House, Ludhiana. 8th edition

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING MECHANICS

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 4 Hrs/week	Theory	: 60 Marks
Practicals	: 2 Hrs/week	Unit Test	: 20 Marks
Total	: 6 Hrs/week	Attendance	: 10 Marks
CREDIT		Assignment	: 10 Marks
Theory	: 4	Term Work	: 25 Marks
Practical	: 1	Total	: 125 Marks
Total	: 5		

Course Prerequisites

The Students should have knowledge of

1. Scalar and Vector
2. Newton's law of motion
3. Law of friction
4. Concept of physical quantities, their units and conversion of units
5. Concept of differentiation and integration

Course Objectives

To develop and apply the concept of resultant and equilibrium for various static and dynamic engineering problems.

Course Outcomes

At the end of this course, a student will be able to understand

1. calculate resultant and apply conditions of equilibrium.
2. analyze the truss and calculate friction force.
3. calculate centroid and moment of inertia.
4. solve problem on rectilinear motion.
5. solve problems on curvilinear motion.
6. Use D'Alembert's principle, Work Energy principle and Impulse Momentum principle for particle.

Unit-I
(8 Hours)

Resultant and Equilibrium

Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach..

Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane, Force and Couple system about a point.

Unit-II
(8 Hours)

Truss and Friction

Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts.

Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.

Unit-III
(8 Hours)

Centroid and Moment of Inertia

Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.

Unit-IV
(8 Hours)

Kinematics of Rectilinear motion of a Particle

Equations of motion, Constant and variable acceleration, Motion Curves, Relative motion, Dependent motion. Farady's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling,

Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.

Unit-V
(8 Hours)

Kinematics of Curvilinear motion of a Particle

Motion of a Projectile, Cartesian components, Normal and Tangential components of a curvilinear motion.Farady's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling,

Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.

Unit-VI

(8 Hours)

Kinetics of a Particle

D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.

Practicals

A) The term-work shall consist of minimum Five experiments from list below.

1. Determination of reactions of Simple and Compound beam.
2. Study of equilibrium of concurrent force system in a plane.
3. Determination of coefficient of friction for Flat Belt.
4. Determination of coefficient of friction for Rope.
5. Study of Curvilinear motion.
6. Determination of Coefficient of Restitution.

B) The term-work shall also consist of minimum Five graphical solutions of the problems on different topics.

Reference Books

1. Beer F.P. and Johnston E.R., "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Tata McGraw Hill Publication.
2. Hibbeler R.C., "Engineering Mechanics (Statics and Dynamics)", McMillan Publication.
3. Shames I.H., "Engineering Mechanics (Statics and Dynamics)", Prentice Hall of India (P) Ltd.
4. Singer F.L., "Engineering Mechanics (Statics and Dynamics)", Harper and Row Publication.
5. Meriam J.L. and Kraige L.G., "Engineering Mechanics (Statics and Dynamics)", John Wiley and Sons Publication.
6. Timoshenko S.P. and Young D.H., "Engineering Mechanics (Statics and Dynamics)", McGraw Hill Publication.
7. Bhavikatti S.S. and Rajashekarappa K.G., "Engineering Mechanics", New Age International (P) Ltd.
8. Tayal A.K., "Engineering Mechanics (Statics and Dynamics)", Umesh Publication.
9. Mokashi V.S., "Engineering Mechanics-I and II (Statics and Dynamics)", Tata McGraw Hill Publication.

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING PHYSICS

TEACHING SCHEME

Lectures	: 4 Hrs/week
Practicals	: 2 Hrs/week
Total	: 6 Hrs/week

CREDITS

Theory	: 4
Practicals	: 1
Total	: 5

EXAMINATION SCHEME

Paper	: 60 Marks
Unit Test	: 20 Marks
Assignment	: 10 Marks
Attendance	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisite

The Student should have basic knowledge of kinematics, electrostatic, wave mechanics and dimensions along with good knowledge of calculus of Higher Secondary level of schooling.

Course Objective

After completing this course the students will able to apply knowledge of Engineering Physics to different branches of engineering for better conceptual clarity and exploring emerging fields of technology and research.

Course Outcomes

1. To use the properties of charged particles to develop modern instruments and explain the mechanism of fusion and fission.
2. To understand the basics of semiconductor and its uses to develop devices such as diode.
3. Students will be capable of applying knowledge of nanoscience to develop new electronic devices.
4. Students will be able to associate the wave nature of light and apply it to measure stress, pressure and dimension etc..
5. To discuss the concept of transverse waves.
6. To judge the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for Non Destructive Testing.
7. To understand the behavior of quantum particles in different types of potentials.

Unit-I
(8 Hours)

Modern Physics

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Wavelength and resolution, Specimen limitation, Depth of field and focus, Electron microscope, Positive rays, Separation of isotopes by Bainbridge mass spectrograph.

Nuclear Physics

Nuclear fission, Liquid drop model of nucleus, Nuclear fission in natural uranium, Fission energy, Critical mass and size, Reproduction factor, Chain reaction and four factor formula, Nuclear fuel and power reactor, Nuclear fusion and thermonuclear reactions, Merits and demerits of nuclear energy, Particle accelerators, Cyclotron, Betatron.

Unit-II
(8 Hours)

Solid State Physics

Band theory of solids, Free electron theory, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors and in extrinsic semi-conductors (with derivation), Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.

Superconductivity

Introduction, Properties of a super conductor, Meissner's effect, Critical field, Types of superconductors, BCS theory, High temperature superconductors, Application of superconductors.

Unit-III
(8 Hours)

Thermodynamics

Zeroth law of thermodynamics, first law of thermodynamics, determination of j by Joule's method, Applications of first law, heat engines, Carnot's cycle and Carnot's engine, second law of thermodynamics, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

Nanoscience

Introductions of nanoparticals, properties of nanoparticals (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticals(Physical and chemical), synthesis of colloids, growth of nanoparticals, synthesis of nanoparticals by colloidal route, applications.

Unit-IV (8 Hours)

Optics - I

Interference

Interference of waves, Visibility of fringes, interference due to thin film of uniform and non-uniform thickness, Newton's rings, Engineering applications of interference (optical flatness, non-reflecting coatings, multi-layer ARC).

Diffraction

Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima, Rayleigh's criterion for resolution, Resolving power of grating and telescope.

Unit-V (8 Hours)

Polarisation

Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism, Dichroism, Polaroids, Elliptical and circular polarisation, Quarter and half wave plates, Production of polarised light, Analysis of polarised light, half shade polarimeter, LCD.

Lasers

Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Properties of lasers, Applications of lasers (Engineering/ industry, medicine, communication, Computers), Holography.

Unit-VI (8 Hours)

Architectural Acoustics

Elementary acoustics, Limits of audibility, Reverberation and reverberation time, Sabine's formula, Intensity level, Sound intensity level, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies.

Quantum Mechanics

Wave nature of matter, De-Broglie waves, Wavelength of matter waves, Electron diffraction, Davisson and Germer's experiment, Physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box and non rigid box.

Term-work :

Experiments

Any eight experiments from the following

1. Determination of band gap of semi-conductor.
2. Solar cell characteristics.
3. e/m by Thomson's method.
4. Uses of CRO for measurement of phase difference and Lissajous figures.
5. Hall effect and Hall coefficient.
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode, Photo diode, LED, Ge/Si diode).
8. Plank's constant by photodiode.
9. Wavelength by diffraction grating.
10. Newton's rings.
11. Ultrasonic interferometer.
12. Sound intensity level measurement.
13. Wavelength of laser by diffraction.
14. Determination of refractive index for O-ray and E-ray.
15. Brewester's law.

Assignments

1. Recent advances in Nanotechnology
2. Nuclear radiation detectors.
3. Atomic force microscope (AFM).
4. Advanced opto-electronic devices.
5. Laser in Industry.
6. Different spectroscopic methods – a comparison (Raman, IR, UVR, etc.).

Text Books

1. Engineering Physics –Gaur and Gupta, Dhanpat Rai Publication
2. A text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar, S. Chand Technical

Reference Books

1. Physics for Engineers – Srinivasan M.R., New Age International Publication
2. Engineering Physics- K. Rajagopal, PHI
3. Electronics Principles – A.P.Molvino, Tata McGraw Hill
4. Fundamentals of Optics – Jenkins and White, McGraw Hill

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

OBJECT ORIENTED PROGRAMMING

TEACHING SCHEME

Lectures	:	3 Hrs/week
Practicals	:	2 Hrs/week
Total	:	5 Hrs/week

CREDIT

Theory	:	3
Practical	:	1
Total	:	4

EXAMINATION SCHEME

Theory	:	60 Marks
Unit Test	:	20 Marks
Attendance	:	10 Marks
Assignment	:	10 Marks
Term Work	:	25 Marks
Total	:	125 Marks

Course Prerequisite

Students should have knowledge about

1. "C" Programming Language
2. Basic Mathematical Ability

Course Objective

1. To familiarize with the universal concepts of computer programming.
2. To present the syntax and semantics of the "C++" language as well as basic data types offered by the language
3. To discuss the principles of the object-oriented model and its implementation in the "C++" language.
4. To demonstrate the means useful in resolving typical implementation problems with the help of standard "C++" language libraries.

Course Outcomes

At the end of the course, a student will be able to

1. Understand basic concepts of Object Oriented Programming .
2. Understand basic,user-defined and derived data types, Operator precedence.
3. Implement Functions , Classes and Objects.
4. Understand concept of Constructor, Destructor and Polymorphism.
5. Implement Inheritance through extending classes.
6. Use Console I/O Operations.

Unit-I (6 Hours)

Principles of Object Oriented Programming

Object Oriented Programming Paradigm, Basic concepts of Object Oriented Programming, Benefits of OOP, Object Oriented Languages, Applications of OOP.

Unit-II (6 Hours)

Beginning with C++

Overview of C++, Sample C++ Program, C++ statements, Structure of C++ program, Creating source file , compiling and Linking, Tokens, Keywords , Identifiers and Constants, Basic data types, User-defined data types, Derived data types, Declaration of variables, Dynamic initialization of variables, Scope Resolution Operator, Operator Overloading, Operator precedence, Control Structures.

Unit-III (6 Hours)

Functions in C++

The Main Function, Function Prototyping, Call by Reference, Inline Functions, Default arguments, Function Overloading , Friend and Virtual Functions .

Classes and Objects

Class specification , Class Objects , Scope resolution operator, Access specifiers- Public , Private, Protected , Defining member Functions, Nesting of Member Functions, Private Member Functions, Static Data Members , Static Member Functions, Data Hiding.

Unit-IV (6 Hours)

Constructors and Destructors

Constructors, Parameterized constructors, Default Constructors, Copy constructor, Dynamic Initialization of Objects, Destructors.

Polymorphism

Base class, Virtual Functions, Pure Virtual Functions, Calling a virtual function through a base class reference, Early and Late Binding .

Unit-IV (4 Hours)

Inheritance : Extending Classes

Defining Derived Classes, Single Inheritance, Making a Private member inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Class, Abstract class.

Unit-V (4 Hours)

Polymorphism

Virtual Functions, Pure Virtual Functions, Calling a virtual function through a base class reference, Early and Late Binding .

Unit-VI (6 Hours)

Managing Console I/O operations

C++ Stream Classes, Unformatted I/O Operations, Working with Files, Opening and Closing a File , Formatted I/O, Base class, Inheritance and protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, Destructors , Passing parameters to base class constructors, virtual base classes. STL: An overview, containers, vectors, lists , maps.

Text Books/ References

- Herbert Schildt : The Complete Reference C++ , 4th edition, Tata Mc Graw Hill, 2003.
- Stanley Lippmann Josee Lajore : C++ Primer, 4th Edition, Pearson Education,2005.
- Scott Meyers : Effective C++ , Third Edition, Scott Meyers , Addison-Wesley.
- K R Venugopal, T Ravi Shankar, Rajkumar Buyya: Mastering C++ , Tata Mc GrawHill.
- Object Oriented Programming using C++ , Balaguruswamy, PHI.

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

PROFESSIONAL SKILL DEVELOPMENT - II

ENGLISH COMMUNICATION

TEACHING SCHEME

Lectures	: 2 Hrs/week
Total	: 2 Hrs/week

EXAMINATION SCHEME

Theory	: 50 Marks
Total	: 50 Marks

CREDITS

Theory	: 2
Total	: 2

Unit I: (4 hours)

Essential Grammar II

Application of tenses, Auxiliaries- correct usage and importance in formal communication, Business Vocabulary - Vocabulary exercises through web-based applications

Unit II: (4 hours)

Written Communication II

Email writing- Formal and Informal email writing structure, Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales Letters etc. Technical writing, Essay writing, Paragraph writing.

Unit III: (2 hours)

Vocabulary Application

Vocabulary exercises through web-based applications, Usage and application through

Unit IV: (2 hours)

Situational Conversation

Application of grammar and correct spoken English according to context/ situation and application in business scenario.

SOFT SKILLS

Unit I: (3 hours)

Fundamentals Of Effective Communication

Public Speaking: fundamentals of effective public speaking, types- Extempore speech, manuscript speech, and ways to enhance public speaking skills, storytelling, oral review

Unit II: (3 hours)

Presentation Skills

PowerPoint presentations, Effective ways to structure the presentation, importance of body language.

Unit III: (3 hours)

Leadership Skills, Leader's Role, Responsibilities And Skill Required

Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback.

Unit VI: (2 hours)

Problem Solving Skill

Problem solving skill, Confidence building

Unit V: (4 hours)

Corporate / Business Etiquettes

Corporate grooming & dressing, etiquettes in social & office setting-Understand the importance of professional behavior at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities.

WORKSHOP TECHNOLOGY

TEACHING SCHEME

Practicals	: 2 Hrs/week
Total	: 2 Hrs/week

CREDITS

Practical	: 1
Total	: 1

EXAMINATION SCHEME

Term Work	: 50 Marks
Total	: 50 Marks

Course Objectives

Introduction to different materials in engineering practices with respect to their workability, formability & machinability with hand tools & power tools and to develop skills through hands on experience. Special; emphasis shall be given to Safety in Workshop - Fire hazards, electric short circuit –causes and remedies, Machine protection, Human protection, Accident prevention methods, developing ability to observe safe working habits.

Term work shall consist of any three jobs, demonstrations on rest of the trades and journal consisting of six assignments one on each of the following topics.

Course Outcomes

At the end of this course, students should be able to understand

1. Basic Manufacturing Processes used in the industry,
2. Importance of safety
3. Electrical circuit making.

Carpentry

Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns, contraction, draft & machining allowances Term work includes one job involving joint and woodturning.

Fitting

Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping. Term work to include one job involving fitting to size, male-female fitting with drilling and tapping.

Sheet Metal Practice

Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.

Joining

Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies. Term work includes one job involving various joining processes like riveting, joining of plastics, welding, brazing, etc.

Forging

Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

Moulding

Principles of moulding, methods, core & core boxes, preparation of foundry sand, casting, Plastic moulding.

Electrical Board Wiring
(Demonstration Common for Electrical & Non electrical Group)

Electric power utilization, energy audit, Types of wiring - House wiring, stair case wiring, two-way switch wiring, Types of fuses and their uses, circuit breaker, Three phase wiring for electrical motors, earthing, minor fault finding.

Plumbing (Demonstration Common for Electrical & Non electrical Group)

Types of pipe joints, threading dies, Pipe fittings.

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standards of Passing and ATKT Rules:

1. For all courses, both UE(University Evaluation) and IA(Internal Assesesment) constitue separate heads-of-passing (HoP). In order to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0(40 % marks) at UE and also a minimum grade point of 5.0 (40 % marks) at IA.

   OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % of aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fails at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT:

1. A student is allowed to carry backlog of courses prescribed for B. Tech. Sem - I, III , V , VII to B.Tech. Sem-II, IV , VI , VIII respectively.
2. A student is allowed to keep term of Sem-III , if he/she is failing in any number of subjects of Sem - I & II.
3. A student is allowed to keep term of Sem-V , if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem- I & II.
4. A student is allowed to keep term of Sem-VII , if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem-III & IV.

Award of Class for the Degree Considering CGPA:

Award of Honours:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks(%)
$9.50 \leq$ CGPA ≤ 10.00	O	Outstanding	$80 \leq$ Marks ≤ 100
$9.00 \leq$ CGPA ≤ 9.49	A+	Excellent	$70 \leq$ Marks ≤ 80
$8.00 \leq$ CGPA ≤ 8.99	A	Very Good	$60 \leq$ Marks ≤ 70
$7.00 \leq$ CGPA ≤ 7.99	B+	Good	$55 \leq$ Marks ≤ 60
$6.00 \leq$ CGPA ≤ 6.99	B	Average	$50 \leq$ Marks ≤ 55
$5.00 \leq$ CGPA ≤ 5.99	C	Satisfactory	$40 \leq$ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40

B. TECH. (I.T.) – SEM III

Sr. No.	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)							Credits		
		L	P/D	T	End Semester Examination	Continuous Assessment			TW & Practical	TW & Oral	Total	Theory	TW	Total
						Unit Test	Attendance	Assignments						
1	Fundamentals of Software Engineering	3	--	1	60	20	10	10	--	--	100	4	--	4
2	Discrete Mathematics	3	2	--	60	20	10	10	50	--	150	3	1	4
3	Software Project Management	3	--	--	60	20	10	10	--	--	100	3	--	3
4	Data Structures and Files	3	2	--	60	20	10	10	50	--	150	3	1	4
5	Platform Independent Programming Paradigms	3	2	--	60	20	10	10	--	50	150	3	1	4
6	Professional skill Development-III	4	--	--	100	--	--	--	--	--	100	4	--	4
7	IT Lab-I	--	4	--	-	--	--	--	50	--	50	--	2	2
	TOTAL	**19**	**10**	**1**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**05**	**25**

\# Practical examination of duration 3 Hours

B. TECH. (I.T.) – SEM IV

Sr.no	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)							Credits		
		L	P/D	T	End Semester Examination	Continuous Assessment			TW & Practical	TW & Oral	Total	Theory	TW	Total
						Unit Test	Attendance	Assignments						
8	Advanced Data Structure	3	2	-	60	20	10	10	50	--	150	3	1	4
9	Digital Electronics and Logic Design	3	--	--	60	20	10	10	--	--	100	3	-	3
10	Database Management System	3	2	--	60	20	10	10	--	50	150	3	1	4
11	Engineering Mathematics III	3	--	1	60	20	10	10	--	--	100	4	-	4
12	Computer Graphics	3	2	--	60	20	10	10	50	--	150	3	1	4
13	Professional skill Development--IV	4	--	--	100	-	-	-	-	-	100	4	-	4
14	IT Lab-II	-	4	-	--	--	-	-	50	-	50	-	2	2
	TOTAL	**19**	**10**	**1**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**05**	**25**

Total CreditsSemester - III = 25

Total CreditsSemester - IV = 25

Grand Credits = 50

FUNDAMENTALS OF SOFTWARE ENGINEERING

Teaching Scheme

Theory : 3Hr/Week

Tutorials : 1Hr/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

To enable students to work in teams and use the latest software technologies to develop and implement creative solutions to complex problems.

Course Prerequisites

Students should have knowledge of

1) Developing well-structured, modular programs
2) Mathematical knowledge of computer science, including discrete structures, algorithms design and analysis.

Course Outcome

Students will be able to

1) Produce efficient, reliable, robust and cost-effective software solutions.
2) Apply the principles, tools and practices of IT project management.
3) Communicate and coordinate competently by listening, speaking, reading and writing English for technical and general purposes.
4) Perform requirement analysis.
5) Understand software quality concepts.
6) Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.

UNIT-I (6 Hours)

Introduction to Software Engineering

Definition of Software Engineering, Software characteristics, Applications, Software myths, Software Development Process models: The Waterfall model, Incremental process models, Evolutionary Process models, Component based development process model, The Formal Method Model, Aspect –Oriented software Development, Unified Software Development, Agile Processes Models.

CASE (Computer Aided Software Engineering)

CASE and its Scope, CASE support in Software Life Cycle, Documentation Support, Architecture of CASE Environment. Exposure to CASE tools like Rational Software suit, Turbo Analyst, Silk Suite etc.

UNIT-II (6 Hours)

Planning & Management:

Management of People, problem & process, Software project estimation: Resources, Software Scope and feasibility, Empirical estimation model, Make-buy decisions, Software acquisition, Project scheduling, Work breakdown structures, Timeline chart, project plan Software risks: identification, Projection, Refinement, RMMM plan,. A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

UNIT-IV (6 Hours)

Requirement Engineering

Requirements Engineering Tasks: Inception, Elicitation, Elaboration, Negotiation and Validating, Requirements, Communication Techniques, FAST, Quality deployment, Analysis principles, modeling, partitioning, specifications, SRS & SRS reviews, Analysis and modeling: Data modeling, functional modeling and information flow, Data flow diagrams, Extensions to real-time systems, behavioral models, Mechanics of structured analysis, E-R diagrams, Control modeling, Data dictionary, Introduction to object oriented modeling

UNIT-V (6 Hours)

Design Engineering

System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom Up design approaches; Functional Versus Object Oriented Approach, Design Specification, 4GL.

Coding

TOP-DOWN and BOTTOM-UP structure programming, Information Hiding, Programming Style, and Internal Documentation, Verification.

UNIT-III (6 Hours)

Software quality and Change Management

Metrics for software quality, Software quality assurance (SQA) & approaches, Formal Technical Review, Software Reliability, SQA plan, ISO 9000 and SEI standards for Software configuration management (SCM), Elements of SCM , Base lines, Software configuration items ,SCM Repository, Scan process: Version Control, Change Control, Configuration Audit, Status Reporting.

UNIT-VI (6 Hours)

Testing Strategies

Levels of Testing, Functional Testing, Structural Testing, Test Plan, Test Case Specification, Test case design, A strategic approach to software Testing: Verification and Validation Testing, Organizing for software Testing, Software Testing Strategy for conventional Architecture: Unit Testing Integration Testing, Validation Testing, System Testing, Debugging, White-box, Black-box testing, Basis path Testing, Control structure testing,

Text Books

1) Roger S Pressman, Software Engineering: A Practitioner's Approach (6/e.) McGraw Hill, 2008.
2) James F. Peter, Software Engineering - An Engineering Approach, John Wiley (2004).
3) Pankaj Jalote, Software Engineering: A Precise Approach , Wiley India, 2010.
4) Ian Sommerville, Software Engineering, Addison-Wesley Publishing Company, (2006) 8th ed.

Reference Books

1) A Shalloway and J Trott, Design Patterns Explained: A new perspective on object oriented design (2/e), Pearson, 2004.
2) Rajib Mall, Fundamentals Of Software Engineering ,PHI Learning Pvt. Ltd 2009

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

DISCRETE MATHEMATICS

Teaching Scheme

Theory : 03 Hrs/Week

Practical : 02 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous Assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1. To apply and relate knowledge of mathematics in computer science.
2. To learn proof theory with propositional calculus and induction.
3. To map and express network problem with trees and graphs

Course Prerequisites

Students should have fundamental mathematical knowledge.

Course Outcome

Students will be able to

1. Formulate real world problems into statement forms using sets and relations which can be solved or proved mathematically using set theory and logic.
2. Find and map relation between mathematical statements.
3. Design mathematical model from theoretical statements.
4. Find optimum solution using theory of probability.
5. Apply knowledge graphs to solve network problems.
6. Design searching algorithm efficiently by applying tree and tree traversal logic.

UNIT-I (6 Hours)

Propositional Logic and Proof Theory

Sets, Set operations, Finite and Infinite sets, Venn diagram, Principle of inclusion and exclusion, Multisets. Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, Normal forms, methods of proofs

UNIT-II (6 Hours)

Relations and Functions

Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence, Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains. Functions, Composition of functions, Invertible functions, Pigeonhole Principle.

UNIT-III (6 Hours)

Induction and Recurrence Relations

Mathematical Induction, Linear Recurrence Relations with constant Coefficients, Homogeneous Solutions, Total solutions, Solutions by the method of generating functions

UNIT-IV (6 Hours)

Probability

Basics of permutations and combinations, Discrete Probability, Conditional Probability, Probability distribution: normal, binomial, Poisson, Bernoulli distribution.

UNIT-V (6 Hours)

Graphs

Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path in weighted graph, Hamiltonian and Euler paths and circuits, factors of a graph, planer graph and Travelling salesman problem.

UNIT-VI (6 Hours)

Trees

Trees, rooted trees, path length in rooted trees, prefix codes, binary search trees, spanning trees and cut set, minimal spanning trees, Kruskal's and Prim's algorithms for minimal Spanning tree.

Assignment List

1. Write a program to implement following set operations.
   i) Union
   ii) Intersection
   iii) Cartesian product
   iv) Power set
2. Write a program to implement Warshall's algorithm.
3. Write a program to calculate value of polynomial for variable x.
4. Write a program to find fogoh, where g(x) and h(x) is taken from user.
5. Write a program to check whether Eulerian circuit is present in the given graph.
6. Write a program to find shortest path between the vertices in given graph.
7. Write a program to create binary search tree for the values taken from user.
8. Write a program to implement various tree traversals.
9. Write a program to implement Kruskal’s algorithm.
10. Write a program to implement Prim’s algorithm.

Text Books

1) Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Edition, McGraw Hill.
2) Seymour Lipzschutz, M.Lipson, Discrete Mathematics, 3rd Edition, McGraw Hill.

Reference Books

1) C. L. Liu, D. P. Mohapatra, Elements of Discrete Mathematics: A Computer Oriented Approach, 4th Edition, McGraw Hill.
2) J.P.Tremblay, R. Manohar, Discrete Mathematical Structures With Applications to Computer Science, McGraw Hill.

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

SOFTWARE PROJECT MANAGEMENT

Teaching Scheme

Theory : 3Hrs/Week

Examination Scheme

End Semester Examination: 60 Marks

Continuous assessment: 40 Marks

Credit Allotted

Theory : 3

Course Objectives

1) To help the students gain understanding of the functions and responsibilities of the manager, and enable them to analyze and understand the environment of the organization.
2) To introduce them with techniques used in the performance of managerial job
3) Enable them to analyze and understand the environment of an IT organization

Course Prerequisites

N/ A

Course Outcome

Students will be able to

1) Understand basic concepts of management functions
2) Understand the process of IT project initiation
3) Understand the IT project planning process
4) Understand the team dynamics of a project team
5) Understand the concepts of quality and process improvement for IT projects
6) Introduce modern concepts in IT management

UNIT-I (6 Hours)

Conceptual difference between terms Management, Administration andOrganization, Functions and Principles of Management, Levels of Management, Type of business organization , Organization structures.

UNIT-II (6 Hours)

Defining Project management life cycle, Gathering and establishing project requirements, Defining the project goals and Scope management, Risk management, Budgeting a project, Creating a work breakdown structure.

UNIT-III (6 Hours)

Building project plan, Preparing and implementing the project plan, Project schedule,Projectnetwork diagram creation and analysis, Project constraints, Tracking project progress andfinancial obligations, Revising the project plan, Establishing change control, Coping with project delays

UNIT-IV (6 Hours)

Recruitment and selection, Training, Creating roles and responsibilities, Team Management: Leading, Mechanics, Meetings, Maintaining, Motivating,Conflict Management, Job evaluation and merit rating

UNIT-V (6 Hours)

Process and product quality, Quality of deliverables, Quality assurance and standards, Quality planning and control, Process: Classification, measurement, analysis and modeling, Process change, Six sigma, CMM, CMMI, PCMM, ISO standards .

UNIT-VI (6 Hours)

Knowledge management: Definition, needs, techniques and architecture.LearningOrganizations, Knowledge management system life cycle, Knowledge workers and knowledge audits, Supply chain management, Change management, Stress management, Credit rating of software projects, Intellectual property rights and Cyber laws

Assignment List

N/ A

Text Books

1) Joseph Phillips, "IT Project Management", Tata McGraw-Hill 2003 Edition
2) Pankaj Jalote, "Software Project Management", Addison-Wesley, 2002

Reference Books

1) Kathy Schwalbe, "Information Technology Project Management", Cengage Learning, 7th Edition
2) Rajib Mall, "Fundamentals of Software Engineering", PHI Learning, 2009, 3rd Edition
3) Ian Sommerville, "Software Engineering", Pearson Education India
4) Roger S. Pressman, "Software Engineering: A Practitioner's Approach",Palgrave Macmillan
5) Elias M. Awad Hassan M. Ghaziri, "Knowledge Management" , Pearson Education
6) By Harold R. Kerzner, "Project Management: A Systems Approach to Planning, Scheduling, and Controlling", John Wiley & Sons Inc.,10th Edition
7) Debora J. Halbert, "Resisting Intellectual Property", Taylor and Francis Group, Routledge-2007

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV,V and VI

DATA STRUCTURES AND FILES

Teaching Scheme

Theory : 3 Hrs/Week

Practical : 2 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous Assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1. To study fundamentals of data stuctures
2. To implement linear sequential and linked organization data structures
3. To study fundamentals of Files and hashing

Course Prerequisites

Students should have knowledge of

1) 'C' programming
2) Basics of OOP

Course Outcome

Students will be able to:

1) understand the fundamentals of data structure
2) implement linear sequential data structures
3) implement linear linked orgnization data structures
4) implement non-linear linked orgnization data structures
5) implement searching, sorting techniques
6) understand Hashing terms and techniques

UNIT-I (6 Hours)

Review of 'C' programming

Arrays, Pointers, Structure, Functions, Recursive Function

Introduction to Data Structures

Concept of Data object, Data structure, Abstract Data Types (ADT), realization of ADT in ‘C’. Types of data structures. Algorithm Analysis: Definition and Characteristics of Algorithm, Analyzing Programs, Time and Space Complexity, Big 'O' Notation, Graphical Representation of Time Complexity, best, Average and Worst Case of Complexity

UNIT-II (6 Hours)

Linear Data Structures using Sequential Organization

Concept of sequential organization, arrays as ADT, sparse matrix, Polynomial representation using array.

Stack

Concepts, Operations on Stacks, Multi-stack, Application of Stack: Polish notation (infix, prefix, postfix expressions), Conversion and Evaluation of expressions

Queue

Concept, Operations on Queue, Circular Queue, Priority Queue, Double Ended Queue, Applications of Queue

UNIT-III (6 Hours)

Linear Data Structure Using Linked Organization

Linear Data Structures using Linked Organization, Limitations of static memory allocation, Dynamic memory allocation in C. Single Linked List, Double Linked List, Circular Linked List, Generalized Linked List, Application of DLL in dynamic storage management, garbage collection and compaction

UNIT-IV (6 Hours)

Non-Linear Data Structure

Trees: Basic terminology, Binary Trees, representation and operatations of binary tree, Binary tree traversal (Inorder, Postorder, Preorder), Threaded Binary Tree, Binary Search Tree (Weighted BST), AVL Tree

Graphs

Basic terminology, Representation of Graph using adjacency Matrix, List and Multilist, Graph Traversal (DFS & BFS), Spanning Tree. Kruskal's and Prim's Algorithm for MST, Dijkstra's algorithm for shortest Path.

UNIT-V (6 Hours)

Sorting and Searching Techniques

Sorting: Need of Sorting and Searching, Internal & External sorting.

Bubble sort, Selection sort, Insertion sort, Shell sort, Radix sort, Quick sort, Heap sort, Merge sort. Analysis of sorting techniques,

Searching: Sequential search, Binary search, Fibonacci search

UNIT-VI (6 Hours)

File Organization and Hashing

Introduction to files, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random access files, File Organization, Indexing

Hashing

symbol table, Hash tables, Hashing Functions, Overflow Handling and Collision Resolution strategies

Assignment List

1. Write a Program to implement fibonacci series, factorial of no and checking for prime no.
2. Write a Program to implement functions for Stack, Queue and Circular Queue data structure.

3. Write a Program to convert expression from
    1. Infix to Prefix
    2. Infix to Postfix
4. Write a Program to implement polynomial operations
5. Write a Program to implement Sparse Matrix operations
6. Write a menu driven program to implement Singly Linked List for basic operations
7. Write a menu driven program that implements Doubly Linked List for basic operations
8. Write a Program to implement Binary Search Tree and Traversal in BST(Inorder, Preorder, Postorder)
9. Write a Program to implement Threaded Binary Tree and its Traversals.
10. Write a Program to implement Breadth First search and Depth First Search in graph.
11. Write a C Program to implement Linear and Binary Search
12. Write a Program to implement sorting methods. (Bubble sort, Selection sort, Insertion sort, Quick sort)

<u>Text Books</u>

1. S. Lipschutz, “Data Structures”, McGraw Hill Pub.
2. Y. Langsm, M. Augentin, A. Tanenbaum, “Data Structure Using C and C++”, Pearson Education
3. R. Gilberg, B. Forozon, “Data Structure: A pseudo code approach with C”

<u>Reference Books</u>

1. Ellis Horowitz, Sartaj Sahni , “Data Structures,Algorithms&Applications Inc++, University Press”, 2nd Edition
2. Trembley Jean Paul, Sorn Soon Paul G, “An Introducton to Data Structures with Applications”, Tata McGraw-Hill Publishing Company, 2008

<u>Syllabus for Unit Test</u>

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

PLATFORM INDEPENDENT PROGRAMMING PARADIGM

Teaching Scheme

Theory : 3 Hrs/ Week

Practical : 2 Hrs/ week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Oral : 50 Marks

Credit Allotted

Theory : 03

Term Work : 01

Course Objectives

1) To provide an understanding of Platform Independent Programming
2) To instill basics of Ruby, Python and Web-applications

Course Prerequisites

Students should have knowledge of

1) C, C++
2) Basic Knowledge of Computing terminologies

Course Outcome

Students will be able to:

1) Convey basic concepts of cross platform software development.
2) Analyze programs in Ruby and Python.
3) Demonstrate JAVA concepts in terms of OOP.
4) Analyze the concepts of HTML and CSS for creating webpages.
5) Analyze the applications of Cross Platform Programming.
6) Describe the architecture of JUCE.

UNIT-I (6 Hours)

Introduction

Cross platform software development, Software Platforms, Operating Systems – introduction and its relevance to application software, Scripting, Compilers and Interpreters.

UNIT-II (6 Hours)

Ruby Programming Language

Semantics, Syntax, data types – strings & collections, conditional statements and loops, Implementation of Class.

UNIT-III (6 Hours)

Java

Architecture, JVM, Byte code, data types, conditional statements and loops, functions.

UNIT-IV (6 Hours)

Python

Semantics, Syntax, data types, statements, methods.

UNIT-V (6 Hours)

Internet

Web servers, Browsers, Webpages, Introduction to Scripting languages, Basics of HTML and CSS.

UNIT-VI (6 Hours)

Applications

Cross platform development & challenges, Cross platform mobile development, HTML5.

JUCE

Introduction, JUCE Module Format, Introjucer, Data Structure, Working with Media Files.

Assignment List

(Term work shall consist of Six assignments from above syllabus.)

1) Demonstrate the programming model of Ruby using a simple example.
2) Discuss OOP features available in JAVA.
3) Summarize atleast 10 Methods of Python.
4) Write a Case Study of JUCE Module Format.
5) Explain the various types of CSS with suitable example.
6) Compare HTML webpage with HTML5 webpage.

Text Books

1) "System Software and Operating System" – D M Dhamdhere (Tata McGraw Hill)
2) "The Ruby Programming Language" - David Flanagan & Yukihiro Matsumoto (O'Reilly Media)
3) "Java - The Complete Reference" - Herbert Schildt(McGraw Hill)
4) "Think Python" - Allen Downey (O'Reilly)
5) "Web Technologies" – Black Book (Dreamtech Press)
6) "Getting started with JUCE" - Martin Robinson (PACKT Publishing)

Reference Books

1) "Professional Cross-Platform Mobile Development" - Scott Olson, John Hunter(Wrox Publication)

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV,Vand VI

ITL - I

Teaching Scheme
Practical : 04 hr/week

Examination Scheme
Practical and Term Work : 50 Marks

Credit Allotted
Term Work : 2

Course Objectives: To

1) Apply concepts of programming language to meet the requirements specified.
2) Sketch an outline of a website with GUI.
3) Solve various problems during development of website.
4) Analyze the given requirement to design the pages for a website.
5) Test the functionalities required.
6) Design web application on an internet.

Course Prerequisites

Students should have knowledge of

1) Programming language
2) Presentation layer, properties

Course Outcome

Students will be able to

1) Design the layout of a website
2) Maintain the presentation logic and business logic
3) Solve customers' requirement by designing web pages
4) Understand principals of GUI
5) Validate the component's role and functionalities associated with it
6) Design website using various client side and server side scripting.

UNIT-I (6 Hours)

Introduction to an Internet

Introduction to internet and its applications, E- mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, World Wide Web and its evolution, uniform resource locator (URL), browsers - internet explorer, netscape navigator, opera, firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

UNIT-II (6 Hours)

HTML

HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags. Imagemaps : What are Imagemaps Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagempas together, alternative text for Imagemaps, Tables : Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, spanning multiple rows or columns, Elements that can be placed in a table. Passing form data Style Sheets : What are style sheets, Why are style sheets valuable Different approaches to style sheets, Using Multiple approaches, Linking to style information in s separate file, Setting up style information, Using the tag, embedded style information

UNIT-III (6 Hours)

JavaSript

Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators : Assignment Operators, Comparison Operators Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload. (6 Hours)

UNIT-IV (6 Hours)

XML

Introduction to XML, Anatomy of an XML, document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL.

UNIT-V (6 Hours)

PHP :

Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors / problems.

UNIT-VI (6 Hours)

Advanced PHP and MySQL : PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, Basic CRUD functionalities using PHP, Cookies and HTTP, Type and Type Conversions, E-Mail.

Assignment List

1) Design a web page for Department of Information Technology, BVUCOE, Pune.
2) Develop a website using CSS alignment.
3) Simulate e-album of images using Imagemap.
4) Maintain database of student using XML and publish the data on a web.
5) Using Java Script design a web page that prints factorial / Fibonacci series / any given series.
6) Design a form and validate all the controls placed on the form using Java Script.
7) Design a DTD, corresponding XML document and display it in browser using CSS.

8) Develop MIS for student, faculty, lab and syllabus.

9) Simulate cookies using PHP.

10) Implement CRUD operation on MySQL

Text Book

1) Web Design The complete Reference, Thomas Powell, Tata McGrawHill

2) PHP : The Complete Reference By Steven Holzner, Tata McGrawHill

Reference Books

2) HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill

3) JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 50 Marks**
CREDITS ALLOTED	:	**2**

Course Pre-requisites

The Students should have knowledge of

1. Basic math's and reasoning, the rules of English and comprehensive ability
2. Basic awareness of phrasal verbs used in spoken communication and knowledge of verbs and other words used in professional life.
3. Basic writing techniques taught to them in the first semester.
4. The strengths and achievements analyzed during self awareness session taught in the second semester. They should also be able to identify their long term and short term goals.
5. Basic knowledge and idea about leaders and leadership qualities.
6. Basic awareness of PowerPoint presentation and paper presentation and also should be fluent in English.

Course Objectives

The Professional Skills Development course which is a combination of aptitude and soft skills aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The English and soft skills section focuses on the higher aspects of soft skills such as grooming them on leadership, presentation, business communication which would enable them to project themselves as professionals in the corporate sector and/or otherwise.

Course Outcomes

The student should be able to

1. Solve the aptitude test in the recruitment exam and competitive

exam by applying short techniques and solve the question in less amount of time. They would be able to handle around 15-20 topics of math's and reasoning and 50 rules of parts of speech.

2. Present themselves with finesse by using around 25-20 idioms and phrases relevant to corporate communication as well as spoken English. They will also learn 50-60 words and other words that are specifically used in meetings, group discussions, presentation and other corporate events.
3. Process their ideas and thoughts (verbal communication) into written communication in an effective, coherent and logical manner within a stipulated time and specific word limit of 500-750 words for essay writing along with limited words for technical writing and report writing.
4. Identify themselves in terms of their strengths. Weaknesses and opportunities available to them for the career growth. They would also learn to overcome their weakness and convert into strengths and also make utilization of the opportunity vis-à-vis their strength. They would also learn to set realistic short/long term goals relevant to them through the SMART goal mnemonic.
5. Differentiate between the different types of leaders and groom themselves to be potential leaders. Based on their qualities and strengths they would learn 5 types of leadership styles and mould themselves according to that. They would also learn 10-15 leadership traits.
6. Prepare PowerPoint presentation and paper presentation effectively by focusing on body language, tone of communication and audiences' needs. They would also learn to handle the questions in an effective and smart way.

Unit I (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**

  i) Enjoy maths + Number system

ii) Number system

iii) Percentage, profit and loss

- **Logical Reasoning**

  i) Coding, Decoding, Number series,

  ii) Blood relation Directions, cubes & dices

- **English**

  i) Vocabulary-1

  ii) Confusing words-1(Homonyms)

Unit II (6 Hours)

Essential Grammar - III

- Idioms and phrases
- Usage of Idioms & phrases in daily conversation
- Activities
- Academic word list- Words to be used in business communication

Unit III (4 Hours)

Written Communication- II

- Essay writing
- Mnemonics to develop ideas and write essays
- Structure of essays
- Technical writing
- Report writing

Unit IV (6 Hours)

SWOT Analysis

- Introduction to SWOT
- Importance to SWOT

- Individual & Organizational SWOT Analysis
- Identifying strengths, weaknesses, threats & opportunities
- Short term goals& Long term goals, Career planning

Unit V (4 Hours)

Interpersonal Skills - III

- Introduction to leadership skills
- Importance of leadership skills
- Types of leadership skills
- Are leaders born or made?

Unit VI (4 Hours)

Presentation Skills

- Introduction to PowerPoint presentation
- Structure & flow of presentation
- Importance of body language
- Presentation by students-evaluation& feedback by trainers

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Scheme

Theory :03 Hrs/week

Practical :02 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1) Analyze the asymptotic performance of algorithms.
2) Demonstrate a familiarity with major algorithms and data structures.
3) Apply important algorithmic design paradigms and methods of analysis.
4) Synthesize efficient algorithms in common engineering design situations.
5) Write rigorous correctness proofs for algorithms.
6) Master the implementation of linked data structures such as linked lists and binary trees.

Course Prerequisites

Students should have knowledge of

1) Basic data structures with their operations.
2) Detail knowledge of graph and trees.

Course Outcome

Students will be able to:

1) Analyze worst-case running times of algorithms using asymptotic analysis.

2) Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
3) Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
4) Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms
5) Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
6) Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

UNIT-I (6 Hours)

Basic Concepts of OOPs – Templates Function and class templates – Algorithms: performance analysis: time complexity and space complexity– Analysis of algorithm efficiency-Asymptotic notations and its properties.

UNIT-II (6 Hours)

Complexity Analysis-Mathematical foundations, summation of arithmetic and geometric series, n, n2,bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, Complexity calculation of various standard functions.

UNIT-III (6 Hours)

Stacks and Queues – ADT– Implementation and Applications –– Introduction to Red Black trees and Splay tree – B Trees – Implementations – Tree Traversals, Binary Heaps: Implementation of Insert and Delete min, Creating Heap. Binomial Queues: Binomial Queue Operations, Binomial Amortized Analysis, Lazy Binomial Queues.

UNIT-IV (6 Hours)

Dynamic Programming And Greedy Technique-All Pairs Shortest Paths Problem: Floyd's Algorithm, Warshall's Algorithm, Dynamic Programming – Greedy Algorithm – Backtracking – Local Search Algorithms.

UNIT-V (6 Hours)

Advance data structure- Biotonic Sorting Network, Fibonacci Heap, Disjoint Set Representation, Red And Black Trees And Their applications, Matrix Operations and Application To Job Sequencing With Deadlines Problem.

UNIT-VI (6 Hours)

Limitations of algorithms-NP & NP complete problem-Backtracking & n-queens problem, Hamiltonian circuit problems, Branch & Bound assignment problem-knapsack problem-Travelling salesman problem-Approximation algorithms for NP Hard problems.

Text Books

1) Anany Levitin-"Introduction to design and analysis of algorithms", Third Edition, Pearson Education,2012

2) Aho Hop croft Ullman —Data Structures and Algorithms, Pearson Education, 2002.

3) "Fundamentals of Computer Algorithms", Horowitz, Sahani, Rajsekharan, Galgotia Publications.

Reference Books

1) Tanenbaum A.S, Langram Y, Augustine M.J., Data Structures using C & C++, Prentice Hall of India, 2002.

2) Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++, Pearson Education, 2002.

3) Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

4) Thomas H.Corman,Charles E.Leiserson,Ronald L.Rivest and Clifford

Stein,"Introduction to algorithms"Third Edition ,PHI Learning Private Limited,2012.

5) Fundamentals of DATA STRUCTURES in C: 2nd ed, Horowitz, Sahni, Anderson-freed, Universities Press.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

DIGITAL ELECTRONICS & LOGIC DESIGN

Teaching Scheme

Theory : 03 Hrs/Week

Practical :

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

1) To introduce number systems and codes.
2) To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
3) To introduce the concept of memories, programmable logic devices and digital ICs.
4) Give students the basic tools for the design and implementation of digital modules and subsystems.
5) Give students the concept of digital logic design.
6) Reinforce theory and techniques taught in the classroom through project assignments.

Course Prerequisites

Students should have knowledge of

1) Basic electronics terms like logic gates, semiconductors etc.
2) Should know the concept of digital IC'S and number systems.

Course Outcome

Students will be able to:

1) Apply knowledge of math, science and engineering.
2) Design digital circuitry, analyze and interpret data

3) Design a system, component, process to meet desired needs within realistic constraints.
4) Design combinational circuits.
5) Extract the analog parasitic elements from the layout and analyze the circuit timing using a logic simulator.

UNIT-I (6 Hours)

Classification of logic families, Characteristics of digital ICs-Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements.TTL logic. Operation of TTL NAND gate, active pull up, wired AND, open collector output, unconnected inputs. Tri-State logic. CMOS logic – CMOS inverter, NAND, NOR gates, unconnected inputs, wired logic , open drain output. Interfacing CMOS and TTL. Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L, DCTL.

Boolean Algebra : Number System : Binary, Hexadecimal numbers, octal numbers and number conversion. Signed Binary number representation: Signed Magnitude, 1's complement and 2's complement representation, Binary, Octal, Hexadecimal Arithmetic: 2's complement arithmetic.Algebra for logic circuits: Logic variables, Logic functions -NOT, AND, NOR, XOR, OR, XNOR, NAND.

UNIT-II (6 Hours)

Standard representations for logic functions, k map representation of logic functions (SOP m POS forms), minimization of logical functions for min-terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD - to – 7 segment decoder, Code converters. Adders and their use as subtractions, look ahead carry, ALU, Digital Comparator, Parity generators/checkers, Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers and their use in combinational logic designs, Decoders, demultiplexer trees. Introduction to Quine McCluskey method.

UNIT-III (6 Hours)

1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops. Application of Flip flops: Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock Skew, Clock jitter. Effect on synchronous designs.

UNIT-IV (6 Hours)

Basic design steps- State diagram, State table, State reduction, State assignment, Mealy and Moore machines representation, Implementation, finite state machine implementation, Sequence detector.

UNIT-V (6 Hours)

Semiconductor memories: memory organization and operation, expanding memory size, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, expanding memory size, Synchronous DRAM (SDRAM), Double Data Rate SDRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory.

UNIT-VI (6 Hours)

Algorithmic State Machines: ASM charts, notations, design of simple controller, multiplexer controller method:

Introduction to HDL, VHDL: Library, Entity, Architecture, Modeling styles, Data objects, Concurrent and sequential statements, Design examples using VHDL for basic combinational and sequential circuits.

Text Books

1) Morris Mano, Digital Design, Prentice Hall of India, 2002.

2) R.P. Jain, “Modern Digital Electronics”, 3rd Edition, Tata McGraw-Hill, 2003, ISBN 0 – 07 – 049492 – 4

3) Malvino, D.Leach “ Digital Principles and Applications”, 5th edition, Tata McGraw Hill

Reference Books

1) John M.Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002
2) Thomson, 2002. 2. Thomas L.Floyd, "Digital Fundamentals", PHI, 2003.
3) J. Bhaskar, "VHDL Primer" 3rd Edition.PHI Publication
4) Wakerly Pearon, "Digital Design: Principles and Practices", 3rdedition, 4threprint, Pearon Education, 2004

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

DATABASE MANAGEMENT SYSTEM

Teaching Scheme

Theory : 03Hr/week

Practical : 02Hr/week

Examination Scheme

Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Oral : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1) Identify various techniques to communicate with database.
2) Relate relevant data for effective processing of data.
3) Construct a database to maintain data adroitly.
4) Study various queries and tools to deal with the data.
5) Understand the relation between data set and respective means to access it.
6) Understand influence of data in the effective development of software.

Course Prerequisites

Students should have knowledge of

1) Basic understanding of data and data structure
2) Basic understanding of programming language

Course Outcom

Students will be able to:

1) Design database to store data related with application
2) Identify technique to deal with data.
3) Extend power of SQL by adding programming paradigm
4) Predict suitable environment for data processing as per type data.
5) Apply knowledge of dbms to process the software efficiently

UNIT-I (6 Hours)

Introduction to DBMS: What is database management system, Use of database system, view of data, relational databases, database architecture, transaction management, Data Models The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. Design of Database , ER-Diagram Database design . ER Model: overview of ER-Model, Constraints, ER-Diagrams, Extended ER Diagrams

UNIT-II (6 Hours)

Relational database model: Logical view of data, keys, integrity rules. Design of Relational Database: features of good relational database design, Normalization (1NF, 2NF, 3NF, BCNF). Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

UNIT-III (6 Hours)

Integrity Constraints: What are constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views Introduction to SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

UNIT-IV (6 Hours)

PL/SQL: Introduction ,Declaring Variables , Writing Executable Statements , Interacting with Oracle Server , Writing Control Structures , Working with Composite Data Types , Writing Explicit Cursors , Writing Implicit Cursors , Handling Exceptions , Creating Procedures , Creating Functions , Managing Subprograms , Creating Packages , More Package concepts , Oracle supplied Packages, Manipulating Large Objects , Creating Database Triggers

UNIT-V

Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

UNIT-VI (6 Hours)

Data Intensive Computing : Introduction to big data, unstructured data processing using Hadoop , NoSQL database using MangoDB

Assignment List

1) Draw an ER Diagram to maintain database of Bank
2) Normalize the database of Library, upto BCNF
3) Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
4) Calculate turnover of a banks in pune using group by query
5) WAP to implement autorollback option on deletion using trigger.
6) WAP to implement Procedure to calculate square of a number.
7) Implement implicit cursor using PL/SQL.
8) Simulate two phase locking protocol on the database of Movie.
9) Perform document processing using MangoDB,.
10) Solve word count problem using Hadoop.

Text Books

1) A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", Sixth Edition McGraw-Hill
2) Oracle SQL and PL/SQL Guide Till 10gR2
3) Ramkrishna R., Gehrke J., Database Management Systems, 3rd Edition, McGraw-Hill

Reference Books

1) Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning.
2) Bipin Desai, Introduction to Database Management Systems.
3) Groff James R., Paul Weinberg, LAN times guide to SQL.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ENGINEERING MATHEMATICS-III

Teaching Scheme

Theory : 03 Hours / Week

Tutorial: 01 Hours/Week

Examination Scheme

End Semester Examination: 60 Marks

Continuous Assessment : 40 Marks

Credits Allotted

Theory : 04

Course Pre-requisites

Students should have basic knowledge of:

1. Differential calculus
2. Integral calculus
3. Complex numbers
4. Vector algebra

Course Objectives

To develop ability to use the mathematical techniques, skills, and tools necessary for engineering practice.

Course Outcomes

At the end of the course , a student will be able to:

1. Form mathematical modeling of systems using differential equations and ability to solve linear differential equations with constant coefficient.
2. Apply basics of analytic functions and the basics in complex integration which is used to evaluate complicated real integrals.
3. Apply theorems to compute the Laplace transform, inverse Laplace transforms.
4. Solve difference equation by Z-transform.
5. Calculate the gradients and directional derivatives of functions of several variables.
6. Use Green's theorem to evaluate line integrals along simple closed contours on the plane.

UNIT - I (06 Hours)

Linear Differential Equations (LDE)

Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

UNIT - II (06 Hours)

Complex Variables

Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy's Theorem, Cauchy's Integral Formula, Laurent's Series, Residue Theorem

UNIT - III (06 Hours)

Transforms

Fourier Transform (FT): Complex Exponential Form of Fourier Series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses.

Introductory Z-Transform (ZT)

Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

UNIT – V (06 Hours)

Laplace Transform (LT)

Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, . Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations.

UNIT - V (06 Hours)

Vector Differential Calculus

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields. Scalar Potential, Vector Identities.

UNIT - VI (06 Hours)

Vector Integral Calculus

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields.

Assignments

1. Linear Differential Equations
2. Complex Variables
3. Transforms
4. Laplace Transform
5. Vector Differential Calculus
6. Vector Integral Calculus

Text Books

1. Advanced Engineering Mathematics by Peter V. O'Neil (Cengage Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference Book

1. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
2. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
3. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
4. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
5. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).

Syllabus for Unit Test

Unit Test -1	UNIT – I
UNIT – II	UNIT - III
Unit Test -2	UNIT – IV
UNIT – V	UNIT - VI

COMPUTER GRAPHICS

Teaching Scheme

Theory : 3Hr/Week

Practical : 2Hr/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objective

1) learn basic and fundamental computer graphics techniques;
2) learn image synthesis techniques
3) examine applications of modeling, design and visualization

Course Prerequisites

Students should have knowledge of

1) C / C++ programming
2) Data structures and files

Course Outcome

Students will be able to:

1) Understand history and evolution of computer graphics, both hardware and software and use a current graphics API (OpenGL).
2) Implement algorithms including: line drawing, polygon filling, clipping, and transformations.
3) Write programs that demonstrate geometrical 2 D transformations
4) Write programs that demonstrate geometrical 3 D transformations
5) Understand illumination and shading concepts
6) Implement Fractals.

UNIT-I (6 Hours)

Introduction to Computer Graphics

Overview of Computer Graphics, , Description of graphics devices, Input Devices, Graphics Devices, Display Technologies, Raster Refresh (Raster-Scan) Graphics Displays, Scan Basics, Video Basics, The Video Controller, Random-Scan, Display Processor, LCD displays, display file and structure, display processor, Graphics file formatComputer Graphics Application and Software Introduction to OPENGL, Applications of Computer graphics, Animation.

UNIT-II (6 Hours)

Scan conversion – lines, circles and Ellipses Filling polygons and clipping algorithms

Line and circle drawing: DDA, Bresenham's, algorithms, Thick line segment, Aliasing, Anti aliasing , Polygons Filling algorithms, edge data structure, Line Clipping algorithms– Cyrus-Beck, Cohen-Sutherland, Polygon Clipping algorithms: Sutherland Hodgeman, Color models.

UNIT-III (6 Hours)

Transformations

Matrix Representation of 2D Transformations: Rotation, Reflection, Scaling, Combined Transformation, Translations and Homogeneous Coordinate system ,Transformation of Points, Transformation of the Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, Window-to-Viewport Transformations. Introduction, Matrix Representation of 3D Transformations: Scaling, Shearing, Rotation, Reflection, Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Composition of 3D Transformations.

UNIT-IV (6 Hours)

Projections

Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections. Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing, viewing, Coordinate Systems and matrices, camera model and viewing pyramid.

UNIT-V (8 Hours)

Hidden Surface Determination

Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms , Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.

Illumination and Shading

Illumination and Shading Models for Polygons, Reflectance properties of surfaces, Ambient, Specular and Diffuse reflections, Atmospheric attenutation, Phong's model, Gouraud shading, some examples.

UNIT-VI (6 Hours)

Curves and fractals

Curve Representation, Nonparametric Curves, Parametric Curves, The General Conic Equation, Representation of Space Curves, Cubic Splines, Bezier Curves, B-spline Curves, B-spline Curve Subdivision, Parametric Cubic Curves, Quadric Surfaces. Bezier Surfaces, fractals and fractal surfaces, Hilbert's curve, Koch curve.

Assignment List

1) Laboratory exercises will normally be conducted using the currently available computer graphics API such as OpenGL
2) Implement Cohen Sutherland/DDA line drawing algorithm.
3) Implement Cohen Sutherland/DDA circle drawing algorithm.
4) Write a program to implement polygon filling algorithm.
5) Implement Cohen Sutherland Line clipping algorithm
6) Implement following 2D Transformations:
   i) Translation
   ii) Rotation

iii) Scaling
iv) Shearing
7) Implement 3D Transformations
i) Translation
ii) Rotation
iii) Scaling
iv) Shearing
v) Shearing
8) Write a program to draw fractals
9) Write a program to draw Koch curve
10) Write a program to draw Hilbert'scurve
11) Using OPENGL libraries create an animation.

Text Books

1) S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 – 100472 – 6. 2.
2) D. Rogers, "Procedural Elements for Computer Graphi cs", 2nd Edition, Tata McGraw-Hill Publication, 2001, ISBN 0 – 07 – 047371– 4.

Reference Books

1) J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Second Edition in C, Pearson Education, 2003.
2) D. Hearn and M. Pauline Baker, Computer Graphics (C Version), Pearson Education, 2nd Edition, 2004.
3) D. F. Rogers and J. A. Adams, Mathematical Elements for Computer Graphics, 2nd Edition, McGraw-Hill International Edition, 1990.
4) 4. F. S. Hill Jr., Computer Graphics using OpenGL, Pearson Education, 2003

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

IT LAB - II

Teaching Scheme

Practical : 04 Hr/ Week

Examination Scheme

Term work and Practical : 50 Marks

Credit Allotted

Term Work : 2

Course Objectives: To

7) Compute time and space complexity for given program.
8) Demonstrate concepts OOPS using java
9) Solve specified requirement
10) Infer various approach to decide efficiency of given approach.
11) Formulate given problem by providing the proof of behavior of given model.
12) Design an application using platform independent approach.

Course Prerequisites

Students should have knowledge of

3) Object Oriented Programming language
4) Logic to solve given problem

Course Outcome

Students will be able to:

7) Design simple application meeting the requirements.
8) Develop their logical skill through various assignments and practicals.
9) Breakdown complex problem into subpart and then handle every part to achieve the goal.
10) Model a solution to any real world problem
11) Analyze significance of platform independency.
12) Design application using object oriented norms.

UNIT-I (6 Hours)

Introduction to Java

Java Fundamentals, Features of Java OOPs concepts Java virtual machine Reflection byte codes Byte code interpretation Data types, variable, arrays, expressions, operators, and control structures Objects and classes .

UNIT-II (6 Hours)

Classes and objects

Java Classes , Abstract classes Static classes Inner classes Packages Wrapper classes Interfaces This Super Access control, embedded style information Exception handling Exception as objects Exception handling mechanism Try catch finally Throw, throws.

UNIT-III (6 Hours)

Object oriented Properties

Inheritance, Encapsulation, Polymorphism, Data Binding, data abstraction. Implementation of these concepts using various statements like if, switch and loops like for,do – while, while.

UNIT-IV (6 Hours)

IO mechanism

IO package Input streams Output streams Object serialization Deserialization Sample programs on IO files Filter and pipe streams

UNIT-V (6 Hours)

Threading and Multithreading

Lifecycle of Thread, Basic functions of thread, multithreading, synchronization.

UNIT-VI (6 Hours)

Collections and Generics

Introduction to collection framework, List, Set, Maps, utility class, Reflection API.

Assignment List

1) WAP to crate array of an object to maintain data of an employee.
2) WAP to design user defined exception to reject negative numbers
3) Count the number of objects created for a class using static member function.
4) Write programs on interfaces.
5) Write programs on packages.
6) Write programs to copy contents of file into other file using all possible alternatives.
7) WAP to simulate traffic signal using multithreading
8) WAP to Maintain the record of student using collection API.
9) WAP to map roll and name to maintain data of students.
10) WAP to maintain record of an employee using List.

Text Books

1) Programming with Java A Primer, E. Balaguruswamy Tata Mc-Graw Hill Companies.
2) SCJP 1.6 – Khalid Mughal
3) SCJP 1.6 – Kathy Sierra

Reference Books

1) Herbert Schildt, Java 2 Complete Reference – 5th Edition, Tata Mc-Gra Hill
2) Dietel & Dietel, Java How to Program

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 100 Marks**
CREDITS ALLOTED	:	**4**

Course Pre-requisites

The Students should have knowledge of

1. Basic concepts of Maths, Logical reasoning and English Grammar taught in the last semester.
2. An overall idea about the difference in personal and professional communication in terms of vocabulary used.
3. Knowledge of writing skills, importance of professionalism in emails and letters.
4. They should be aware of concepts of self esteem, self-assessment and its importance in setting long term and short term goals.
5. Awareness of the interpersonal skills like team work and introduction to Leadership taught during the last semester.
6. Body language and importance of non verbal communication to maintain professionalism.

Course Objectives

The Professional Skills Development 4 is an extension of PSD- 3 with focus on the remaining topics of Maths and Logical reasoning. The further complex concepts of Aptitude and Grammat aims to acquaint them with the level of complexity presented in recruitment tests and also provide them techniques to solve such question with tricks/methods in a very short period. The English communication and soft skills section of PSD-4 focuses on the higher aspects of soft skills such as grooming them on corporate etiquettes and various formats of email/ letter writing so that can present themselves as professionals further both in oral and written communication.

Course Outcomes

The student should be able to

1. Learn further concepts of Maths, Logical reasoning and English grammar and apply short cuts/ tricks to solve questions in less time. Learn remaining 25-30 rules of grammar relevant from the recruitment point of view.
2. Use appropriate words in the right context both academically and professionally. Students would have approximately around 80-100 words from the academic word list prescribed in the syllabus.
3. Understand the importance of email etiquettes and distinguish between the format of formal and informal emails/letters. They would be able to draft professional mails and letters like job application letters, cover letters, and apology emails with proper structure and words which are necessary in the corporate life.
4. Apply various strategies of conflict resolution through amicable way to settle team conflicts/disputes. They would learn to handle criticism and feedback in a positive way as an individual as well as a team.
5. Understand the major concepts of leadership like coaching, mentoring. They would learn effective time management strategies- Pareto principle (the 80-20 rule of time management) and apply them in the corporate life.
6. Understand the importance of grooming, body language and etiquettes in the corporate sector. They would be able to conduct themselves in a professional and impressive way by conducting themselves according to situations in the professional sector. They would also learn various strategies and conversational techniques to handle telephonic interviews confidently.

Unit I (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**
  - i) Simple Interest and Compound Interest
  - ii) Ratio, Proportion and Average

iii) Mixture and Allegation

- **Logical Reasoning**
  i) Data Interpretation
  ii) Data Sufficiency

- **English**
  i) Grammar I
  ii) Vocabulary - Analogies

Unit II (4 Hours)

Essential Grammar - IV

- Vocabulary – Academic word List

Unit III (6 Hours)

Written Communication- III

- Email writing and etiquettes – formal and informal email writing, format of various types of email, do's and don'ts of email writing
- Letter writing – formal letters, job application letter, cover letter.
- Essay writing – mnemonics top develop ideas and write essays, structure of essays

Unit IV (4 Hours)

Self Awareness and Conflict Resolution

- Self-assessment & Perception & attitudes.
- Analyzing skills & weaknesses and habits.
- Developing positive attitude & handling criticism positively
- Handling conflicts in the personal and corporate sector
- Causes of conflicts in work scenario.
- Ways and methods for conflict resolution

Unit V (6 Hours)

Interpersonal Skills - III

- Mentoring, Difference between Leadership and Management
- Leading with examples
- Time management -The Time Management Matrix, Pareto Principle

Unit VI (4 Hours)

Corporate Etiquettes and Grooming

- Introduction to grooming & etiquettes
- Ways of handling telephonic interviews

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standars of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be decleared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
$9.50 \leq$ CGPA ≤ 10.00	0	Outstanding	$80 \leq$ Marks ≤ 100
$9.00 \leq$ CGPA ≤ 9.49	A+	Excellent	$70 \leq$ Marks ≤ 80
$8.00 \leq$ CGPA ≤ 8.99	A	Very Good	$60 \leq$ Marks ≤ 70
$7.00 \leq$ CGPA ≤ 7.99	B+	Good	$55 \leq$ Marks ≤ 60
$6.00 \leq$ CGPA ≤ 6.99	B	Average	$50 \leq$ Marks ≤ 55
$5.00 \leq$ CGPA ≤ 5.99	C	Satisfactory	$40 \leq$ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40

B. TECH. (I.T.) – SEM V

Sr. No	Course Title	Teaching Scheme			Examination Scheme							Credits		
					End Semester Examination	Continuous Assessment			TW & Practical	TW & Oral	Total Marks			
		L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	TW	Total
1	Theory Of Automata & Formal Language	3	1	--	60	20	10	10	--	--	100	4	-	4
2	Data Communication and Networks	3	-	2	60	20	10	10	--	50	150	3	1	4
3	System Programming	3	-	2	60	20	10	10	50	--	150	3	1	4
4	Microprocessor Architecture and Programming	3	-	2	60	20	10	10	50	--	150	3	1	4
5	Elective-I	3	-	--	60	20	10	10	--	--	100	3	-	3
6	Professional skill Development -V	4	-	--	100	-	-	--	--	-	100	4	-	4
7	IT Lab-III	-	-	4	--	--	-	-	50		50	-	2	2
	TOTAL	**19**	**1**	**10**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**05**	**25**

ELECTIVE- I

1) Software Testing and Quality Assurance
2) Management of Information System
3) Human Computer Interactions
4) Information Theory & Coding

Sr. No.	Course Title	Teaching Scheme			Examination Scheme							Credits		
					End Semester Examination	Continuous Assessment			TW &PR	TW &OR	Total Marks			
		L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	TW	Total
1	Operating System	3	--	2	60	20	10	10	50	--	150	3	1	4
2	Advanced Database Management Systems	3	--	2	60	20	10	10	--	50	150	3	1	4
3	Design and Analysis of Algorithms	3	1	--	60	20	10	10	--	--	100	4	-	4
4	Elective-II	3	--	--	60	20	10	10	--	--	100	3	-	3
5	Computer Organization and Architecture	3	--	2	60	20	10	10	50	--	150	3	1	4
6	Professional skill Development -VI	4	--	--	100	--	--	--	--	--	100	4	--	4
7	IT Lab-IV	--	--	4	--	--	--	--	50	--	50	-	2	2
	TOTAL	**19**	**1**	**10**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**20**	**5**	**25**

ELECTIVE-II

1) Multimedia Techniques
2) Embedded System
3) Geographical Information System
4) Cyber Law and Security Policies

Optional Subject: Mathematics- IV

Course Title	Teaching Scheme			Examination Scheme							Credits		
				End Semester Examination	Continuous Assessment			TW &PR	TW &OR	Total Marks			
	L	T	P	Theory	Unit Test	Attendance	Assignments				Theory	TW	Total
Mathematics- IV	4	--	--	60	20	10	10	--	--	100	4	-	4
TOTAL	**4**	**-**	**-**	**60**	**20**	**10**	**10**	**-**	**-**	**100**	**4**	**-**	**4**

THEORY OF AUTOMATA AND FORMAL LANGUAGES

Teaching Scheme

Theory : 3Hrs/Week

Tutorials : 1Hr/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 4

Course Objectives

Students will learn about a variety of issues in the mathematical development of computer science theory, particularly finite representations for languages and machines, as well as gain a more formal understanding of algorithms and procedures.

Course Prerequisites

Students should have knowledge of set theory and state transition diagrams.

Course Outcome

Students will be able to:

1) Design automata machines for strings given.

   Write regular expression for the given string and find set of strings if regular expression is given.

   2) Write grammar rules for the strings given.

3) Design push down automata for the string and grammar.

4) Design Turing machine and apply the same to solve algorithmic problems.

5) Apply knowledge of TAFL in compiler construction.

UNIT-I (6 Hours)

State Machines

Abstract Machine, Acceptance of language by machine. Finite Automata (FA) - Definition, Types of FA, NFA and DFA, Language accepted by NFA and DFA, Designing of finite state machines. Equivalence and difference between DFA and NFA, Inter-conversion between NFA and DFA, Machines with output-Moore and Mealy machines, Designing, Inter-conversion between Moore and Mealy machine.

UNIT-II (6 Hours)

Regular Expression (R.E.)

Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Arden's theorem, FA and RE: DFA to RE, RE to DFA, Properties of Regular Languages: Pumping lemma for Regular Languages, Closure and decision properties of regular languages, Equivalence and minimization of automata.

UNIT-III (6 Hours)

Grammars

Definition, Production rules, Derivation trees, Ambiguous Grammar, Removal of ambiguity, Regular Grammar, Inter-conversion between RE and Grammar, Reduced form of grammar- Removal of unit production, Removal of useless symbols, Removal of epsilon symbol. Linear grammar: left & right linear grammar, Inter-conversion. Chomsky hierarchy of languages, Context Free Grammar- Definition, Context free language (CFL. Normal Forms-Chomsky Normal Form(CNF), Griebach Normal Form(GNF).

UNIT-IV (6 Hours)

Push Down Automata (PDA)

Limitations of FA, PDA: Definition, Uses, Equivalence between FA and PDA, Designing of PDA, Deterministic Push Down Automata and Non-Deterministic Push Down Automata- Definition, Language accepted by PDA, Properties of CFL, Pumping Lemma for CFL. Limitations of PDA, Applications of PDA.

UNIT-V (6 Hours)

Turing Machine(TM)

Definition, Model, Comparison of TM, FSM, PDA, Design of TM, Examples of TM- Combinational TM, Iterative TM, Recursive TM, Universal TM, TM as a language acceptor, Some Problems that cannot be solved by Turning Machines, Language accepted by TM, Recursive sets, Partially recursive functions. Church's Turing hypothesis, Multitask TM, TM limitations, Halting problem.

UNIT-VI (6 Hours)

Applications

Comparison between FA, PDA, TM. Application of RE: Regular expressions in Unix, GREP utilities of Unix, Lexical analysis and finding patterns in text, Application of CFG: Parser, Markup languages, XML and Document Type Definitions. Applications of PDA and TM.

Assignment List

1. Solve problems on designing of finite automata.
2. Design and inter-convert Moore and Mealy Machine for same problems.
3. Form grammar rules for language ot set of regular expression or strings given.
4. Design Push Down Automata for grammar or given string.
5. Construct Turing Machine to solve given problem.
6. Compile all the applications of RE, Grammar, TM.
7. Study Assignment on Complexity Theory.

Text Books

1) John Martin. Introduction to Languages and Theory of Computation. McGrawHill.
2) Michael Sipser. Introduction to The Theory of Computation . ISE.
3) Vivek Kulkarni. Theory of Computation. Oxford University Press.

Reference Books

1) John E. Hopcoroft, Rajeev Motwani, Jeffrey D-Ullman. Introduction to Automata Theory Languages And Computation. Addison-Wesley.
2) Sanjeev Arora, Boaz Barak. Computational Complexity: A Modern Approach. Cambridge University Press
3) Mishra K.L.P., Chandrasekaran N. Theory of Computer Science: Automata, Languages and Computation. Prentice Hall India.
4) Christos H. Papadimitriou. Computational Complexity. Pearson Education.
5) Cristopher Moore, Stephan Mertens. The Nature of Computation. Oxford University Press

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

DATA COMMUNICATION AND NETWORKS

Teaching Scheme

Theory : 3 Hrs/Week

Practical : 2 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Oral : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives: To

1) Build an understanding of the fundamental concepts of computer networking
2) Familiarize the student with the basic taxonomy and terminology of the computer Networking area.
3) Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4) gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Prerequisites

Students should have knowledge of

1) how computer networks operate and the fundamentals of data communication
2) Concepts and fundamental design principles of modern computer networking in a top-down approach, focusing on the Internet's architecture and protocols.

Course Outcome

Students will be able to:

1) describe network architecture
2) understand basic computer network technology

3) Analysis including error detection, error control and flow control.
4) Recognize the different types of network topologies and protocols
5) Analyze the different types of network devices and their functions within a network
6) Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

UNIT-I (6 Hours)

Data Communication Concepts

Introduction: Data Communications, Networks, The Internet, Protocols and Standards, Network Models, Layered Tasks, The OSI Model, Layers in the OSI Model, TCP/IP Protocol Suite, Addressing, Physical Layer and Media, Data and Signals, Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance, Digital Transmission, Digital-to-Digital Conversion, Analog-to-Digital Conversion, Analog Transmission, Digital-to-analog Conversion, Analog-to-analog Conversion

UNIT-II (6 Hours)

Transmission Media and Transmission Technologies

Bandwidth utilization: Multiplexing and Spreading, Multiplexing, Spread Spectrum, Transmission Media, Guided Media, Unguided Media: Wireless, Switching, Circuit-Switched Networks, Datagram Networks, Virtual-Circuit Networks, Structure of a Switch, Using Telephone and Cable Networks for Data Transmission, Telephone Networks, Dial-up Modems, Digital Subscriber Line, Cable TV Networks, Cable TV for Data Transfer

UNIT-III (6 Hours)

Data Security and Integrity

Error Detection and Correction, Introduction, Block Coding, Liner Block Codes, Cyclic Codes, Checksum, Data Link Control, Framing, Flow and Error

Control, Protocols, Noiseless Channels, HDLC, Point-to-Point Protocol, Multiple Access, Random Access, Aloha, Controlled Access, Channelization, IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet, IEEE 802.11, Bluetooth

UNIT-IV (6 Hours)

Network Interconnections

Connecting LANs, Backbone Networks, and Virtual LANs, Connecting Devices, Backbone Networks, Virtual LANs, Cellular Telephony, Satellite Networks, Sonet/SDH, Architecture, Sonet Layers, Sonet Frames, STS Multiplexing, Sonet Networks, Virtual Tributaries, Virtual-Circuit Networks: Frame Relay and ATM, Frame Relay, ATM, ATM LANs

UNIT-V (6 Hours)

LAN,MAN & WAN

LAN standards (IEEE standards 802 for LANs), Interconnecting LANs, LAN Hardware (server platforms, backup devices, LAN adapters, printers, etc.)LAN system software, LAN application software, AN selection criteria

MAN

Network routing, Public data networks, Circuit, switched data network, Packet, switched data network, Internet protocol, ISDN, Electronic mail

UNIT-VI (6 Hours)

WWW and HTTP

Architecture, Web Documents, HTTP, Network Management: SNMP, Network Management System, Simple Network Management Protocol (SNMP), Multimedia, Digitizing Audio and Video, Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/Video, RTP, RTCP, Voice over IP

Assignment List

1) Socket programming - TCP and UDP, peer-to-peer applications; reliable communications using unreliable datagrams; client-server using RPC;concurrent servers using threads or processes.
2) What are the three criteria necessary for an effective and efficient network?
3) Give the key elements of protocol.
4) What are the responsibilities of physical layer, data link layer, network layer, Transport layer, session layer, presentation layer, application layer.
5) How can we use the Hamming code to correct a burst error?
6) Explain IP 4& IP 6 .Identify the class and default subnet mask of the IP address 217.65.10.7.

Text Books

1) Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,TMH.
2) Computer Networks, A.S.Tanenbaum, 4th edition,Pearson education.

Reference Books

1) Introduction to Data communications and Networking, W.Tomasi, Pearson education.
2) Data and Computer Communications,G.S.Hura and M.Singhal,CRC Press,Taylor and Francis Group.
3) An Engineering Approach to Computer Networks-S.Keshav,2nd Edition,Pearson Education.
4) Understanding communications and Networks,3rd Edition, W.A.Shay,Cengage Learning.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

SYSTEM PROGRAMMING

Teaching Scheme

Theory : 3 Hrs/Week

Practical : 2Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1) To learn & understand fundamentals of system software program as Assembler, Linkers, loaders.
2) To study phases of compiler in detail.
3) To learn how to design system programs.

Course Prerequisites

Students should have knowledge of

1) Data Structures
2) Computer Organization
3) Microprocessor
4) Basic Searching & Sorting Algorithms

Course Outcome

Students will be able to:

1) Understand operating system user view point, fundamentals of Language processing
2) Understand general machine structure and instruction formats.
3) Design & implement low level programming using TASM,software for programming development
4) Design & implement System Programs as Macroprocessor

5) Understand various loader schemes and Design of absolute and direct linking loaders
6) Understand Compiler phase
7) use tool Lex for generation of Lexical Analyzer
8) use tool YACC for generation of Syntax Analyzer.

UNIT-I (6 Hours)

Introduction

Evolution Of the Components of Programming System, Evolution Of Operating System

Operating system User Viewpoint

Functions ,Operating System User Viewpoint : Batch Control Language , Operating System User Viewpoint : Facilities Language Processing Activities, Fundamentals of Language Processing, Language processor development t tools

UNIT-II (6 Hours)

Machine Structure, Machine Language And Assembly Language
General Machine Structure :General Approach to a new Machine,

Machine Structure

360 and 370

Machine Language

Long Way, No Looping, Address Modification Using Instructions as Data, Address Modification Using Instructions Using Index Registers, Looping

Assembly Language

An Assembly Language Program, Example using Literals

UNIT-III (6 Hours)

Assemblers

General Design Procedure, Design Of Assembler,

Table Processing

Searching: Linear Search, Binary Search

Sorting

Interchange Sort, Shell Sort, Bucket Sort, Radix Exchange Sort, Address Calculation Sort, Comparison of Sorts

UNIT-IV (6 Hours)

MACRO Language And The MACROPROCESSOR

Macro Instructions, Features of Macro Facility, Implementation Of Restricted Facility : A Two pass Algorithm

UNIT-V (6 Hours)

Loaders

Loader Schemes : Compile-And-Go Loaders, General Loader Scheme, Absolute Loaders, Subroutine Linkages, Relocating Loaders, Direct Linking Loaders,, Other Loader Schemes,

Linkers

Relocation and linking concepts, Design of linker, self relocating programs, Static and dynamic linking Design of Absolute and Direct-Linking Loaders

UNIT-VI (6 Hours)

Compilers

Basics of Compiler

Recognizing Basic Elements

Recognizing Syntactic Units and Interpreting Meaning

Storage Allocation

Code Generation

Phases Of Compiler

Lexical Phase, Syntax Phase, Interpretation Phase, Optimization, Storage Assignment, code Generation ,Assembly phase

Text Books

1) D.M. Dhamdhere ,"Systems Programming and Operating Systems", Tata McGraw-Hill, ISBN-13:978-0-07-463579-7
2) JOHN J.DONOVAN "System Programming ",TATA McGRAW-HILL EDITION
3) Alfred V. Aho, Ravi Sethi, Reffrey D. Ullman, "Compilers Principles, Techniques, and Tools",Addison Wesley, ISBN 981-235-885-4

Reference Books

1) Terence Parr, "Language Implementation Patterns",SPD,2009
2) Leland L. Beck, "System Software An Introduction to Systems Programming" 3rd Edition, Person Education, ISBN 81-7808-036-2
3) R.K. Maurya Wiley-dreamtech , "System Programming and Compiler Construction"
4) Srimanta Pal ," System Programming " OXFORD Publication
5) Richard Anthony," Systems Programming: Designing and Developing Distributed Applications" 1st Editio

Assignment List

1 To Study Fundamentals of language processing.
2 Write an assembly language program using Literals.
3 Write an assembly language program for table processing.(Searching & sorting)
4 To study the design of two pass Macroprocessor.
5 To study the phases of compilers.
6 To study the design of Absolute and Direct-Linking Loaders
7 Use of tool Lex for generation of Lexical Analyzer.
8 Use of tool YACC for generation of Syntax Analyzer.

Note

The respective faculty may take viva or quiz or follow any type of assessment method for continuous assessment of the subject.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

MICROPROCESSOR ARCHITECTURE & PROGRAMMING

Teaching Scheme

Theory : 03 Hrs/Week

Practical : 02 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit Allotted

Theory :3

Term Work : 1

Course Objectives

1) To study 8-bit Microcontroller
2) To study Advanced Computer Architectures
3) To study 16-bit Microprocessor and Peripherals

Course Prerequisites

Students should have knowledge of

1) Basic Electronics Engineering

Course Outcome

Students will be able to:

1) Basics of microprocessors, 16-bit microprocessor architecture
2) Various microprocessor peripherals and their interfacing with 8086
3) Assembly language programming concepts
4) Advanced computer architectures
5) 8-Bit Microcontroller architecture, Programming and Interfacing

UNIT-I (06 Hours)

16-Bit Microprocessor Architecture

Basic microprocessor architecture, Bus concept, Intel 8086 microprocessor: Features, Block diagram and pin configuration, Max/min mode, Instruction cycles, Read Write cycles. Memory segmentation,8086 Memory organization, , Instruction pipelining, Instruction set, 8086 Interrupt structure

UNIT-II (06 Hours)

8086 Assembly Language Programming

Programmers model of 8086, 8086 addressing modes, Assembler directives, DOS and BIOS interrupts, Function calls, Procedures and Macros, EXTRN and PUBLIC directives, FAR procedure, Turbo debugger, Writing programs in C using int86, int86x, intdos, intdosx functions.

UNIT-III (06 Hours)

NDP and Peripherals

8087 Architecture, Communication and Interfacing with 8086, Writing basic programs using 8087, Architecture, Modes and Interfacing of following peripherals with 8086 : 8255 Programmer Peripheral Interface, 8259 Programmable Interrupt Controller, 8253 Programmable Interval Timer, 8237 DMA Controller, Designing 8086 based applications using above peripherals

UNIT-IV (06 Hours)

Advanced Processor Architectures

Multiprocessor Architectures : Closely coupled and Loosely coupled, RISC and CISC Architectures, SPARC, Superscalar Architecture, Multicore Architecture, Intel i3, i5 and i7 architectures

UNIT-V (06 Hours)

8-bit Microcontroller-I

Microcontroller 8051 Architecture, On-Chip data memory and program memory organization, Programming of 8051 : Register set, Register bank, SFRs, Instruction format & addressing modes. Instruction set. External data memory and program memory & its interfacing, I/O ports programming.

UNIT-VI (06 Hours)

8-bit Microcontroller-II

Interrupts structure and Response. Timers/counters and their programming, Serial port and programming, Interrupt programming, Design of minimum system using 8051 micro-controller for various applications, Software & hardware tools for development of microcontroller based system such as assembler, compiler, IDÉ, Emulators, debugger, programmer, development board, DSO, Logic Analyzer.

Text Books

1) Microprocessor Architecture and Interfacing : Ramesh Gaonkar
2) Microprocessor and Interfacing : Douglas V.Hall
3) 8086 Microprocessor: Programming and Interfacing, Keneth Ayala
4) Microprocessors and Microcontrollers : N.Senthil Kumar
5) 8051 microcontroller & embedded system, Mazidi
6) IBM PC Assembly Language Programming, Peter Abel

Reference Books

1) Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
2) Ray Dunkon, "Advanced MSDOS Programming", 2nd Edition, BPB Publication.
3) Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
4) Intel Microprocessor and peripheral Handbook: Volume 1
5) Yashwant Kanitkar, "TSR through C", BPB Publication, 1995, ISBN 81-7029-520-3.

List of Assignments

1) Programs based on numerical computing, code conversion
2) Programs based on string processing

3) Programs using EXTRN, PUBLIC directives
4) Creating library of macros and using it in programs.
5) Programs in C using int86, int86x, intdos, intdosx functions
6) Simple 8051 programs based on 8085 development board
7) Program on Timer programming: ISR based
8) Program with interfacing : a) A/D Convertor
   b) D/A Convertor
   c) Stepper motor

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

ELECTIVE-I : SOFTWARE TESTING AND QUALITY ASSURANCE

Teaching Scheme

Theory : 3 Hrs/Week

Credit Allotted

Theory : 03

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Course Objectives

This course equips the students with a solid understanding of:

1) Practices that support the production of quality software
2) Software testing life cycle and activities
3) Software Quality Assurance and Models

Course Prerequisites

Students should have knowledge of Software Engineering, Software development life cycles, methodologies

Course Outcome

Students will be able to:

1) Understand the concepts of software testing
2) Learn techniques of dynamic black box testing
3) Learn techniques of dynamic white box testing
4) Learn techniques of static black and white box testing
5) Understand special Software Testing Activities
6) Study software quality assurance, models

UNIT-I (06 Hours)

Introduction to Software Testing

Basics of Software Testing, Software quality, Need of software testing, Testing principles, Goals, Software Testing Life Cycle(STLC), Error, Fault, Failure, Defect Life Cycle, Testing terms and definitions: Precision and Accuracy, Verification and Validation, Quality and Reliability, Testing and Quality Assurance, Software test plan (IEEE format), Software Failure Case Studies

UNIT-II (06 Hours)

Dynamic Testing: Black Box Testing

Need of Black Box Testing, Black box testing concept, Requirement analysis, Test case design criteria, Testing methods, requirement based testing, positive & negative testing, boundary value analysis, equivalence class testing, state based testing, cause effect graph based testing, error guessing, design of test cases

UNIT-III (06 Hours)

Dynamic Testing: White Box Testing

Need of white box testing, White box testing concept, Logic coverage criteria, Structure- Control flow testing, Cyclomatic complexity, Loop Testing, Data flow testing, Slice based testing, Mutation Testing, Design of test cases, Challenges in White box testing

UNIT-IV (06 Hours)

Static Testing

Static Black Box Testing: testing the specification, performing a high level review of the specification, low- level specification test techniques

Static White Box Testing

examining the design and code, Formal reviews: peer reviews, walkthroughs, inspections, coding standards and guide lines, generic code review checklist

UNIT-V (06 Hours)

Software Testing Activities

Levels of testing: Unit testing, Integration testing, system testing, Acceptance Testing

Special tests

GUI testing, compatibility testing, configuration testing, recovery testing, stress testing, load testing, recovery testing, regression testing, usability testing, documentation testing, website testing

Debugging process and tools, Software testing tools: Static and Dynamic testing tools, Automation testing and tools

UNIT-VI (06 Hours)

Software Quality Assurance

Software quality, Quality cost, Quality attribute, Quality assurance, Quality control & assurance, Quality management, Quality management and project management, Methods of quality management, SQA models: ISO 9126, Capability Maturity Model(CMM), Software Total Quality Management, Six Sigma

Text Books

1) Software Testing Principles and Practices By Naresh Chavan Oxford Publication
2) Software Testing Principles and Tools By M.G. Limaye TMG Hill Publication
3) Software Testing, Second Edition By: Ron Patton, Pearson Education

Reference Books

1) Metric and Model in Software Quality Engineering, Stephen H Kan, Pearson Education
2) Effective methods for software testing by William Perry , Willey Publication
3) Foundation of software testing by Dorothy Graham, Erik Van Veenendaal, CENGAGE learning
4) Introducing to Software Testing, Louis Tamres, Addison Wesley Publications
5) Software Quality Assurance, Daniel Galin, Pearson Education.

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

ELECTIVE-I : MANAGEMENT OF INFORMATION SYSTEM

Teaching Scheme

Theory : 3 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 03

Course Objectives: To

1) Understand significance management of information.
2) Use technology and resources for effective usage of information.

Course Prerequisites

Students should have knowledge of

1) Introduction to computer
2) Significance of Information needed for business

Course Outcome

Students will be able to:

1) Understand necessity of information.
2) Use effective technique to maintain the data.
3) Analyze information using tools and techniques to increase the business.
4) Use huge data available due to social networking site and internet.
5) Apply information analysis for decision making.
6) Apply adequate tool for MIS

UNIT-I (6 Hours)

Introduction of MIS

Architecture of MIS, data storage, processing and formatting. Need of MIS, pre requisites for MIS.

UNIT-II (6 Hours)

Transaction processing System

Information Technology, Information extraction, Information retrieval, Approach and algorithms used to store and manage data

UNIT-III (6 Hours)

Information Filtration and analysis

Information extraction, representation of useful information, derives various forms of information, reporting useful for business.

UNIT-IV (6 Hours)

Social Engineering

Effective use of social engineering sites, use of internet to increase the reach, Extract the information and deliver the necessary things in adequate form at social network.

UNIT-V (6 Hours)

Decision Support System

Data Analytics, business intelligence, chart and report generation , logical conclusion to ease the process of decision making

UNIT-VI (6 Hours)

Applications of MIS

ERP, CRM, SCM, KMS, case study of SAP, openbiz

Assignment List

1) Analyze different forms of information required for particular business domain.
2) Use technology to collect the information.
3) Design expert system to manage the information for business

4) Use information extraction approaches and algorithms.
5) Analyze valuable information by representing it in suitable format.
6) Use social engineering in decision making
7) Use google analytics to create complete history of user, needed for decision making.
8) Apply various filtration techniques using OLAP for decision making
9) Understand working of SAP – case study
10) Understand working of moodle– case study

Text Books

1) Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia
2) Management Information Systems, Jawadekar, Tata McGraw Hill
3) Management Information Systems, Davis and Olson, Tata McGraw Hill

Reference Books

1) Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia
2) Management Information Systems, Schulthesis, Tata McGraw Hill
3) Management Information Systems - Sadagopan, Prentice Hall
4) Management Information Systems - Jayant Oke
5) MIS: Managing Information Systems in Business, Government and Society , Rahul De

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

ELECTIVE-I : INFORMATION THEORY AND CODING

Teaching Scheme

Theory : 3Hrs/Week

Examination Scheme

End Semester Examination: 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

1) To deeply understand the mathematics of Information Theory and its physical meaning
2) To understand various channel coding techniques
3) Students will be introduced to convolution and block codes, decoding techniques, and automatic repeat request

Course Prerequisites

Students should have knowledge of

1) Student should have knowledge of Communications Systems or equivalent.
2) Knowledge of calculus, algebra, and probability

Course Outcome

Students will be able to:

1) This course covers the fundamental concepts of information theory and error control coding.
2) Students will be introduced to the basic notions of information and channel capacity.
3) Students will be understood how error control coding techniques are applied in communication systems.
4) Design a data compression scheme using suitable source coding technique.

5) Design a convolution coding scheme for a communication system.

6) Evaluate performance of a communication system

UNIT-I (6 Hours)

Introduction

Introduction to Information Theory, uncertainty and information, number theory, group theory average mutual information and entropy, average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequence, Mark-off statistical model for information source, source coding theorem,.

UNIT-II (6 Hours)

Channel Capacity

Channel models, channel capacity, Encoding of the source output, Shannon's encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels. information capacity theorem, Entropy and information rate of mark-off source, random selection of codes

UNIT-III (6 Hours)

Coding

Error control coding: linear block codes and their properties, decoding of linear block code, perfect codes, Shannon-Fano coding, Huffman coding, Arithmetic coding, Lempel-Ziv algorithm, run-length encoding and rate distortion function haming codes, and optimal linear codes and MDS codes

UNIT-IV (6 Hours)

Cyclic Codes

Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, burst error correction, fire codes, golay codes, CRC codes, circuit implementation of cyclic codes. BCH codes: minimal polynomials, generator polynomial for BCH codes, decoding of BCH codes, Reed-Solomon codes and nested codes.

UNIT-V (6 Hours)

Convolution Codes

Tee codes and trellis codes, polynomial description of convolution codes, distance notions for convolution codes, generation function, matrix description of convolution codes, viterbi decoding of convolution codes, distance bounds for convolution codes, turbo codes and turbo decoding.

UNIT-VI (6 Hours)

Trellis Coded Modulation

Concept of coded modulation, mapping by set partitioning, Ungerboeck's TCM design rules, TCM decoder, Performance evaluation for Additive White Gaussian Noise (AWGN) channel, TCM for fading channels, applications and use cases of ITCT, applications of coding technique in cryptography, cryptosystem like ECC(Ellyptical curve cryptography).

Assignment List

1) A code is composed of dots and dashes. Assume that the dash is 3 times as long as the dot and has one-third the probability of occurrence. (i) Calculate the information in dot and that in a dash; (ii) Calculate the average information in dot-dash code; and (iii) Assume that a dot lasts for 10 ms and this same time interval is allowed between symbols. Calculate the average rate of information transmission.
2) State Shannon-Hartley�s law. Derive an equation showing the efficiency of a system in terms of the information rate per Unit bandwidth. How is the efficiency of the system related to B/W?
3) Consider a source with 8 alphabets and respective probabilities as shown: A B C D E F G H 0.20 0.18 0.15 0.10 0.08 0.05 0.02 0.01 Construct the binary Huffman code for this. Construct the quaternary Huffman and code and show that the efficiency of this code is worse than that of binary code
4) If Ci and Cj an two code vectors in a (n,k) linear block code, show that their sum is also a code vector and Show CHT =0 for a linear block code.
5) A) Write short notes on BCH codes B) Draw the general block diagram

of encoding circuit using (n-k) bit shift register and explain its operation.

6) What are convolutional codes? How is it different from block codes? Implement a convolutional code with a viterbi (trellis) and a sequential decoder.

7) Write a program to ensure to ensure integrity of packet transfer using coding technique similar top CRC

8) Analysis and study of crypt tool.

Text Books

1) Ranjan Bose, “Information Theory, Coding and Cryptography”, Tata McGraw- Hill, 2002.

2) K. Sam Shanmugam, John Wiley “Digital and analog communication systems”, 1996

Reference Books

1) Viterbi, “Information Theory and Coding”, McGraw-Hill, 1982.

2) John G. Proakis, “Digital Communications”, McGraw-Hill, New edition, 2000.

3) Gareth A. Jones and J. Mary Jones, “Information and Coding Theory”, Springer Undergraduate Mathematics Series, 2000. 104

4) Glover and Grant; “Digital Communications”, Pearson Ed. 2nd Ed 2008

Syllabus for Unit Test

Unit Test -1 Unit I ,II and III

Unit Test -2 Unit IV, V and VI

ELECTIVE-I : HUMAN COMPUTER INTERACTION

Teaching Scheme

Theory : 3 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

To build interaction between human and computer using Graphical User Interface,Design processes, software tools and various interaction devices

Course Prerequisites

Students should have knowledge of

1) Analysis and design of software

Course Outcome

Students will be able to:

1) Understand User interface design
2) Understand Graphical user interface and its characteristics
3) Identify various design processes
4) Understand screen designing
5) Understand Windows, Components and Software Tools
6) Identify various interaction devices

UNIT-I (6 Hours)

Introduction

Importance of user interface, Importance of good design, Benefits of good design,A brief history of screen design

UNIT-II (6 Hours)

The Graphical User Interface

Popularity of Graphics,The concept of direct manupation,Graphical system,Characteristics,Web user-Interface popularity,characteristics-Principles of user interface

UNIT-III (6 Hours)

Design process

Human interaction with computers,importance of human characteristics,Human consideration,Human interaction speeds and understanding business junctions

UNIT-IV (6 Hours)

Screen Designing

Design goals-Screen planning and purpose,organizing screen elements,ordering of screen data and content-screen navigation and flow,information retrieval on web-statistical graphics-Technological consideration in interface design

UNIT-V (6 Hours)

Windows,Components and Software Tools

Windows: New and navigation schemes,selection of window,selection of devices based and screen based controls.

Components

Text and messages,Icons,Multimedia,colors

Software Tools

Specification methods,interface-Building Tools

UNIT-VI (6 Hours)

Interaction Devices

Keyboard and function keys-Pointing devices-speech recognition digitization and genenration-image and video displays-drivers

Assignment List

1) A Case study on Graphical User Interface
2) A Case study on Design process
3) A Case study on Screen Designing
4) A Case study on Windows and Components
5) A Case study on Software Tools
6) A Case study on Interaction Devices

Text Books

1) Designing the user interface,Third edition,Ben Shneiderm ann,Pearson Education Asia
2) The essential guide to user interface design,Wilbert O Galitz,Wiley Drdeam Tech

Reference Books

1) User Interface Design,soren Lauesen,Pearson Education
2) Human Computer Interaction,Alan Dix,janet Fincay, GreGoryd, Abowd, Russell Bealg,Pearson Education

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

IT LAB-III

Teaching Scheme

Practical : 04

Examination Scheme

Term Work and Practical : 50Marks

Credit Allotted

Term Work :02

Course Objectives: To

1) Understand web environment for building the application.
2) Implement web application.
3) Implement server side programming.
4) Analyze life cycle servlet.
5) Analyze life cycle JSP.

Course Prerequisites

Students should have knowledge of

1) Core Java
2) Scripting languages

Course Outcome

Students will be able to:

1) Undesrstand the lifecycle of web application
2) Understand flow of request and data in web application.
3) Implement relevant technology based on the functionalities involved in the respective web application.
4) Design acompetative web application which will work real web environment.
5) Implement server side technology.
6) Apply server side programming to implement web application.

UNIT-I (6 Hours)

JDBC

Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases

UNIT-II (6 Hours)

Servlet Basics

Web Application Basics, Architecture and challenges of Web, application. Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml). Handling Request and Response Initializing a Servlet, Accessing Database, Servlet Chaining, Session Tracking & Management, Dealing with cookies.

UNIT-III (6 Hours)

Servlet Advanced

Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, Sharing information using scope object Controlling concurrent access User Authentication, Filtering Request and Response, Programming Filter, Filter Mapping, Servlet Listeners

UNIT-IV (6 Hours)

Java Server Pages : Standard approach

Basic JSP Architecture, Life Cycle of JSP (Translation, compilation), JSP Tags and Expressions, Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects.

UNIT-V (6 Hours)

Java Server Pages : Customized approach

Tag Libraries, JSP Expression Language (EL), Using Custom Tag, JSP Capabilities Exception Handling Session Management Directives JSP with Java. Case study of struts and spring framework.

UNIT-VI (6 Hours)

RMI (Remote Method Invocation) & EJB (Enterprise java Beans)

Bean RMI overview, RMI architecture, concept of stub and skeleton, Example demonstrating RMI ,Introduction to EJB , Types of enterprise beans Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Types of EJB.

Assignment List

1) Maintain record of students and perform CRUD functionality.
2) Write a program to redirect a request using a dynamic approach.
3) Write a program to pass the data using session
4) Write a servlet to remove spam.
5) Maintain the record of faculty member using jsp action tags and directives.
6) Design a tag to perform the necessary editing in a given report.
7) Design reusable components of the form using taglib.
8) Perform multiplication of two numbers using RMI.
9) Implement submission of assignment and evaluation of the same using EJB.
10) Understand working of framework – struts, spring- case study

Text Books

1) SCWCD Exam Study Kit: Java Web Component Developer Certification Hanumant Deshmukh, Jignesh Malavia, Manning Publication
2) Head First Servlets and JSP , by Bryan Basham (Author), Kathy Sierra (Author), Bert Bates, Head First Publication
3) J2EE: The complete Reference, Jim Keogh (Author)

Reference Books

1) OCEJWCD Study Companion: Certified Expert Java EE 6 Web Component Developer (oracle Exam 1Z0-899), by Charles E. Lyons (Author), Garner Press.
2) JDBC, Servlets and JSP Black Book Paperback , by Santosh Kumar K. (Author), Kogent Solutions Inc.
3) Java Server Programming Java EE7 (J2EE 1.7): Black Book Kogent Learning Solutions Inc
4) Sun Certified Enterprise Architect for Java EE Study Guide(Second edition) Mark Cade (Author)
5) Sun Certified Enterprise Architecture for J2EE Technology Study Mark Cade (Author), Simon Roberts (Author)

OPERATING SYSTEM

Teaching Scheme

Theory : 3 Hrs/Week

Practical : 2 Hrs/Week

Examination Scheme

End Semester Examination	: 60 Marks
Continuous assessment	: 40 Marks
Term Work and Oral	: 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

1) To Introduce basic concepts and functions of modern operating systems
2) To Understand the concept of process, and thread management
3) To Understand how the resources are scheduled and managed
4) To Understand the concepts of process synchronization and deadlock
5) To know the concept of I/O and File management
6) To Understand various Memory management techniques
7) To be aware of latest trends in Operating Systems

Course Prerequisites

Students should have knowledge of

1) Computer Organization
2) Data Structure

Course Outcome

Students will be able to:

1) Possess knowledge of the role of Operating Systems and their types.
2) Apply the concept of a process, thread and scheduling algorithms.
3) Apply the concepts of process synchronization and how it is achieved.

4) Realize the concept of deadlock and different ways to handle it.
5) Realize various memory management techniques, concept of I/O management and File system.
6) Realize latest trends and techniques in various operating systems

UNIT-I (6 Hours)

Operating System Overview

Operating System Objectives and Functions, The Evolution of Operating Systems, Developments Leading to Modern Operating Systems, Virtual Machines, OS Design Considerations for Multiprocessor and Multicore architectures, Microsoft Windows Overview, Modern UNIX Systems, Linux, Android. Booting Process of all the above operating systems.

UNIT-II (6 Hours)

Process Description and Control

Process: Concept of a Process, Process States, Process Description, Process Control (Process creation, Waiting for the process/processes, Loading programs into processes and Process Termination), Execution of the Operating System.

Threads

Processes and Threads, Concept of Multithreading, Types of Threads, Thread programming Using pthreads, Multicore processors and threads, Linux Process and Thread Management, Android Process and Thread Management.

Scheduling

Uniprocessor Scheduling ¬ Types of Scheduling, Scheduling Algorithms, and Thread Scheduling, An introduction to Multiprocessor and Real¬Time Scheduling, Traditional UNIX Scheduling, Linux Scheduling.

UNIT-III (6 Hours)

Concurrency: Mutual Exclusion and Synchronization

Concurrency: Process/thread Synchronization and Mutual Exclusion Principles of Concurrency, Requirements for Mutual Exclusion, Mutual Exclusion: Hardware Support, Operating System Support (Semaphores and Mutex), Programming Language Support (Monitors),

Classical synchronization problems

Readers/Writers Problem, Producer and Consumer problem.

Concurrency

Deadlock and Starvation Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, An Integrated Deadlock Strategy, Example: Dining Philosophers Problem, Linux inter¬process communication and concurrency mechanisms, Android Inter¬process communication mechanisms and concurrency mechanisms

UNIT-IV (6 Hours)

Memory Management

Memory Management: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Segmentation.

Virtual Memory

Hardware and Control Structures, Operating System Software, Linux Memory Management, Windows Memory Management, Android Memory Management

UNIT-V (6 Hours)

Input/Output And Files

I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, Disk Cache, Linux I/O.

File Management

Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, Linux Virtual File System, Android File Management.

UNIT-VI (6 Hours)

Recent And Future Trends In OS

Linux Kernel Module Programming, Embedded Operating Systems: Characteristics of Embedded Systems, Embedded Linux, and Application specific OS. Basic services of NACH Operating System. Introduction to Service Oriented Operating System (SOOS), Introduction to Ubuntu EDGE OS, etc.

Assignment List

1) Study of hardware and software requirements of different operating systems (UNIX, LINUX, WINDOWS XP, WINDOWS 7/8/10)
2) Implement CPU scheduling policies a) SJF (b) Priority (c) FCFS (d) Multi-level queue
3) Implement file storage allocation techniques: (a) Contiguous (using array) (b) Linked –list (using linked list) (c) Indirect allocation (indexing)
4) Implementation of Contiguous allocation techniques: (a) Worst-Fit (b) Best-Fit (c) First-Fit
5) Calculation of external and internal fragmentation.
6) Implementation of Compaction for the continually changing memory layout and calculate total movement of data.
7) Implementation of resource allocation graph (RAG).
8) Conversion of resource allocation graph (RAG) to wait-for-graph (WFG) for each type of method used for storing graph.
9) Write a program where parent process counts number of vowels in the given sentence and child process will count number of words in the same sentence. Use FORK and JOIN construct.
10) Implement the solution for Bounded Buffer (Producer-Consumer) problem using inter process communication technique – Semaphores.
11) Study latest trends in various operating systems.

Text Books

1) William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN¬10: 0133805913 • ISBN¬13: 9780133805918
2) Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition,2012, ISBN 978¬1¬118¬06333¬0
3) Maurice J. Bach, "Design of UNIX Operating System", PHI

Reference Books

1) Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007.ISBN¬10: 0596009526 | ISBN¬13: 978¬0596009526
2) Harvey M. Deitel, Operating Systems, Prentice Hall, 3rd Edition,2003, ISBN¬10: 0131828274 | ISBN¬13: 978¬0131828278
3) Andrew S. Tanenbaum, Modern Operating System, Prentice Hall, 3rd Edition, 2007,ISBN¬10: 0136006639 | ISBN¬13: 978¬0136006633
4) Operating System in depth by Thomson

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ADVANCED DATABASE MANAGEMENT SYSTEMS

Teaching Scheme

Theory : 3Hrs/Week

Practical : 2Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Oral : 50 Marks

Credit Allotted

Theory : 3

Term Work : 1

Course Objectives

Exploring the working of large scale and emerging database management systems Study and analysis of query processing and query optimization

Course Prerequisites

Student should be well aware of database management systems, analysis of data structure and algorithms and sufficient programming experience

Course Outcome

Students will be able to:

1) Understand the concepts of Object Oriented Database Management Systems
2) Understand various system architectures
3) Understand the processes of query processing and optimization
4) Understand Data warehousing concepts
5) Understand Data mining concepts
6) Familiarize with emerging database applications

UNIT-I (6 Hours)

Object-Oriented and Object Relational Databases

Overview of Object-Oriented Concepts, Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type and Class Hierarchies and Inheritance, Complex Objects, Overview of the Object Model of ODMG, The Object Definition Language, The Object Query Language, Object Database Conceptual Design, Other Objected-Oriented Concepts

Database design for an ORDBMS–Nested relations and collections, Implementation and Related Issues for Extended Type Systems, The Nested Relational Model, Extended ER diagram, Comparison of OODBMS, ORDBMS and RDBMS

UNIT-II (6 Hours)

Database-System Architectures

Centralized and Client –Server Architectures, Server System Architectures

Parallel Databases

Introduction to Parallel Systems , I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems

Distributed Databases

Introduction to Distributed Systems, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Availability, Heterogeneous Distributed Databases

UNIT-III (6 Hours)

Query Processing and Query Optimization

Query Processing : Overview, Measures of Query Cost, Algorithms for Selection, Sorting and Join Operation, Evaluation of Expressions.

Query Optimization

Overview, Transformation of Relational Expressions, Estimating Statistics of Expression, Results, Choice of Evaluation Plans, Semantic Query Optimization, Materialized Views, Introduction to dynamic query evaluation

UNIT-IV (6 Hours)

Data Warehousing and OLAP

Characteristics of Data warehouse, Data marts, Building data warehouse, Architectural strategies and organizational issues, Design considerations, Data Content, Metadata, Distribution of data, Tools for Data Warehousing, Applications of Data warehousing OLAP and OLTP, Data Modeling- Star and snowflake schema

UNIT-V (6 Hours)

Data Mining and information retrieval

Overview of data mining, Steps of data mining, Association Rules, Classification, Clustering, Applications of data mining Decision support systems, Information retrieval systems, Web search engines, Directories

UNIT-VI (6 Hours)

Emerging Database Technologies and Applications

Time in Databases, Spatial and Geographic Data, Geographic Information Systems, Genome Data Management, Multimedia Databases, Mobility and Personal Databases, Mobile Databases Performance Tuning, Performance Benchmarks, Standardization, Application Migration, Transaction-Processing Monitors

Assignment List

1. Study and implementation of nested relations using SQL.
2. Study and implementation of Object types and collection in SQL .
3. Study and design of Extended ER diagram for any given DBMS.
4. Study (and implementation if possible) of web search engine (Lucene).
5. Study and implementation of selection, sorting and join operations.
6. Study and implementation of semantic queries.
7. Study, implementation and comparison of Views and Materialised views.
8. Study, implementation and comparison of Snowflake and Star schema

9. Study and demonstrating of OLAP operations in SQL.

10. Implementation of triggers in PL/SQL (Performance statistics and diagnostics)

Text Books

1) Fundamentals of Database Systems, Sixth Edition, Ramez Elmasri, Shamkant B. Navathe, Pearson Education

2) Database System Concepts, Seventh Edition, Avi Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill

3) Data Warehousing: Concepts, Techniques, Products and Applications, 3rd Edition, C.S.R. PRABHU,PHI Learning Pvt. Ltd.,

Reference Books

1) Database Management Systems, 3rd Edition, Raghu Ramakrishnan and Johannes Gehrke, Mcgraw Hill Education

2) An Introduction to Database Systems, 8th Edition, C.J. Date, Pearson

3) Database Systems: A Practical Approach to Design, Implementation, and Management, Third Edition, Thomas Connolly, Carolyn Begg, Pearson

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

DESIGN AND ANALYSIS OF ALGORITHMS

Teaching Scheme

Theory : 3 Hrs/Week

Tutorials : 1Hr/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 4

Course Objectives

Students will be able to find a best suited algorithmic approach as a solution for given problem.

Course Prerequisites

Students should have knowledge advanced data structures, graph theory and algorithmic steps in problem solving.

Course Outcome

Students will be able to:

1) Understand fundamental data structures and with the manner in which these data structures can best be implemented.
2) Learn how to analyze algorithms and estimate their worst-case and average-case behavior.
3) Ability to analyze and design algorithms divide and conquer approach.
4) Ability to understand and design algorithms using greedy strategy and dynamic programming
5) Learn fundamental knowledge of computational complexity, approximation and randomized algorithms.
6) Apply subject knowledge in various scenarios .

UNIT-I (6 Hours)

Introduction

Elementary data structures: Linear data structures, Graphs, Trees. Algorithm: Understanding problem, Designing, Analyzing, and Coding. Mathematical analysis of algorithms, Standard and Asymptotic Notations.

UNIT-II (6 Hours)

Brute Force and Exhaustive Search

Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems by Brute Force, Exhaustive Search: Traveling Salesman Problem, Knapsack Problem. Depth-First Search and Breadth-First Search

UNIT-III (6 Hours)

Divide and Conquer

Merge sort, Quick sort, Binary Tree Traversals and Related Properties, Multiplication of Large Integers and Strassen's Matrix Multiplication, Multiplication of Large Integers, Strassen's Matrix Multiplication, The Closest-Pair and Convex-Hull Problems by Divide-and-Conquer, The Closest-Pair Problem, Convex-Hull Problem. Heaps and Heap sort.

UNIT-IV (6 Hours)

Dynamic Programming and Greedy Techniques

The Knapsack Problem and Memory Functions, Optimal Binary Search Trees, Warshall's and Floyd's Algorithms, Greedy Techniques: Prim's Algorithm, Kruskal's Algorithms, Dijkstra's Algorithm, Huffman Trees and Codes.

UNIT-V (6 Hours)

Backtracking and Complexity Theory

Lower-Bound Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array, P, NP and NP-

Complete, Coping with the Limitations of Algorithm Power, Backtracking: n-Queens Problem, Hamiltonian Circuit Problem, Subset-Sum Problem, Branch-and-Bound, Knapsack Problem, Traveling Salesman Problem.

UNIT-VI (6 Hours)

Applications

Case Studies of Algorithmic Designs & Applications, Deadlock detection and avoidance implementation. Resource allocation algorithm with deadlock avoidance, Heuristic search algorithm. Recent advances in the subject.

Assignment

Concerned course faculty can arrange classroom tutorials, MCQ tests and students presentations on each unit. Discuss recent advances in the subject.

Text Books

1) Anany Levitin. Introduction to Design and Analysis of Algorithms. Pearson Education.
2) Horowitz E, Sahni S, Rajasekaran S. Fundamentals of Computer Algorithms. University Press.
3) Thomas H. Cormen. Introduction to Algorithms. MIT Press.

Reference Books

1) Jon Kleinberg. Algorithm Design. Pearson Education.
2) Gilles Brassard, Paul Bratley. Fundamentals of Algorithmics. Pearson Education.
3) Donald E. Knuth. Art of Computer Programming. Dorling Kindersley Pvt Ltd.
4) Steven S Skiena, The Algorithm Design Manual. Springer.
5) Michael T. Goodrich. Algorithm Design. Wiley.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE-II : MULTIMEDIA TECHNIQUES

Teaching Scheme

Theory : 03 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

1) To enable the students to develop synchronization concepts and mechanisms across the whole multimedia system architecture.
2) To study the basic concepts for multimedia transmission at the physical, Medium access control layers presenting the past and existing network technologies

Course Prerequisites

Students should have knowledge of

1) Student have knowledge of Computer Graphics and GUI Programming
2) Student should have knowledge of Computer programming with C and C++

Course Outcome

Students will be able to

1) Understand the concepts of Multimedia architecture, elements, applications and interface standards.
2) Learn the different types of compression techniques and different types of data file Format used in multimedia systems.
3) Understand Different types of audio and video file formats.
4) Develop an interactive multimedia application to display their ability to use multimedia tools including multimedia authoring.

5) Have an insight into how the quality of multimedia systems is perceived and how this relates to the design of multimedia input, output and editing systems.

6) Student will able develop any academic or commercial application.

UNIT-I (6 hours)

Introduction to Multimedia and Graphic Devices

Types of media, Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Multimedia Elements, Color Schemes, Picture representation, display devices, display adapters.

UNIT-II (6 hours)

Data Compression

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling. Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression

UNIT-III (6 hours)

Audio and Video

Basic sound concept, Multimedia system sound, MIDI versus digital audio, Audio file formats, National interchange file formats, Digital Audio software's. Types of Video, Video broadcasting standards, Video Quality, Digital Video Software's, Video file formats (for web), Video Compression, Video codec's.

UNIT-IV (6 hours)

Image/Graphics and Animation

Still images, Types of Image, Image Quality, Image Compression, Graphics Software's, Image file formats (for web) Principals of animation, Methods of

Animation, Animation Software's, Animation file formats (for web) (JPEG, & MPEG standards)

UNIT-V (6 hours)

Multimedia Storage Devices

Magnetic media, optical media, file systems (traditional, multimedia), Communication devices, Multimedia software's, presentation tools, CD, DVD construction details, recording and reproducing data from CD & DVD. CDROM, COMBO DRIVE, DVD Writer technologies.

UNIT-VI (6 hours)

Multimedia Applications

Media preparation, communication, entertainment using commercial tools, Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Assignment List

1) Explain Types of Multimedia? Multimedia Objects
2) An audio clip has duration of 8 minutes. The highest frequency in the soud wave is 15 kHz. This is to be sampled using 8 bits per sample and in stereo mode. Calculate the file size. Mention any assumptions made?
3) Sound capturing & editing using tools like SOUNDFORGE
4) An MPEG-1 video has a frame sequence: IBBPBBPBBPBBI. Determine the size of GOP. Derive the transmission sequence of the frames?
5) Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)
6) Consider a TV camera where the maximum intensity of a color signal is represented by 1 volt. An unsaturated magneta signal is formed by mixing 70% R, 20% G and 60% B. What is the luminance output voltage for the signal? What would this value be if the magenta color is saturated?

7) A CD-ROM contains 333000 blocks to be played back in 74 minutes. Calculate the data rate and capacity of the CD-ROM when operating in (a) Mode 1 (b) Mode 2 333000 blocks are played back in 74 minutes?

8) Prepare case study on Educational application Or Industrial application

Text Books

1) Multimedia – Making it work 5th edition by Tag Vaughan (TMGH)

2) Multimedia Communication – Pearson Education Fred Halsall.

3) Mark Nelson "Data Compression Book" BPB

Reference Books

1) David Hillman "Multimedia technology and Applications" Galgotia Publications.

2) Rosch "Multimedia Bible" Sams Publishing.

3) Sleinreitz "Multimedia System" Addison Wesley.

4) James E Skuman "Multimedia in Action" Vikas.

5) J. Jeffcoate , Multimedia in Practice: Technology and Application , PHI.

Syllabus for Unit Test:

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV,Vand VI

B. TECH. (I.T.) – SEM VI

ELECTIVE-II : EMBEDDED SYSTEM

Teaching Scheme

Theory : 3 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory :3

Course Objectives

1) To enable the students to gain a fair knowledge on characteristics and applications of Embedded systems
2) To introduce students to the design issue of embedded system
3) To understanding and experience of state-of-the-practice industrial embedded systems and intelligent embedded system development

Course Prerequisites

Students should have knowledge of

1) Students have knowledge about the basic functions of embedded systems Outcomes
2) Digital hardware, introductory electrical circuits concepts, computer architecture, programming & systems programming

Course Outcome

Students will be able to

1) Identify the unique characteristics of real-time systems,
2) Explain the general structure of a real-time system,
3) Define the unique design problems and challenges of real-time systems,
4) Apply real-time systems design techniques to various software programs
5) Understand the basics of an embedded system,
6) Program an embedded system,
7) Design, implement and test an embedded system

UNIT-I (6 Hours)

INTRODUCTION

Introduction to embedded systems ,Classification, Characteristics and requirements, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design, Concept of Real time Systems, Challenges in Embedded System Design, Design Process Requirements, Specifications, Architecture Design, Designing of Components and System Integration,.

UNIT-II (6 Hours)

EMBEDDED SYSTEM ARCHITECTURE

Instruction Set Architecture-CISC architecture [8051] and RISC instruction set architecture [ARM processors], DSP Processors, Coprocessors and Hardware Accelerators, Processor Performance Enhancement Pipelining, Super-scalar Execution, CPU Power Consumption, Memory System Architecture-, Caches, Virtual Memory, Memory management unit and address Translation.

UNIT-III (6 Hours)

DESIGNING EMBEDDED COMPUTING PLATFORM

Designing with Processors System Architecture, Hardware Design, Implementation Development Environment, Debugging Techniques, Manufacturing and Testing. Design Using CPU Bus: Bus Protocols, Bus Organization, I/O Device Interfacing, Interfacing Protocols-GPIB, FIREWIRE, USB, Watchdog Timers.

UNIT-IV (6 Hours)

OPERATING SYSTEMS

Kernel Features: Real-time Kernels, Polled Loops System, Co-routines, Interrupt driven System, Multi-rate System, Processes and Threads, Context Switching, Cooperative Multi-tasking, Pre-emptive Multi-tasking,Scheduling-

Rate,Monotonic Scheduling, Earliest-Deadline First Scheduling, Task Assignment, Fault-Tolerant Scheduling. Inter-process Communication-Real-time Memory Management: Stack Management, Dynamic Allocation-Evaluating and Optimizing Operating System Performance-Response. (6 Hours)

UNIT-V (6 Hours)

RTOS

Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes. 8. Advanced Processor-(only architectures) 80386, 80486 and ARM (References)(6 Hours)

UNIT-VI (6 Hours)

EMBEDDED CONTROL APPLICATIONS

Open-loop and Closed Loop Control Systems-Application Examples-Washing Machine, Automotive Systems, Auto-focusing digital camera, Air-conditioner, Elevator Control System, ATM System.

Assignment List

Concerned course faculty can arrange classroom tutorials, MCQ tests and students presentations on each unit. Discuss recent advances in the subject.

Text Books

1) Raj Kamal, "Embedded Systems", TMH,first edition, 2004

2) David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.

3) Microcontroller (Theory and Applications) Ajay V Deshmukh,Tata McGraw- Hill@2005

Reference Books

1) Wayne wolf, "Computers as components", Morgan Kaufmann publishers, 2nd Edition, 2008.

2) Ayala. K.J. "The 8051 Microcontroller", Penram International, 1991.

3) Dr. Prasad, “Embedded Real Time System”, Wiley Dreamtech, 2004.
4) Jean J.Labrosse, “Embedded system building blocks”, CMP books, 2nd Edition, 1999.
5) Arnold berger, “Embedded system design”, CMP books, 1st Edition, 2001.
6) Narayan and gong, “Specifications and design of embedded systems”, Pearson education, 2nd Edition, 1999.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE-II : GEOGRAPHICAL INFORMATION SYSTEM

Teaching Scheme

Theory : 3Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 3

Course Objectives

To understand use of GIS data and systems in various applications that we can use in our life.

To understand use of GIS data and systems to analyze geographical resources and its management

Course Prerequisites

Students should have knowledge of

1) Basic graphical elements and Maps
2) Basic computer operating skills

Course Outcome

Students will be able to

1) Understand Maps and its use in GIS.
2) Understand GIS data Acquisition and Management.
3) Understand GIS data Processing and Visualization.
4) Understand Terrain Mapping, Geocoding.
5) Understand role of Remote Sensing in GIS.
6) Understand GIS Project and Trends .

UNIT-I (6 Hours)

Fundamentals of GIS

Introduction, Definition of GIS, Evolution of GIS, Roots of GIS , Definition, GIS Architecture, Models of GIS, Framework for GIS, GIS Categories, Map as a

Model, Spatial Referencing System, Map Projections, Commonly Used Map Projections, Grid Systems, Cartographic Symbolization, Types of Maps, Typography, Map Design, Map Productions, Map Applications.

UNIT-II (6 Hours)

Data Management, Models and Quality Issues

Conceptual Models, Geographical Data Models, Data Primitives, Data Types - Raster and Vector Approach, Digital Terrain Modeling , Approaches to digital terrain data modeling , Acquisition of digital terrain data, Data Modeling and Spatial Analysis, Sources of Geographical Data, Data Collectors and Providers, Creating Digital Data Sets, Data Presentation, Data Updating, Data Storage, Spatial Data Costs, Quality of GIS Output, Sources of Errors in Spatial Data, Factors affecting Reliability of Spatial Data, Faults from Assumptions, spatial autocorrelation, Quadrat counts and Nearest. Neighbour analysis, Trend surface analysis, Gravity models.

UNIT-III (6 Hours)

GIS Data Processing, Analysis and Visualization

Raster based GIS data processing, Vector based GIS data processing, Human computer interaction and GIS, Visualization of geographic information, principles of cartographic design in GIS, Generation of information product, Image Classification and GIS, Visual Image Interpretation, Types of Pictorial Data Products, Image Interpretation Strategy, Image Interpretation Process, Overview of Image Interpretation Equipments.

UNIT-IV (6 Hours)

Terrain Mapping, Geocoding and Segmentation

Interpolation, Visualization of Continuous Surfaces, Data Sources for Interpolations, Methods for Interpolations, Global Interpolation, Local Deterministic Methods, Comparison of Global and Local Method, Optimal Interpolation Using Geo Statistics. Kriging, Variogram, Geocoding, Applications of Geocoding, Dynamic Segmentation, Applications of Dynamic Segmentation

UNIT-V (6 Hours)

Remote Sensing Fundamentals

Remote Sensing - Basic Principles, Electromagnetic Remote Sensing, Energy Sources, Energy Interactions with Earth's Surface Materials, Microwave Remote Sensing, The Radar Principle, Factors Affecting Microwave Measurements, Radar Wavebands, SLAR Systems, Sar, Interpreting Sar Images, Geometrical Characteristics, Remote Sensing, Platform and Sensors, Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources Satellites, Meteorological Satellites.

UNIT-VI (6 Hours)

GIS Project Design and Management

Software engineering as applied to GIS, GIS project planning, System analysis and study of user requirement, Geographic database design methodology, GIS application software design methodology, system implementation, system maintenance and support.

Issues and Applications in GIS

Changes in Technology, Data Supply and Users, Role of Satellite Imagery and Data Sets, Trends in GIS, GIS users, Urban and Municipal Applications, Other Applications.

Assignment List

1) Analyze google Maps for geographical area of any city
2) Analyze data from google Maps for any city's geographical structure
3) Study data resource sources for any GIS system
4) Analyze Google Map with Geocoded Address
5) Study various remote sensing application
6) Analyze any GIS Project with tools and techniques used.

Text Books

1) M. Anji Reddi ," Remote Sensing and Geographical Information Systems" B. S. Publications, Second Edition
2) George B Korte, .The GIS Book., Onword press, Thomson Learning, 5th Edition, 2003.
3) Ian Heywood, Sarah Cornelius & etal., .An Introduction to Geographical Information Systems., 2nd Edition, Pearson Education

Reference Books

1) Tor Bernhardsen, .Geographic Information Systems. An Introduction., 3rd edition, Wiley.
2) Peter A Burrough and McDonell, .Principles of Geographical Information Systems, Oxford University Press, 1998
3) M. N. DeMers, .Fundamentals of Geographic Information Systems., 3rd edition, Wiley.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE – II : CYBER LAW AND SECURITY POLICIES

Teaching Scheme

Theory : 03 Hrs/Week

Examination Scheme

End Semester Examination: 60 Marks

Continuous assessment : 40 Marks

Credit Allotted

Theory : 03

Course Objectives: To

1) Understand significance of cyber security and its effect on Individual and society at large.
2) Use of IT ACT 2000 for its possible implementation.

Course Prerequisites

Students should have knowledge of

1) Working of the Internet
2) Basic security related issues.

Course Outcome

Students will be able to:

1) Understand security policies
2) Use effective technique to maintain the data.
3) Analyze information using tools and techniques to increase the business.
4) Use huge data available due to social networking site and internet.
5) Apply information analysis for decision making.
6) Apply adequate tool for MIS

UNIT-I (6 Hours)

Introduction to Computer Security

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II (6 Hours)

Secure System Planning and administration, Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III (6 Hours)

Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy-developing standards.

UNIT-IV (6 Hours)

Information security

fundamentals-Employee responsibilities- information classification-Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V (6 Hours)

Organizational and Human Security

Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

UNIT-VI (6 Hours)

Indian IT Act 2000 and 2008

Introduction, Definitions in Act, Electronic signature, certifying authority,

Text Books

1) Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media
2) Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall
3) Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysisand Response Solutions", IGI Global

Reference Books

1) Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall
2) Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag
3) Matt Bishop, "Computer Security: Art and Science", Addison-Wesley Professional
4) Joseph M.Kizza, "Computer Network security", Springer
5) Thomas R.Peltier, "Information Security Risk Analysis", CRC Press

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

COMPUTER ORGANIZATION & ARCHITECTURE

Teaching Scheme

Theory : 3 Hrs/Week

Practicals: 2 Hrs/Week

Examination Scheme

End Semester Examination : 60 Marks

Continuous assessment : 40 Marks

Term Work and Practical : 50 Marks

Credit

Theory : 3

Term Work : 1

Course Objectives

4) To study various advanced computer architectures.
5) To study 32-bit/64-bit processor architecture
6) To study latest technology

Course Prerequisites

Students should have knowledge of

2) Basic Microprocessors and Microcontrollers

Course Outcome

Students will be able to

6) Learn 32-bit as well as 64-bit processor architectures.
7) Learn latest computer architectures
8) Learn design of the control unit
9) Learn various latest memory and bus technologies
10) Learn parallel processing concepts

UNIT-I

80386DX Features, Functional Block Diagram, PIN Description, Register set, Flags, Physical address space, Data types 80386Dx descriptor Tables GDT, LDT, IDT, descriptor cache, Code, data and stack descriptors, system descriptors, privilege levels, Segmentation in 80386DX, comparison of segmentation with 8086, paging, TSS, Nested Tasks, Operating in Real Mode, Protected Mode, Virtual 86 mode, Virtual addressing, 80386DX instruction set, setting protected mode, setting v86 mode, Real mode programming, Memory Management, Protection Mechanism.

UNIT-II (06 Hours)

Memory Organizations, Flash memory, SDRAM, DDR3, DDR4, Advanced DRAMs, Memristors, PRAM (Phase change RAM / PCM –Phase Change Memory) by IBM, Magneto-resistive RAM (MRAM), Resistive RAM (RRAM), Spin Transfer Torque RAM (STT-RAM), Ferro-electric RAM (FRAM), MLC NAND Flash, 3-D NAND, , 3 -D XPoint Technology by Intel and Micron, Intelligent RAM (IRAM) , NUMA and UMA, Memory allocation policies, Cache memory: Concept, architecture (L1, L2, L3), mapping Techniques, Replacement algorithms, Cache coherency, Interleaved and Associative memory. Virtual Memory: Concept, Segmentation and Paging, Page replacement policies.

Secondary Storage

RAID, Blue Ray Disk, Solid State Drives (SSD),Cloud storage Bus design considerations, Bus types : PCI, ISA, AGP, SCSI, GPIB, USB, Bus arbitration

UNIT-III

Single Bus Organization, Micro operations and Register Transfers.

Hardwired Control Design methods, Typical Example - Multiplier Control unit, Micro-programmed Control: Basic concepts, Microprogram, Microinstruction sequencing, micro-program sequencing, A complete microprogram, Applications of microprogramming (6Hours)

UNIT-IV

Intel Pentium Processor

Features, Block Diagram, Pin grouping according to function, Modes, Programmer's model, Superscalar Operation, Integer & Floating Point Pipeline Stages, Branch Prediction, Cache Organization, Cache coherence, MESI. Study of features of Pentium Pro, Pentium 2, Pentium 3 and Pentium 4 Processors.

UNIT-V (06 Hours)

Advanced Processor Architectures

Multiprocessor Architectures : Closely coupled and Loosely coupled, UMA, NUMA, COMA, RISC and CISC Architectures, Basics of ARM processor, Superscalar Architecture, SuperSPARC, Nehalem micro-architecture, Intel Haswell micro-architecture Multicore Architecture, Hyper Threading Technology (HTT), Intel 64bit Architecture: Block Diagram, Intel Core i3, i5 and i7 architectures, Supercomputer architectures : CDAC PARAM, IBM Blue Gene

UNIT-VI

Introduction to parallel processing systems

Introduction to parallel processing concepts, Architectural classification of parallel processors, pipeline processing, instruction pipelining, pipeline stages (Intel Pentium pipelining), pipeline hazards, Performance evaluation of pipeline, Data dependency analysis, concurrency analysis, Bernstein's conditions, Message passing libraries like PVM, MPI, CUDA : Parallel Programming Model, Vector processing concepts, NVIDIA GPU Computing

Text Books

1) C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", McGraw Hill, 2002, 5th edition.
2) J. Hays, "Computer Architecture and Organization", 2nd Edition, McGraw-Hill, 1988 ISBN 0–07–100479–3
3) 2. Stallings William, "Computer Organization and Architecture: Principles of structure and function", 2nd Ed, Maxwell Macmillan Editions, 1990 ISBN 0 – 02 –946297 – 5.
4) 80386 Microprocessor Handbook, Chris H. Pappas, William H. Murray
5) Pentium Processor System Architecture: Tom Shanley & Don Anderson, Addison - Wesley.
6) Advanced Computer Architecture: Parallelism, Scalability and Programmability-Kai Hwang

Reference Books

1) B. Govindarajulu, “Computer Architecture and Organization: Design Principles and Applications”, Second Edition, Tata McGraw-Hill.

2) Dr. M. Usha, T. S. Srikanth, “Computer System Architecture and Organization”,First Edition, Wiley- India.

3) John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

4) The 80386DX Microprocessor: Hardware, Software and Interfacing: Walter A Triebel, Prentice Hall.

List of Assignments

1) A program for
   a) LRU page replacement algorithm.
   b) FIFO page replacement algorithm.
2) A program to simulate the mapping techniques of Cache memory.
   a) Direct Mapped cache
   b) Associative Mapped cache
   c) Set Associative Mapped cache
3) A program to simulate memory allocation policies.
   a) First-fit algorithm
   b) Best-fit algorithm
4) A program to implement serial communication (PC - PC communication).
5) A program to implement parallel communication. (PC - Printer communication).
6) A program for printer simulation.
7) A program for keyboard simulation.
8) Write ALP using to read and display the table content pointed by GDTR/LDTR and IDTR.

Syllabus for Unit Test

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

IT LAB-IV

Teaching Scheme

Practical : 4

Examination Scheme

Term Work and Practical : 50 Marks

Credit Allotted

Term Work : 2

Course Objectives

1) Describe the basic features of the Linux operating system.
2) Effectively use software development tools including libraries, preprocessors, compilers, linkers, and make files.
3) Discuss correct synchronization techniques for both application programs and kernel code running on uniprocessor as well as multiprocessor (SMM) platforms.
4) Use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.
5) Apply the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.
6) Ability to use Linux environment and write programs.

Course Prerequisites

Students should have knowledge of

1) Prior exposure to a computer running an operating system such as Apple or Windows.
2) A Unix editor, understands files and directory structures , shell mechanisms.
3) Basic fundamentals of shell programming.

Course Outcome

Students will be able to

1) Understand the open source software movement and the advantages and disadvantages of open source software.
2) Acquire knowledge of script programming basics.
3) Acquire a fundamental knowledge of operating system file systems.
4) Use modern operating system calls such as Linux process and synchronization libraries.
5) Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks.

UNIT-I (6 Hours)

Introduction

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

UNIT-II (6 Hours)

Working with the Bourne again shell(bash)

Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT-III (6 Hours)

Files:

File Concept, File System Structure, Inodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls(File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links.

UNIT-IV (6 Hours)

Process

– Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs. Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

Interposes Communication

Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues- Kernel support for messages, Unix system V APIs for messages, client/server example.

UNIT-V (6 Hours)

Multithreaded Programming

Differences between threads and processes, Thread structure and uses, Threads and Lightweight Processes, POSIX Thread APIs, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs.

UNIT-VI (6 Hours)

Sockets

Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs

Assignment List

1) Installation of Unix/Linux operating system
2) Study of logging/logout details.
3) Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.
4) Write a shell script program to display the process attributes.
5) Write a shell script program to check variable attributes of file and processes.
6) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
7) Study of Unix/Linux files system (tree structure).
8) Study of .bashrc, /etc/bashrc and Environment variables.
9) Shell script program to copy contents of one file to another.
10) Create directory, write contents on that and Copy to a suitable location in your home directory.

Text Books

1) Unix System Programming using C++, T.Chan, PHI.(UNIT III to UNIT VIII)
2) Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3) Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.

Reference Books

1) Linux System Programming, Robert Love, O'Reilly, SPD.
2) Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3) Unix Network Programming, W.R.Stevens,PHI.
4) Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standars of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be decleared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
$9.50 \le CGPA \le 10.00$	0	Outstanding	$80 \le Marks \le 100$
$9.00 \le CGPA \le 9.49$	A+	Excellent	$70 \le Marks \le 80$
$8.00 \le CGPA \le 8.99$	A	Very Good	$60 \le Marks \le 70$
$7.00 \le CGPA \le 7.99$	B+	Good	$55 \le Marks \le 60$
$6.00 \le CGPA \le 6.99$	B	Average	$50 \le Marks \le 55$
$5.00 \le CGPA \le 5.99$	C	Satisfactory	$40 \le Marks \le 50$
CGPA Below 5.00	F	Fail	Marks Below 40

Bharati Vidyapeeth
(Deemed to be University) Pune, India.

Faculty of Engineering & Technology
Programme : B. Tech. (IT)

COURSE STRUCTURE AND SYLLABUS
(Choice Based Credit System - 2014 Course)
B. Tech. (Information Technolgoy) – Sem VII & VIII

Bharati Vidyapeeth Deemed University, Pune

Bharati Vidyapeeth, the parent organization of this University is one of the largest educational organizations in the country. It has 171 educational units under its umbrella including 67 Colleges and Institutes of conventional and professional education.

The Department of Human Resource Development, Government of India on the recommendations of the University Grants Commission accorded the status of "Deemed to be University" initially to a cluster of 12 units of Bharati Vidyapeeth. Subsequently, 17 additional colleges / institutes were brought within the ambit of Bharati Vidyapeeth Deemed University wide various notifications of the Government of India. Bharati Vidyapeeth Deemed University commenced its functioning on 26th April, 1996.

Constituent Units of Bharati Vidyapeeth Deemed University

1. BVDU Medical College, Pune.
2. BVDU Dental College & Hospital, Pune
3. BVDU College of Ayurved, Pune
4. BVDU Homoeopathic Medical College, Pune
5. BVDU College of Nursing, Pune
6. BVDU Yashwantrao Mohite College of Arts, Science & Commerce, Pune.
7. BVDU New Law College, Pune
8. BVDU Social Sciences Centre (M.S.W.), Pune
9. BVDU Yashwantrao Chavan Institute of Social Science Studies & Research, Pune.
10. BVDU Centre for Research & Development in Pharmaceutical Sciences & Applied Chemistry, Pune
11. BVDU College of Physical Education, Pune.
12. BVDU Institute of Environment Education & Research, Pune
13. BVDU Institute of Management & Entrepreneurship Development, Pune
14. BVDU Poona College of Pharmacy, Pune
15. BVDU College of Engineering, Pune
16. BVDU Interactive Research School in Health Affairs (IRSHA), Pune
17. BVDU Rajiv Gandhi Institute of Information Technology & Biotechnology, Pune
18. BVDU College of Architecture, Pune
19. BVDU Abhijit Kadam Institute of Management & Social Sciences, Solapur
20. BVDU Institute of Management, Kolhapur
21. BVDU Institute of Management & Rural Development administration, Sangli
22. BVDU Institute of Management & Research, New Delhi

23. BVDU Institute of Hotel Management & Catering Technology, Pune
24. BVDU Yashwantrao Mohite Institute of Management, Malakapur-Karad
25. BVDU Medical College & Hospital, Sangli
26. BVDU Dental College & Hospital, Mumbai
27. BVDU Dental College & Hospital, Sangli
28. BVDU College of Nursing, Sangli
29. BVDU College of Nursing, Navi Mumbai

The status of University was given to a cluster of these colleges and institutes in appreciation of the high level of their academic excellence and for their potential for further growth.

During the last 20 years or so, the University has achieved higher pinnacles of academic excellence and has established its reputation to such an extent that it attracts students not only from various parts of India but also from abroad. According to a survey conducted by Association of Indian Universities, this University is one among the top ten Universities in the country preferred by the overseas students for admissions. At present, there are more than 850 overseas students from 47 countries on the rolls of constituent units of this University.

During the last 20 years, there has been tremendous academic expansion of the University. It now conducts in all 305 courses in its constituent units, of them 108 are Post Graduate, 45 are Under Graduate and 55 Diploma level courses. 12 Fellowship and 5 certificate courses. All the professional courses which the University conducts such as those of Medicine, Dentistry, Engineering etc., have approval of the respective statutory councils, viz., Medical Council of India, Dental Council of India, All India Council for Technical Education etc.

The University is a throbbing center of research activities and has launched Ph.D. programmes in 77 subjects and M.Phil in 3 subjects. It has also introduced quite few innovative academic programmes such as Masters in Clinical Optometry, M.Tech. in Nano Technology etc.

The University's performance and achievements were assessed by the "National Assessment and Accreditation Council" and it was reaccredited with a prestigious "A" grade in 2011. Some programmes of the constituent units such as College of Engineering at Pune, Management Institute in Delhi and others have also been accredited by "National Board of Accreditation". Three constituent units of Bharati Vidyapeeth Deemed University are also the recipients of ISO 9001-2001 certifications.

College Information :

Bharati Vidyapeeth University College of Engineering, Pune (BVUCOE) established in 1983, a constituent unit of BVU (University with 'A' Grade status by MHRD, accredited to Grade 'A' by NAAC in 2004 and 2011) and holds a place of pride and is amongst the most reputed institute. It has been ranked to 61st by National Institutional Ranking Framework (NIRF) with criteriawise ranking as 5th in Graduate Outcome (GO), 13th in Outreach and Inclusivity (OI), 44th in Teaching Learning Resources (TLR) and 62nd in Perception (PR). This also made institute to stand 4th in the State of Maharashtra. Further, DATAQUEST-CMR national survey also ranked this institute to 4th among private technical institutions of India, 29th by Times of India and 41st by OUTLOOK. This is the only institute selected by MHRD for its Technical Education Quality Improvement Programme (TEQIP-II – 1.1 Programme) for the grant of Rs. 4 Crores.

BVUCOE, Pune offers 09 graduate, 08 post graduates programmes and Doctoral programmes in 08 disciplines. All Programmes are accredited by National Board of Accreditation (NBA) twice and we have applied for third cycle of accreditation.

Institute has its own spacious well designed building measuring 26,286 sq. m. and it houses 101 labs, 43 class rooms, and 21 tutorial rooms. The library of the institute is a five storied building and houses periodical section, computer center, reading hall, reference section. It contents more than 60,000 books, 15,000 volumes, 80 national and 81 international journals subscription and digital library facility. Digital library of institute with 66,944 number of journals in e-form is one of the richest source of knowledge in e-form for students and faculty members. The Library, Laboratories, Equipments, Learning resources and Software constantly get upgraded and updated in tune with the changing time. An Investment of Rs.119.95 million is made in the last five years.

The structured faculty development programme has strengthened quality of Teaching - Learning Process in the institute. 35 faculty members with Ph. D. qualifications have been proved as resources for research, innovations and sound Teaching – Learning Process. As a part of quality improvement programme 04 number faculty members were deputed to International Universities, Institutions of national importance such as IIT, NIT etc. for qualification improvement. Team of 206 faculty members with average experience 11.7 years and average age 38.3 years indicates teachers with fine blend of experience and youth. Faculty members are well conversant and trained for use of latest softwares and latest equipments being purchased every year as policy of upgrading laboratories. In last five years college has invested Rs. 119.95 million in laboratory upgradation. Institute organized 138 number of continuing education programmes in last five years to keep sharpen skills of faculty members. Further, 1389 faculty members were deputed to attend various workshops and training programmes for sharing and enhancing their knowledge. Faculty members also play active role in curriculum development as Member of Board of Studies of various subjects and other statutory bodies of the University.

The research quality is indicative of the university penchant for quality. The research publications in reputed international and national refereed journals and conferences have shown a steady and significant rise over the years which is aptly reflected by 1091 Research papers publications in reputed national and international journals in last five years. Grant of Rs. 152.73 Lakhs from funding agencies such as UGC, DST, DRDO, AICTE etc. fetched by faculty members is strong indicator of research aptitude of faculty members. Seed money up to Rs. 3 lakhs under Institutionally Funded Research Programme (IFRP) nurtures research aptitude of faculty members. 575 number of publications in standard research databases such as SCOPUS, Web of Science, Google Scholar etc. in last five years throws light on quality of publications by faculty members of this institute. These publications by faculty members have received 137 number of citations in the same period. Institute has 02 patents to its credit and filed 05 patents.

The institute has collaboration with international universities such as North Carolina A & T State University, Greensboro, USA, Joint School of Nanoscience and Nanoengineering (JSNN), USA, The University of Tokushima, Japan, ARM University, USA and with industries such as TCS, SKF India Ltd. Every year one faculty member is deputed for Ph. D. programme in NCAT with scholarship. Students of M. Tech. (Nanotechnology) joins JSNN, USA to pursue their dissertation research work for six months with scholarship to the tune of $1000 per month. Further, NCAT, USA, The University of Tokushima, Japan contributes intellectually as well as financially to organize biannual international conference NANOCON. Three editions of NANOCON are conducted since 2010 with their association. In association with Eduvance & GAATsis, a " Center of Excellence in Embedded Systems" is established in the Institute with donation of Educational kits like ARM development boards from ARM University Program and PSoC kits by Cypress Semiconductors are used for developing projects in the sponsored laboratory. TCS supports students and faculty members for faculty enablement programmes and student development programme. Establishment of Lubricant Conditioning Monitoring Laboratory is outcome of collaboration with SKF India Ltd.

Being Deemed University college takes advantage of academic autonomy in making the curriculum industry oriented and enable students to make employable. In-plant training (45 days), courses such as Professional Skill Development introduced as integrated part of course structure. In-plant training enable students to interact within their associated industries for gaining practical field experience and professional exposure. Curriculum is Choice Based Credit System which makes students path of joining international universities for their higher studies smoother.

Today, qualitative soft skill development in students is more pertinent to a student's professional career. The institute regularly arranges training programme in the area of personality development, aptitude test, group discussion and personal interview. Through its Employment Enhancement Programme (EEP) designed for third year students which comprises of communication skill quantities analysis, corporate culture, IT Training and soft skills. This programme is conducted in association with professional institutes of national repute for effective execution and implementation. To enhance their professional experience and get them head start in the industry, an innovative programme is initiated on student mentoring "Saturday @ BV", wherein speakers are entrepreneurs and high ranked corporate who share their experiences, hardship and their corporate journey.

In it's long, multi-pronged, persistent and pain staking efforts for producing quality engineering professionals, institute has produced more than 1068 entrepreneurs.

PROGRAMME : IT ENGINEERING

Vision

Provide high quality Production Engineers to the insustry and society.

Mission

Promoting industry institute interaction.
Enhancing employability
Creating future leaders to fulfil the needs of industry.

Program Educational Objectives

1. Create innovative Production Engineers.
2. Pursue lifelong learning for professional development
3. To develop leadership qualities

Programme Outcomes

Graduate production engineer will be able to,

1. Apply knowledge of mathematics, science and engineering in Manufactuting industries.
2. Identify the need, plan and conduct experiments, analyze data for improving the manufacturing processes.
3. Design manufacturing systems that meet desired specifications and requirements.
4. Design and develop complex manufacturing system using statistical and advanced mathematical tools.
5. Use IT tools for prediction and modelling of production engineering activities with an understanding of the limitations.
6. Design Eco-friendly and sustainable safety manufacturing system.
7. Be professionally and ethically responsible to apply engineering tools to satisfy society needs.
8. Perform as a member or a leader in multidisciplinary teams.
9. Communicate in written and verbal form.
10. Manage projects in multidisciplinary environment as a member or leader of a team exhibiting his knowledge, understanding and managerial skills.
11. Engage in independent and life-long learning.

Sr. no	Course Title	Teaching Scheme				Examination Scheme							Credits	
		L	T	P	Contact hrs/wk	Theory	Unit Test	Attendance	TA & Assignments	PR & TW	OR &TW	Total Marks	Theory	TW
1	Compiler Construction and Design	4	-	2	6	60	20	10	10	--	50	150	4	1
2	Computer Forensics and Cyber Laws	3	-	2	5	60	20	10	10	50	-	150	3	1
3	Software Testing	3	-	2	5	60	20	10	10	50	--	150	3	1
4	Elective–III	2	2	-	4	60	20	10	10	--	50	150	2	2
5	Seminar I	-	-	2	2	--	--	--	--	--	50	50		1
6	Project Stage-I	-	-	2	2	--	--		--	--	50	50	-	4
7	Industrial Training	-	- -	-	-	--	--		--	--	50	50	-	3
	TOTAL	**12**	**2**	**10**	**24**	**240**	**80**	**40**	**40**	**100**	**250**	**750**	**12**	**13**

Elective III :
1) Web Services
2) Natural Language Processing
3) Network Modeling & Designing
4) Neural Network

Teaching Scheme			Examination Scheme							Credits	
Lecture	Practical	Tutorial	Theory	Unit Test	Attendance	Assignments	PR& TW	OR& TW	Total	Theory	TW
12	10	02	240	80	40	40	100	250	750	12	13

Sr.no	Course Title	Teaching Scheme				Examination Scheme							Credits	
		L	T	P	Contact hrs/wk	Theory	Unit Test	Attendance	TA & Assignments	Practical& TW	Oral& TW	Total Marks	Theory	TW
1	Web Engineering	2	1	2	5	60	20	10	10	50	--	150	3	1
2	Component Engineering	2	1	2	5	60	20	10	10	--	50	150	3	1
3	Mobile Computing	2	1	-	3	60	20	10	10	--	--	100	3	-
4	Distributed Computing	2	1	-	3	60	20	10	10	--	--	100	3	-
5	Elective-IV	2	--	--	2	60	20	10	10	--	--	100	2	-
6	IT Lab-V	-	--	2	2	--	--	--	--	50	--	50	-	1
7	Project stage -II	-	-	4	4	--	--	--	--	50	50	100	-	8
	TOTAL	**10**	**04**	**10**	**24**	**300**	**100**	**50**	**50**	**150**	**100**	**750**	**14**	**11**
	Environmental Studies	**4**	-	-	**4**	**100**	-	-	-	-	-	**100**	-	-

Elective-IV :

1)Advanced TCP/IP
2)Genetic Algorithm
3) Network Security and Cryptography
4)Semantic Web Mining

Teaching Scheme			Examination Scheme							Credits	
Lecture	Practical	Tutorial	Theory	Unit Test	Attendance	Assignments	PR+TW	OR+TW	Total	Theory	TW
10	10	04	300	100	50	50	150	100	750	14	11

COMPILER CONSTRUCTION AND DESIGN

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 4 Hrs/Week	End Semester Examination: 60 Marks	Theory:04
Practical : 2 Hrs/Week	Internal Assessment:40 Marks	Term Work:01
	Oral and Term Work: 50 Marks	

Course Objectives:

1) Students will understand concepts of compiler phases and design.
2) Students will get deeper insights into the more advanced semantic aspects of programming language and compilers.

Course Prerequisites:

Students should have knowledge of

1) Basic Programming Skills
2) Data Structure Fundamentals.
3) Theory of Automata and Formal Languages

Course Outcome:

Students will be able to:

4) Learn about different phases of a compiler and their functioning.
5) Implementa program toexhibit basic functionalities of compiler.
6) Understand how compilers generate source code to machine code and manages memory during runtime.
7) Acquaint with techniques for simple code optimizations.
8) Use compiler construction tools and softwares like LEX, YACC and FOSS.
9) Know functioning of advanced compilers and advancements in the field.

UNIT-I Lexical Analysis: (06 Hours)

Language Processor: Preprocessor, compiler, assembler, interpreters, Translation Process, Phases of Compiler, Compiler construction: Design issues, Tools. Lexical Analysis: Role, Regular expressions, Specification and recognition of tokens, LEX, Construction of lexical analyzer using LEX.

UNIT-II Syntax Analysis: (06 Hours)

Context free grammar, writing a grammar, Top down parsing, Bottom up parsing, LR parsers: LR parsing algorithm, Constructing SLR parsing tables, Constructing canonical LR parsing tables, Constructing LALR parsing tables, Using ambiguous grammars, YACC. Symbol tables: use and need of symbol tables.

UNIT-III Syntax Translation: (06 Hours)

Syntax directed definition and analysis, Syntax tree construction, Bottom up evaluation, S and L attribute definitions, Top down translation, Space allocation at compile time, Type checking, Type conversion.

UNIT-IV Run Time Environment and Intermediate Code Generation:(06 Hours)

Runtime Environment: Storage organization, Stack allocation, Access to non-local data, Heap management, Parameter passing mechanisms, Garbage collection, Dynamic storage allocation techniques.

Intermediate Code Generation: Declaration, Assignment statement, Boolean expression, Case statement, Backpatching, Procedure calls.

UNIT-V Code Generation: (06 Hours)

Issues in Code generation, Basic Code generation techniques, run time storage management, Basic blocks and Flow graphs, Next-use information, A simple Code generator, DAG representation of Basic blocks, Peephole optimization, Generating code from dags, Code generation algorithms.

UNIT-VI Code Optimization and Applications: (06 Hours)

Code optimization techniques, Principal Sources of Optimization, Optimization of basic Blocks, Global Data Flow Analysis, Runtime Environments, Source and Target Language issues, Dynamic compilation, Cross compilers, Decompiler, Tools: FOSS, C Compiler, GCC, javac, JIT, Interpreters (JVM/Dalvik).

Assignment List:

1) Analyze source program compilation with respect to compilation phases.
2) Explain the role of lexical analysis in compilation process.
3) Explain in brief i) Top down parsing ii) Bottom up parsing.
4) Write a short note on necessity of type checking and type conversion.
5) Write a procedure to insert an item into a linked list by passing a pointer to the head of the list. Under what parameter passing mechanisms does this procedure work?
6) Discuss dynamic storage allocation techniques.
7) Explain DAG representation of basic blocks with suitable example.
8) Briefly explain runtime storage management in code generation phase.
9) Write a short note on code optimization technique.
10) Enlist and explain advanced compiler tools.

Term Work Assignment List:

1) Understand basic syntax of LEX specifications, built-in functions and variables.
2) Implement a preprocessor for C program.
3) Implement a lexical analyzer for subset of C language.
4) Implement a parser for an expression grammar using YACC and LEX.
5) Write a program to simulate symbol table generator.
6) Implement operations of semantic analysis like type checking,verification of function parameters, variable declarations and coercions etc.
7) Simulation and Demo: Compiler and interpreter using LEX and YACC.
8) Implement intermediate code generator for the Boolean expression in three Address code format.

9) Implement the front end of a compiler that generates the three-address code for a simple language.

10) Generate an appropriate Target Code from the given intermediate code assuming suitable processor details.

Text Books:

1) Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques and Tools”, Pearson Education Edition.

2) J. R. Levin, T. Mason, D. Brown, “Lex and Yacc", O’Reilly.

Reference Books:

1) Kenneth C. Louden., “Compiler Construction Principles and Practice”, Cengage Learning India.

2) Andrew Appel and Jens Palsberg., “Modern Compiler Implementation in ML: Basic Techniques”, Cambridge University Press.

3) Anthony J. Dos Reis, “Compiler Construction Using Java, JavaCC and Yacc”, Wiley.

4) Keith D. Cooper, Linda Torczon, “Engineering a Compiler”, Elsevier.

5) Axel T. Schreiner, H. George Friedman Jc, “Introduction to Compiler Construction with Unix”, Prentice Hall.

Syllabus for Unit Test:

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

COMPUTER FORENSICS AND CYBER LAWS

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 3Hrs/Week	End Semester Examination : 60Marks	Theory : 03
Practical : 2 Hrs/Week	Internal Assessment : 40 Marks	Term Work :01
	Practical and Term Work : 50 Marks	

Course Objective:

To maintain an appropriate level of awareness, knowledge and skill required to minimize the occurrence and severity of incidents related to forensics and cyber law.

Course Prerequisites:

Students should have knowledge of

1) Basics of data communication.
2) Aware about security issues with digital world.

Course Outcome:

Students will be able to:

1) Understand how to analyze evidences and its use in investigation.
2) Demonstrate data recovery in computer forensic.
3) Analyze hardware and operating systems in cyber security.
4) Demonstrate Computer Forensic tools and Disaster Recovery.
5) Understand Network Forensic and Mobile Network Forensic.
6) Discuss cyber laws.

UNIT-I Introduction to Computer Forensics: (06 Hours)

Pomputer crimes, evidence, extraction, preservation Overview: Concept of Computer Forensic, Types of Forensic Science, Storage device, Storage device characteristics, types of storage device.

Forensic Investigator: Role of Computer Forensic Investigator, line of investigation, investigation steps, responsibilities of Computer Forensic Investigator.

Evidence: Definition of evidence, life cycle of evidence, types of evidence, rules for evidence, evidence.

Storage and its Security Incident Response: Introduction, Investigations, Pre-Incident Preparations, Formation of Incident Response Team, Role of Incident Response Team.

UNIT-II Data recovery: (06 Hours)

Computer crime and Legal issues: Intellectual property, privacy issues, Criminal Justice system for forensic, audit/investigative situations and digital crime scene, investigative procedure/standards for extraction, preservation, and deposition of legal evidence in a court of law.Data Recovery: Definition of data recovery, Identifying hidden data, Encryption/Decryption, Steganography, recovering deleted files.data recovery mechanism, tools used for recovery.Digital evidence controls: uncovering attacks that evade detection by Event Viewer, Task Manager, and other Windows GUI tools, data acquisition, disk imaging, recovering swap files, temporary &cache files

UNIT-III Hardware and Operating Systems: (06 Hours)

Overview of hardware and operating systems: structure of storage media/devices; windows/Macintosh/ Linux -- registry, boot process, file systems, file metadata.Investigating Logs: Audit logs and security, system log, remote logging, configuring Windows, logging, setting up remote logging in Windows, event reporter and Application Logs.Software Reverse Engineering: defend against software targets for viruses, worms and other malware, improving third-party software library, identifying hostile codes-buffer overflow, provision of unexpected inputs, etc.

UNIT-IV Computer Forensic tools and Disaster Recovery: (06 Hours)

Computer Forensic tools: X-Ways, Index.dat Analyzer, Data Doctor ,Encase, Helix, FTK, Autopsy, Sleuth kit Forensic Browser, FIRE, Found stone Forensic ToolKit, WinHex, Linux dd and other open source tools. Disaster Recovery: Preparing for disaster recovery, backing up data, scheduling backup jobs, restoring data, recovering from server failure, selecting disaster recovery methods.

UNIT-V Network Forensic and Mobile Network Forensic: (06 Hours)

Network Forensic: Collecting and analyzing network-based evidence, reconstructing web browsing, email activity, and windows registry changes, intrusion detection, tracking offenders, etc. Mobile Network Forensic: Introduction, Mobile Network Technology, Investigations, Collecting Evidence, Where to seek Digital Data for further Investigations, Interpretation of Digital Evidence on Mobile Network.

UNIT-VI Cyber Law: (06 Hours)

Battling Cyber Squatters and Copyright Protection in the Cyber World : Concept of domain name and reply to cyber squatters, meta-tagging, legislative and other innovative moves against cyber squatting, freedom and control on the internet, works in which copyright subsists and meaning of copyright, copyright ownership and assignment, license of copyright, copyright term and respect for foreign works, copyright infringement, offences and remedies, copyright protection and content on the internet, copyright notice, disclaimer and acknowledgment, downloading for viewing contents, hyper-linking and framing, liability of ISPs for copyright, violation in the cyber world, legal developments in the US, Napster and its cousins, computer software piracy.Licenses and versions of GPL,Trademark, Patent.Digital Signature, Certifying Authorities and E-Governance : Digital signature, digital signature certificate, certifying authorities and liabilities, digital signature Governance in India

Term Work Assignment List:

1. Explain role of Computer Forensic Investigator and investigation steps.
2. Explain life cycle of evidence and its types.
3. Demonstrate deleted data recovery by using suitable tools.
4. Demonstrate setting up remote logging in Windows.
5. Use Computer Forensic tools.
6. Demonstrate backing up data and restoring data.
7. Implement collecting and analyzing network-based evidence.
8. Implement interpretation of digital evidence on mobile network.
9. Design copyright protection in the cyber world.
10. Implementdigital signature.

Assignment List:

1. Discuss types of Forensic Science
2. Discuss Intellectual property.
3. Demonstrate data recovery mechanism
4. Demonstrate event reporter and Application Logs
5. Discuss selecting disaster recovery methods
6. Demonstrate computer Forensic tool X-Ways
7. Discuss Collecting and analyzing network-based evidence
8. Demonstrate intrusion detection
9. Demonstrate digital signature certificate heads.
10. Differentiate between Copyright, Patent and Trademark.

Text Books:

1) Jay A. Siegel "Forensic Science: The Basics ", CRC Press.
2) Anthony J. Bertino, "Forensic Science: Fundamentals and Investigations", Cengage Learning.
3) Joe Nickell and John F. Fischer, "Crime Science: Methods of Forensic Detection", Kentuckypress.
4) Sherri Davidoff, Jonathan Ham," Network Forensics: Tracking Hackers Through Cyberspace", Prentice Hall, 2012.

Reference Books:

1) Stuart H. James and Ph. D., Jon J. Nordby, "Forensic Science: An Introduction to Scientific and Investigative Techniques", 2nd edition.
2) Andy Jones and Debi Ashenden, "Risk Management for Computer Security: Protecting Your Network & Information Assets".
3) Colin Evans, "The Casebook of Forensic Detection: How Science Solved 100 of the World's Most Baffling Crimes".
4) Edward Amoroso, "Cyber Security, Computer Network Security and Cyber Ethics", 2nd edition by Joseph Migga Kizza.
5) Robert McCrie, "Security Operations Management", Second Edition.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

SOFTWARE TESTING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 3 Hrs/Week	End Semester Examination : 60 Marks	Theory :03
Practical : 2 Hrs/Week	Internal Assessment : 40 Marks	Term Work:01
	Practical and Term Work : 50 Marks	

Course Objectives:

1) Students will learn the advanced techniques that underlie the practice of software testing.
2) Course will provide deeper insights into quality assurance of developed softwares.

Course Prerequisites:

Students should have knowledge of

Software Development and Software Engineering concepts.

Course Outcome:

Students will be able to:

1) Classify measurement models and software metrics.
2) Perform unit and integration tests by determining test design and test automation.
3) Apply suitable higher order testing techniques and methods in order to achieve verified and validated software by following best testing practices.
4) Understand the methods of software quality measurement.
5) Understand various test processes, fault models and methods of test generation.
6) Acquaint with software automation tools and applications.

UNIT-I Principles of Testing: (06 Hours)

Purpose of Software Testing, Testing Principles, Goals of Testing, Software components, characteristics, architecture, Software testing life cycle, Testing aspects: Requirements, Test Scenarios, Test cases, Test scripts/procedures. Strategies for Software Testing, Testing Activities, Mistakes, Faults &Failures, PlanningVerification andValidation, Software Inspections, Automated Static Analysis, Verification and Formal Methods, Levels of Testing, White-Box Testing, Black-Box Testing.

UNIT-II Functional Testing: (06 Hours)

Test Plan, Test Management, Test Execution and Reporting, Test Specialist Skills, Tester's Workbench and Tool Categories, Test Maturity Model and Test Process Assessment, Functionality Matrix (FM), Debugging & Root Cause Analysis, Software Items, Component & Units, Test Bed, Traceability and Testability, Attributes of Testable Requirements, Test Matrix, Types of Testing, Creating Test Cases from Requirements and Use cases, Software Defects: Origins, Classes, cycle, attributes, Need for Testing.

UNIT-III Higher Order Testing: (06 Hours)

Object Oriented Testing, Specification Based Testing, Performance Testing, Ad-hoc Testing, Usability and Accessibility Testing, Risk-based Testing, Exploratory Testing, Scenario-based Testing, Random Testing Compatibility Testing, User Documentation Testing, Client–Server System Testing, RAD Testing, Configuration Testing, Testing internal Controls, Multiplatform Environment Testing, Security Testing, Web-based System Testing.

IEEE Standards Related to Testing.

UNIT-IV Software Measurement: (06 Hours)

Objectives, Measurement andModels, Measurement Scales, Classification of Software Measures, Measurement Framework, Software measurement validation, Measuring Internal Product Attributes: Size, structure, Halstead's Software Science, Product Quality Metrics, In-Process Quality Metrics, Software Reliability: Measurement and Prediction, The Rayleigh Model, Exponential Distribution and Reliability Growth Models, SRE process.

UNIT-V Software Quality Assurance and Test metrics: (06 Hours)

Software Quality Concepts, Planning for SQA, Six Sigma Principles, Malcolm Baldridge Assessment, Edward Deming's Principles, Ishikawa's Seven Basic Tools, Software Maintenance, Software inspection concepts, Software Benchmarks and Baselines, Identifying Software Best and Worst Practices.

Test metrics: Types of metrics, project metrics, Progress metrics, Test Defect metrics, Development defect metrics, Productivity metrics, Release metrics.

UNIT-VI Automation and Applications: (06 Hours)

Software test automation: Introduction, Scope. Design and architecture for automation: External modules, test cases and test framework modules, tools and result modules, report generator, process model for automation, challenges. Manual testing, Automated Testing Tools & Case studies, Study of Testing tools: QTP, Rational Robot, Winrunner, Loadrunner, Bugzilla, Selenium.

Assignment List:

1) Explain in detail the difference between Software Product and Software Project.
2) Explain the need of Software Testing in software development.
3) Explain software defects with reference to origins, classes and defect repository.
4) What is minimization and prioritization of Test Cases for Regression Testing? Explain with suitable example.
5) Write a short note on 'Quality Standards' of testing.
6) Explain in detail 'Software Reliability'.
7) Enlist different software reliability models, briefly explain each.
8) Explain Defect cycle and Bug execution.
9) Write a short note on tools and models to measure Software Quality.
10) What is the need of regression testing? Which test cases are executed in regression testing?

Term Work Assignment List:

1) Describe architecture, components, characteristics, type, category, types of users and user expectations for given software application.
2) State and describe software development life cycle (SDLC) and software testing life cycle (STLC) phases.
3) Create Functionality Matrix (FM) for any software application.
4) Write down test scenario and test cases on mobile application.
5) Construct Requirement Traceability Matrix (RTM) for software application.
6) Perform following testing for E-commerce application,
a) Functional Testing b) Performance Testing c) UI testing d) Security testing.
7) Installation and Demo of open source testing tool (Selenium, Bugzilla etc.)
8) Test your project as a software application using any software testing tool.
9) Study different Defect Tracking Tool, and Create Defect report using Bugzilla.
10) Study assignment: Explain Quality attributes of Software Application and differentiate between QA, QC, and QMS.

Text Books:

1) Fenton, Pfleeger, "Software Metrics: A Rigourous and practical Approach", CRC Press.
2) Desikan, Ramesh, "Software Testing: principles and Practices", Pearson Education.

Reference Books:

1) Burnstein, "Practical Software Testing", Springer International Edition.
2) William E. Perry, "Effective Methods for Software Testing", John Wiley and Sons.
3) Yogesh Singh, "Software Testing", Cambridge University Press.
4) Ronald Radice, "Software Inspections", Tata McGraw Hill.
5) Capers Jones, "Software Assessments, Benchmarks, and Best Practices", Addison-Wesley.
6) Paul C. Jorgensen, "Software Testing: A Craftsman's Approach",CRC Press.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE-III: 1) WEB SERVICES

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 3 Hrs/Week	End Semester Examination : 60 Marks	Theory : 03
Practical : 2 Hrs/Week	Internal Assessment : 40 Marks	Term Work : 01
	Oral and Term Work : 50 Marks	

Course Objectives:

This course will cover the practical aspects web services in detail. The goal of this course is to introduce the students to the basics of distributed application development. We will introduce the students to Web Services, Applications of Web Services.

Course Prerequisites:

Students should have knowledge of:

1) Understanding the working of Network with TCP / IP.
2) Basic idea of how the Internet Works.
3) .Net and Java Framework Knowledge.

Course Outcome:

Students will be able to:

1) To understand the details of web services technologies like WSDL,UDDI, SOAP.
2) To learn how to implement and deploy web service client and server.
3) To explore interoperability between different frameworks.

UNIT-I Introduction: (06 Hours)

Evolution and Emergence of Web Services – Evolution of distributed computing, Core distributed computing technologies — client/server, CORBA, JAVA RMI, Microsoft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services — The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services. Web Services Architecture — Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication models, basic steps of implementing web services.

UNIT-II SOAP: (06 Hours)

Fundamentals of SOAP — SOAP Message Structure, SOAP encoding, Encoding of different data types, SOAP message exchange models, SOAP communication and messaging, Java and Axis, limitations of SOAP.

UNIT-III WSDL: (06 Hours)

Describing Web Services — WSDL — WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL.

UNIT-IV Web Service Discovery: (06 Hours)

Discovering Web Services — Service discovery, role of service discovery in a SQA, service discovery mechanisms, UDDI — UDDI registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, Publishing API, Publishing, searching and deleting information in a UDDI Registry, limitations of UDD1.

UNIT-V Web Services Interoperability: (06 Hours)

Web Services Interoperability — Means of ensuring Interoperability, Overview of .NET, Creating a .NET client for an Axis Web Service, creating Java client for a Web service, Challenges in Web Services Interoperability. Web Services Security — XML security frames work, Goals of Cryptography, Digital signature, Digital Certificate, XML Encryption.

UNIT-VI Designing Web service: (06 Hours)

Java, and .Net Frame Work. Case Studies with Java and .Net.

Term Work Assignment List:

1) Compare different distributed computing technologies likeCORBA, JAVA RMI, Microsoft DCOM, MOM.
2) Implement a simple web service of checking the status of client.
3) Implement SOAP in Java with simple messaging.
4) Identify limitations of SOAP. Suggest the solutions.
5) Study WSDL in detail with respect to WWW.
6) Implement a simple program for discovery.
7) Write a Java program to verify digital signatures.
8) Write a Java program to verify digital certificates.
9) Case Study: Use of Java for Web Services.
10) Case Study: Use of .NET for Web Services.

Text Books:

1) R. Nagappan, R. Skoczylas, R.P. Sriganesh,"Developing Java Web Services", Wiley India.

Reference Books:

1) James McGovern, Sameer Tyagi etal.,"Java Web Service Architecture", Elsevier
2) S. Graham and others"Building Web Services with Java", 2 Edition,Pearson Edn.
3) D.A. Chappell & T. Jewell, "Java Web Service"s, O'Reilly,SPD.
4) G. Alonso, F. Casati,"Web Service's, Springer.Outcomes

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE III: 2) NATURAL LANGUAGE PROCESSING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 2 Hrs/Week	End Semester Examination : 60 Marks	Theory : 02
Tutorial : 2 Hrs/Week	Internal Assessment : 40 Marks	Term Work : 02
	Oral and Term Work : 50 Marks	

Course Objectives:

1) To understand the concepts of morphology, syntax, semantics and pragmatics of the language.
2) To give introduction of knowledge acquisition, information retrieval and machine translation.

Course Prerequisites:

Students should have knowledge of

1) Probabilities and statistics.
2) Algorithms and programming experience.

Course Outcome:

Students will be able to:

1) Understand the models, methods, and algorithms of statistical Natural Language Processing (NLP).
2) Understand the basic NLP techniques, including syntactic parsing, semantic interpretation, lexical and morphological analysis.
3) Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars.
4) Choose appropriate solutions for solving typical NLP sub problems (tokenizing, tagging, parsing)
5) Understand basics of knowledge representation.
6) Understand resources of natural language data – corpora.

UNIT-I Language Modeling: (06 Hours)

NLP-Language and Grammar-Processing:Origins and challenges, Language models: Uni-gram, N-gram –Statistical Language Model, NLP Applications.

UNIT-II Natural Language and Formal Language: (06 Hours)

Text Preprocessing, Regular Expressions and Finite State Automata word recognition, lexicon. Phrases and idioms, word order, agreement, tense, aspect and mood and agreement, Context Free Grammar, spoken language syntax.

UNIT-III Part of Speech Tagging and Hidden Markov Models: (06 Hours)

The concept of parts-of-speech, Tagging, Tagsets, and Morphology, The Penn Treebank and Brown Corpus. Probabilistic (weighted) finite state automata. Hidden Markov models (HMMs). The Viterbi Algorithms.

UNIT-IV Grammars & Parsing Algorithms: (06 Hours)

Context-free Grammars, Parsing Regular Grammars, Parsing Context Free Grammars, Example Toy NL Grammar,Shift-Reduce Parsers ,Probabilistic Parsing: Introduction.

UNIT-V Information Extraction: (06 Hours)

Vector space model, term weighting, homonymy, polysemy, synonymy, Improving user queries. Machine Translation– Overview,Applications of NLP- Spell-checking, Summarization.

UNIT-VI Linguistics resources: (06 Hours)

Introduction to corpus, elements in balanced corpus, TreeBank, PropBank, WordNet, VerbNet etc. Resource management with XML, Management of linguistic data with the help of GATE, The Semantic Web technologies, ontologies, OWL, NLTK.

Assignment List:

1) Write note on word normalization and stemming. Explain case folding with suitable example.

2) What is significance of decision tree in sentence segmentation also give implementation of decision tree for suitable example.
3) Discuss challenges of Machine translation .What are classical approaches of machine translation?
4) Case study on IBM translation model.
5) Case study on WordVET and VerbNet
6) Study of Hidden Markov Model and POS tagging.
7) Study assignment on Python—Analyzing Text with the Natural Language.
8) Research paper reading, analyzing and demonstrating.
9) Describe various Natural Language representation methods.
10) Describe different techniques for removal of ambiguity.

Term Work Assignment List:

1) Implement bottom up parser for any given grammar.
2) Analysis of natural language using lexical analysis.
3) Case study of any parsing algorithm.
4) Study of clustering algorithm in NLP.
5) Case study: NLP in web mining or text mining.
6) Case study of Viterbi Algorithm.
7) Study of Python features used in NLP.
8) Study assignment of information retrieval techniques.
9) Installation of NTLK Toolkit.
10) Implement program in Python to calculate frequency distribution.

Text Books:

1) Allen, J. “Natural Language Understanding”, The Benajmins/Cummings Publishing Company ,Inc. 1994. ISBN 0-8053-0334-0.
2) Daniel Jurafsky and James H Martin. “Speech and Language Processing”, 2e, PearsonEducation, 2009.

Reference Books:

1) James A".Natural language Understanding"2e, Pearson Education, 1994

2) Bharati A., Sangal R., Chaitanya V."Natural language processing: a Paninian perspective",PHI, 2000.

3) Siddiqui T., Tiwary U. S. "Natural language processing and Information retrieval", OUP, 2008

4) NLTK – Natural Language Tool Kit - http://www.nltk.org/

5) Journals : Computational Linguistics, Natural Language Engineering, Machine Learning, Machine Translation, Artificial Intelligence.

Syllabus for Unit Test:

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE III :3) NETWORK MODELING & DESIGNING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 02 Hrs/Week	End Semester Examination : 60 Marks	Theory : 02
Tutorial : 02 Hrs/Week	Internal Assessment : 40 Marks	Term Work : 02
	Oral and Term Work : 50 Marks	

Course Objectives:

1) Build an understanding of the fundamental concepts of networking.
2) Familiarize the student with the basic taxonomy and terminology of the networking Design & Modeling.
3) Introduce the student to advanced networking concepts preparing the student for entry Advanced courses in computer networking.
4) Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Prerequisites:

Students should have knowledge of

The fundamental concepts of computer networking.

Course Outcome:

Students will be able to:

1) Understand basic network technology.
2) Understand and building the skills of network traffic.
3) Design a network topology.
4) Design a network algorithm.
5) Understand internals of main protocols such as SNMP v1,v2,v3, RMON1, RMON2.
6) Understand the organization of Network Administration.

UNIT-I Requirements Planning and Choosing Technology: (06 Hours)

User Requirements, documentation and planning, traffic sizing, tuning data size across the network, traffic characteristics, time and delay consideration

UNIT-II Traffic Engineering and Capacity Planning: (06 Hours)

Poisson Arrivals, Markov processes, Voice traffic modeling, Queuing system models, Markovian queuing system models M/D/1, M/M/1, Bernoulli process, Erlang formulas and M/M/c/e system priority queue system, LAN Traffic Modeling, Availability and Reliability.

UNIT-III Network Design: (06 Hours)

Designing the network topology and solutions-Top down Approach – Network Design Layers--Application Layer, Premises Architecture or Local Enterprise, Architecture Layer, Access Layer, Backbone Layer, Access Layer Design, Backbone Network Design.

UNIT-IV Network Design Problem definition: (06 Hours)

Network Design Problem definition : Multipoint line layout heuristics, CMST algorithm, ESAUWilliam's algorithm, Sharma's algorithm, Unified algorithm, Bin packing, Terminal assignments, Concentrator location.

UNIT-V Network Management Protocols: (06 Hours)

Network Management Protocols: SNMP v1,v2,v3, RMON1, RMON2, Netflow, Syslog. Network Management Standards, ASN.1, encoding structure, Macros, Functional Model.

UNIT-VI Network Administration: (06 Hours)

Functions and responsibilities, Network planning and implementation, Sub-netting, Bandwidth management, security issues, Tools for BW and security management, modifying network implementation.

Assignment List:

1) Explain in detail 'Requirement paling Traffic sizing of network'.
2) Discuss Various characteristics with time & delay consideration for better network design.
3) List and explain 'Markovian Queen system models'.
4) Discuss LAN traffic modeling with its average and Reliability.
5) Demonstrate Various design approach with respect to design layers for networking.
6) Describe backbone network design.
7) Summarize network design problem definition with various algorithm (CMST, Sharma's, Unified).
8) Justify network management protocol SNMPv1,v2,v3.
9) Draw and explain functions model of network management standard.
10) State various functions and responsibility of network administration.

Term Work Assignment List:

1) Study assignment: Network topology.
2) Simulate Markovian queuing system models.
3) Design LAN traffic model assuming suitable model.
4) Design network of your college considering layers present.
5) Implement CMST algorithm.
6) Implement Bin packing algorithm assuming suitable parameters.
7) Study assignment: Network management protocols.
8) Analyze traffic using traffic monitor analyzer.
9) Demonstrate tools used for network management.
10) Case study: Tools for Security Management.

Text Books:

1) Keshav S., "An Engineering Approach to Computer Networking," AddisonWesley.

Reference Books:

1) Darren L. Spohn, “Data Network Design”, Tata McGraw Hill Edition.

2) Mani Subramanian, “Network Management Principles and Practice”, Pearson Education.

3) James D, “Network Analysis, Architecture, and Design”, Morgan Kaufman.

4) Robert S Kahn, “Wide Area Network Design”, Morgan Kaufman.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE III: 4) NEURAL NETWORK

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 2 Hrs/Week	End Semester Examination : 60 Marks	Theory :02
Tutorial : 2 Hrs/Week	Internal Assessment : 40 Marks	Term Work :02
	Oral and Term Work : 50 Marks	

Course Objectives:

1) To understand the basics concept of biological Neural Network.
2) To learn the basics concept of artificial Neural Network
3) To analyze applications of ANN
4) To study different pattern recognition application using ANN.
5) To use the practical approach of artificial neural networks in various technical, organizational and economic applications.
6) To learnbasic learning algorithms: the delta learning rule, the back-propagation algorithm, self-organized learning, etc.

Course Prerequisites:

Students should have knowledge of

1) Algorithms and programming, data structures.
2) Probability theory, calculus etc.

Course Outcome:

Students will be able to:

1) Analyze the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
2) Understand the differences between for supervised and unsupervised learning.
3) Designing of single and multi-layer feed-forward neural networks.
4) Understand the concept of generalization and function approximation.

5) Understand the concepts and techniques of neural networks through the study of the most important neural network models.

6) Analyze the sufficient theoretical background to be able to reason about the behavior of neural networks.

7) Develop an application of neural network, and to know what steps to take to improve performance.

UNIT-I Introduction and Basics of Artificial Neural Networks: (06 Hours)

Introduction to Neural Networks, Features of ANN, Structure of Biological Neural Network, Comparison of BNN and ANN, Characteristics of neural network, Artificial Neural Model: McCulloch – Pitts model, Perceptron, Adaline model, Learning process:Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive Learning, Supervised and Unsupervised Learning,, Topology of neural network architecture.

UNIT-II Architectures of Neural Networks: (06 Hours)

Architecture of Feedforward and Feedbacknetwork, Single layer ANN, Multilayer perceptron, Perceptron Learning Algorithm, Perceptron Coverage Therom, Backpropagation Learning, input - hidden and output layer computation, Backpropagation algorithm, applications, Selection of tuning parameters in BPN, Limitation of Backpropagation Algorithm.

UNIT-III Associative Memories, Activation & Synaptic Dynamics: (06 Hours)

Basic Concepts, Linear Associator, Basic Concepts of Recurrent Autoassociative Memory: Retrieval Algorithm, Storage Algorithm, Performance Considerations, Performance Analysis of Recurrent Autoassociative Memory, Bidirectional Associative Memory: Memory Architecture, Association Encoding and Decoding, Stability Considerations, Memory Example and Performance Evaluation, Improved Coding of Memories, Multidirectional Associative Memory, Associative Memory of Spatio-temporal Patterns, Introduction To Activation, Activation Dynamics models, Basics of Synaptic Dynamics models, Stability and Convergence.

UNIT-IV Basic functional units of ANN: (06 Hours)

Basic feedforward, Basic feedback, and basic competitive learning neural network, Feedforward neural networks: Linear responsibility X-OR problem and solution, Analysis of pattern mapping networks summary of basic gradient search methods, Feedback neural networks Pattern storage networks, stochastic networks and simulated annealing, Boltzmann machine and Boltzmann learning.

UNIT-V Competitive learning, Matching and Self-Organizing Networks:(06 Hours)

Components of CL network pattern clustering and feature mapping network, Hamming Net and MAXNET, Unsupervised Learning of Clusters: Clustering and Similarity Measures, Winner-Take-All Learning, Recall Mode, Initialization of Weights, Separability Limitations, Counter propagation Network, Feature Mapping, Self-organizing Feature Maps, ART networks, Features of ART models, character recognition using ART network, Cluster Discovery Network (ART1).

UNIT-VI Applications of ANN: (06 Hours)

Linear Programming Modeling Network, Robot Control, Pattern association, Pattern classification and pattern mapping tasks, Pattern classification – Recognition of Olympic games symbols, Recognition of printed Characters, Recognition of handwritten characters, Connectionist Expert Systems for Medical Diagnosis

NET Talk: to convert English text to speech. Recognition of consonant vowel (CV) segments, texture classification and segmentation

Assignment List:

1) Draw and Explain structure and working of Biological Neural Network
2) Write note on:
a) Mc Culloch – Pitts model
b) Adaline model
3) Explain when, where and why it is sensible to use the sigmoid (logistic) function as the activation function in a Back-Propagation network.
4) Describe how the basic Back-Propagation Learning Algorithm for Multi-Layer Perceptron (MLP) networks is related to gradient descent learning.

5) Explain the significance of each of the following theorems: (a) Cohen-Grossberg theorem (b) Cohen-Grossberg-Kosko theorem (c) Adaptive bidirectional associative memory theorem

6) Consider a stochastic unit with a bipolar I-1, 11 output function. The probability distribution for the unit is given by P(s = 1 |x) = 1/(1+ exp (-2 λx)) If the learning of the stochastic unit is based on gradient descent on the error between the desired and the average output, show that the resulting learning law is the same as the learning law obtained using delta learning for a deterministic unit with hyperbolic tangent as the output function.

7) How to perform the following tasks by a Boltzmann machine? (a) Pattern completion (b) Pattern association (c) Pattern recall from noisy input.

8) What is meant by full free energy and clamped free energy in a Boltzmann machine? How do you interpret the Boltzmann learning in terms of full free energy and clamped free energy?

9) Explain the Components of CL network pattern clustering and feature mapping network.

10) Explain the process of character recognition using ART network.

11) What is the significance of neural networks in the NETtalk application?

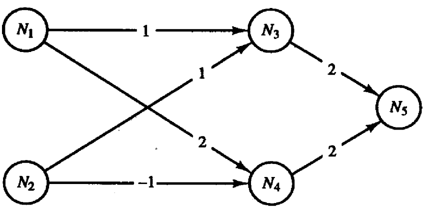
12) Explain how a constraint satisfaction model can be exploited for improving the recognition accuracy for. CV units.

Term Work Assignment List:

1) Consider the Neural Network of McCulloch-Pitts neurons shown in Figure. Each neuron(other the the input neuron N1 and N2) has a threshold of 2.

   a) Define the purpose of neuron N5 at time t in terms of the activations of the input neurons, N1 and N2, at the appropriate time.

   b) Show the activation of each neuron that results from the input signa of N1= 1, N2=0 at t=0



2) What is Learning Process of Neural Network? Explain in Detail the types of Learning in NN.

3) Write and Explain Perceptron Learning algorithm and Perceptron Coverage Therom.

4) Write a program implementing the error back-propagation training algorithm (EBPTA) for user-selectable I, J, and K values for a single hidden layer network. Learning constant η should be user-selectable; no momentum term is needed. The initial weights for the network should be selected at random. Provisions for specification of input pattern(s) and the desired response(s) should be made in order to initiate and carry out the training. Use bipolar continuous perceptrons

5) Assume that a linear associator has been designed using the crosscorrelation matrix for heteroassociative association of p orthonormal patterns. Subsequently, another orthonormal pattern s(p+1) associated with f(p+l) must be stored. An incremental change in the weight matrix needs to be performed using the cross-correlation concept. Prove that the association s(p+1)->f(p+1) results in no noise term present at the output

6) The weight matrix of the temporal associative memory is known as Knowing that a vector s(1) = [- 1 1 - 1 - 1 1 1]t belongs to a sequence, find the remaining vectors of the sequence. Having found the full sequence, verify that encoding it actually yields the weight matrix W as specified in the problem. Calculate the noise term vectors generated at each recall step and determine that they are suppressed during the thresholding operation.

$$\mathbf{W} = \begin{bmatrix} -1 & 3 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 3 \\ -1 & -1 & 3 & -1 & -1 \\ -1 & 3 & -1 & -1 & -1 \\ 3 & -1 & -1 & 3 & 1 \end{bmatrix}$$

7) Explain the Concept of Feed Forword and Feed back NN with suitable Example.

8) Consider the ART1 neural net with four F1 units and three F2 units. After some training, the weights are as follows:

Determine the new weight matrices after the vector (0,0,1,1) is presented if

a) the vigilance parameter is 0.3.

b) the vigilance parameter is 0.7.

Bottom-up weights b_{ij}

0.67	0.0	0.2
0.0	0.0	0.2
0.0	0.0	0.2
0.0	0.67	0.2

Top-down weights t_{ji}

1	0	0	0
0	0	0	1
1	1	1	1

9) The MAXNET with four output nodes, p = 4, receives the input vector yo= [0.5 0.6 0.7 0.8]t

(a) Find the εvalue that would be required to suppress the output of the weakest node exactly to the zero value after the first cycle.

(b) Find subsequent responses of the network, y1and y2, for the computed value of ε.

10) Develop a multilayer feedforward character classifier for five printed digits shown as 5 X 5 black-white pixel maps on Figure. Devise a suitable network architecture for a local representation classifier. Prepare the set of five inputloutput binary training vector pairs.Train the network for zero decision errors. Perform the recall of nondistorted digits by reusing the training input data. Perform the evaluation of the classifier by recalling digits distorted by the center pixel (pixel 13) of the 5 X 5 field being white rather than black. Evaluate the classifier by recalling digits distorted by reversal of input pixels 12, 13, and 14.

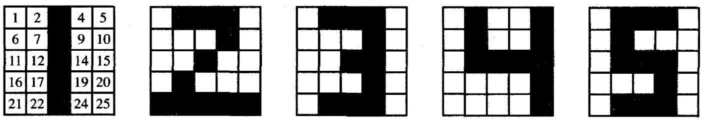


Figure. Pixel maps for digit recognition network in problem.

Text Books:

1) Stuart Russel, Peter Norvig, "Artificial Intelligence – A Modern Approach.

2) Patrick Henry Winston, "Artificial Intelligence", Pearson Education.

3) L. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications", Prentice-Hall.

4) Jacek M. Zurada, Introduction to Artificial Neural Systems, PWS Publishing.

Reference Books:

1) B. Yegnanarayana ,"Artificial neural Networks", PHI Publication.

2) S. Raj sekaran , Vijayalakshmi Pari, "Neural networks, Fuzzy logic and Genetic Algorithms", PHI Publication.

3) Laurene Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications", Prentice Hall International.

4) Satish Kumar, "Neural Networks", McGraw Hill publication.

5) B. D. Ripley, "Pattern Recognition and Neural Networks", Cambridge University Press

6) Simon Haykin, "Neural Networks: A Comprehensive Foundation", pearson Education.

Syllabus for Unit Test:

Unit Test -1	Unit I ,II and III
Unit Test -2	Unit IV, V and VI

SEMINAR I

Teaching Scheme	Examination Scheme	Credit Allotted
Practical: 02Hrs/Week	Oral and Term Work: 50 Marks	Term Work: 04

Course Objectives:

1) To improvise presentation, technical documentation and communication skills.
2) To learn recent technologies and understand it's functioning.

Course Prerequisites:

Students should have knowledge of

1) Source of good research articles.
2) Basic knowledge of mathematical modeling.

Course Outcome:

Students will be able to:

1) Learn documentation of the seminar report.
2) Learn to communicate effectively.
3) Analyze the recent technologies.
4) Present their idea and convey the concepts.
5) Use the research material in the project.
6) Understand to draft research paper.

Guidelines for the project:

1) Refer quality research article from IEEE, Springer, Elsevier and ACM
2) Select a domain of interest and use of it in developing the project.
3) Check the demand and future scope of that topic to utilize it for research or startup.
4) Check the feasibility of research considering technology, timeline, available resources.
5) Propose novel approach to deal with the future scope mentioned in the paper.
6) Check plagiarism and quality of contents.
7) Prepare a presentation and documentation of your seminar.

Exam

Parameter	**Marks**
Novelty	10
Understanding of Mathematical Model	05
Presentation Skills	05
Publication or Demonstration	05

PROJECT STAGE - I

Teaching Scheme	Examination Scheme	Credit Allotted
Practical : 02 Hrs/Week	Oral and Term Work : 50 Marks	Term Work : 04

Course Objectives:

1) To apply concepts mathematics and basic science while doing literature survey.
2) To plan the project by assigning tasks per user.
3) To coordinate the project with project partners.

Course Prerequisites:

Students should have knowledge of

1) Logic used in programming language.
2) Basic concepts of database.

Course Outcome:

Students will be able to:

1) Identify the problem in the existing system.
2) Learn various approaches to deal with problem.
3) Decide best solution for optimization to solve the problem.
4) Learn management of project.
5) Propose novel approach to solve a problem.
6) Apply skills that they have acquired.

Guidelines for the project:

1) Prepare plan by following standards of project planning.
2) Select domain by using quality research papers like IEEE, Springer, Elsevier, ACM.
3) Analyze every approach by doing literature survey (preferably transaction journal of current year).

4) Identify the problem in the existing system.

5) Design solution by using mathematical model and prove it hypothetically.

6) Check the feasibility for implementation.

7) Select tools and technologies suitable for the implementation.

8) Prepare presentation, report and research paper on literature survey (To be submitted in IEEE transaction for critical analysis and uniqueness in contents and approaches).

Examination

Parameter	**Marks**
Selection of problem for betterment of a life	2.5
Analysis of Literature survey	05
Finalizing problem statement	2.5
Design of project plan	05
Mathematical Modeling	05
Review of paper by publishing agency – like IEEE, Springer, ACM, Elsevier, EOS, Scopus Indexed journals only	05

INDUSTRIAL TRAINING

Examination Scheme	Credit Allotted
Oral and Term Work: 50 Marks	Term Work: 03

Course Objectives:

1) To apply industry standards and technologies.
2) To learn to be good team player to coordinate tasks assigned at industry during the training.

Course Prerequisites:

Students should have knowledge of

Knowledge of Programming, Database Management, Software Engineering.

Course Outcome:

Students will be able to:

1) Learn to implement knowledge gained.
2) Learn to be a good team player.
3) Understand of work culture at industry.
4) Design efficient tools and techniques.
5) Apply the techniques and tools learnt.
6) Bridge the gap between industry and institute.

Guidelines for the Industrial Training:

1) Submit acceptance letter issued from organization before undergoing for the training.
2) Undergo for industrial training for 45 days in industries preferably government organization and NASSCOM listed organizations.
3) Apply the techniques and tools learnt during the curriculum.
4) Understand the new technologies for accomplishing the tasks.
5) Prepare Presentation and Reports based on the work completed at industry.
6) Maintain Log book and prepare day to day activity chart and get it authorized by concerned person from industry.
7) Work sincerely to grab opportunities for sponsored projects as well as job.

Exam

Parameter	Marks
Presentation	10
Log Book	10
Demonstration of skills acquired	05

WEB ENGINEERING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory :2Hrs/Week	End Semester Examination :60Marks	Theory:03
Tutorial : 1Hr/Week	Internal Assessment :40Marks	Term Work:01
Practical : 2Hrs/Week	Practical and Term Work:50Marks	

Course Objectives:

1) Learn web application architectures.
2) Learn to model web applications.
3) Understand testing techniques for web applications.

Course Prerequisites:

Students should have knowledge of

1) Basic concepts of Software engineering.
2) Basic concepts of HTML,XML,CSS.

Course Outcome:

Students will be able to:

1) Understand categories and characteristics of web applications.
2) Understand client and server side technologies.
3) Understand Web Application Architectures.
4) Designmodel for Web Applications.
5) DesignvariousWeb Applications.
6) Test various Web Applications.

UNIT-I Introduction to web engineering: (06 Hours)

Motivation, Evolution and need for web engineering, Categories of web applications, Characteristics of web applications: Product related, Usage related, Development related.

Requirements Engineering Introduction, Fundamentals, Requirements engineering activities, Requirements engineering specifics in web engineering, Adapting requirements engineering methods to web application development, Principles for requirements engineering of web applications, Requirement types, Tools.

UNIT-II Technologies for Web Applications: (06 Hours)

Client Side Technologies:HTML, HTML basic concepts, Static and Dynamic HTML, DHTML, XML, XSL,JavaScript.Server Side Technologies:Servelet, URI handlers, Middlewares, Web services.

UNIT-III Web Application Architectures: (06 Hours)

Introduction, Specifics of web application architecture, Layered architectures(2-layer,N-layer),Database centric architectures, Data aspect architectures, Architectures for web document management, Components of generic web application architecture.

UNIT-IV Modeling Web Applications: (06 Hours)

Introduction, Modeling specifics in web applications, Modeling requirements, Hypertext modeling, Content modeling, Access modeling concepts, Customization modeling, Presentation modeling

UNIT-V Web Application Design: (06 Hours)

Web design from an evolutionary perspective, Software design, Information design, Problems in integrated web design, Presentation design, Device independent development, Interaction design, Navigation design, Designing link internals, Functional design.

UNIT-VI Testing Web Applications: (06 Hours)

Objectives of testing, Levels of testing, Test approaches, Test schemes, Test methods and techniques, Test automation, Test driven development, Test tools, Advantages and Disadvantages of automated test.

Web Project Management:

Understanding scope, defining framework activities, Web team building, Risk management, Schedule development, Quality management, Change management, Project tracking

Assignment List:

1) Explain evolution and need of web engineering
2) Describe requirement engineering methods for web application development
3) Explain in detail client side technologies for web applications
4) Explain in detail server side technologies for web applications
5) Describe various web application architectures
6) Explain in detail components of generic web application architecture
7) Explain various modeling techniques of web applications.
8) Describe various designing methods of web applications
9) Study of latest testing techniques of web applications
10) A case study on designing and testing websites

Term Work Assignment List:

1) A case study on any static websites like wikipedia, college websites, etc
2) A case study on any dynamic websites like E-commerce, social networking sites,etc
3) Design a client-side form validation webpage using javascript
4) Create a web application for student database
5) Design and develop IT department website
6) Design and develop E-commerce website
7) A case study on methodology, techniques and tools used in designing websites
8) A case study on latest testing techniques of web applications
9) Create a mini project using html, css and javascript
10) Test mini project using any testing methodology

Text Books:

1) Roger S.Pressman,DavidLowe,"Web Engineering",TataMcGraw Hill Publication,2007
2) GertiKappel, Birgit Proll, "Web Engineering", John Wiley and Sons Ltd, 2006
3) GertiKappel, Birgit Proll, Siegried Reich, Werner Retschitzegger,"Web Engineering: The Discipline of Systematic Development of Web Applications",Wiley,2006

Reference Books:

1) "Web Engineering: A Practitioner's Approach"Roger Pressman and David Lowe, McGraw-Hill, 2009.
2) Moller, "An Introduction to XML and Web Technologies" , Pearson Education New Delhi, 2009
3) "Web Engineering: Principles and Techniques",Woojong Suh,Idea Group Inc.,2005
4) "Web Engineering:Managing Diversity and complexity of web application development",Springer,2001

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

COMPONENT ENGINEERING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 02 Hrs/Week	End Semester Examination : 60 Marks	Theory : 03
Practical : 02 Hrs/Week	Internal Assessment : 40 Marks	Term Work : 01
Tutorial : 01 Hr/Week	Oral and Term Work : 50 Marks	

Course Objectives:

1) To learnevolution of distributed computing.
2) To provide students with fundamental knowledge needed to design and implement object-oriented client-server applications.
3) To understand the object models
4) To design a framework to bridge the gap. In this framework, inter-component communication is separated from the components and handled by ports and links which deal with infrastructure level middleware and protocols, including CORBA

Course Prerequisites:

Students should have knowledge of

1) Object Oriented Programming.
2) Distributed System.
3) Java Programming and Applications.

Course Outcome:

Students will be able to:

1) Learn objectifying enterprise system.
2) Understand the component architecture.
3) Use CORBA Technology and the Java™ Platform Standard Edition.
4) Learn the issues regarding the designing of distributed objects.
5) Understand Object Reuse.
6) Analyze Java component technologies.

UNIT-I Object Technology: (06 Hours)

A typical OO system, Object Oriented concepts, Advantages of the client model, integrating object technology with Enterprise systems: Objectifying individual Modules, Objectifying Conventional Architecture model, Using OO language in an OO architecture Model, Objectifying enterprise system.

UNIT-II Component Technology: (06 Hours)

Component concepts, characteristics Of components, component and Objects, Modules, callbacks, fundamental properties of Component technology ,component Architecture, Interfaces – specification, Component Models objects, components and middleware ,Components and Object-Oriented Implementations, Bridging the Gap: Framework and Composition

UNIT-III CORBA Component Technologies: (06 Hours)

Introduction to Java and CORBA,Object Request Broker,System object model,CORBA's Objective and design criteria CORBA services-overview, information management services Model driven architecture

UNIT-IV Distributed Object Technology: (06 Hours)

Evolution Of Distributed Systems, Characteristics of Distributed Systems, Study of Distributed Objects, Characteristics of distributed Objects, Methods in distribution, Issues in designing of distributed objects, Need of multitier architecture, Evolution of multitier Architecture

UNIT-V Interfaces in COM and DCOM: (06 Hours)

Introduction to COM, OLE/ActiveX, DCOM and .NET,Introduction to interfaces, Interface definition Language,(IDL), COM – interface and versioning and object reuse COM services: Dispatch interface, connectable objects

UNIT-VI Java Based Component Models: (06 Hours)

Introduction to Java Component Technologies EJB and Java Bean, Threads Introduction, Threads-state transition diagram, example

Enterprise Java Beans: EJB architecture, Enterprise JavaBeans and JavaBeans.

Types of Beans : Session beans- Stateful and stateless session beans, Entity beans and Message driven beans Distributed Object Model : Introduction RMI,RMI Architecture ,RMI Service.

Assignments List:

1) Implement polynomial as an object in C++.
2) Create an RMI Application.
3) Explain CORBA component model.
4) Explain information management services.
5) Sketch simple components and define their interface.
6) Explain of evolution of multitier Architecture.
7) Discuss interfaces in COM and DCOM.
8) Write simple banking application program using CORBA IDL.
9) Write java component technologies EJB and Java Bean.
10) Create a Java Bean connecting to Google API.

Term Work Assignments List:

1) Describe Integrating object technology with Enterprise systems.
2) Explain the software architecture in object oriented programming.
3) Enlist and describe characteristics of components.
4) Explain object request broker.
5) Elaborate Evolution of Distributed Systems.
6) What is the Need of multitier architecture? Elaborate evolution of multitier Architecture.
7) Describe Interfaces in COM and DCOM.
8) Describe Component Technologies EJB and Java Bean.
9) Describe Enterprise Java Beans.
10) Describe RMI Architecture and RMI Service.

Text Books:

1) G. Sudha Sadasivam," Component Based Technology", Wiley India Edition
2) Paul Allen, Stuart Frost, "Component-Based Development for Enterprise Systems: Applying the SELECT Enterprise ", Cambridge University Press
3) Clemens Szyperski, "Component Software: Beyond Object-Oriented Programming", Pearson Education publishers, 2003

Reference Books:

1) Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
2) Mowbray, "Inside CORBA", Pearson Education, 2003.
3) Freeze, "Visual Basic Development Guide for COM & COM+", BPB Publication, 2001.
4) Hortsamann, Cornell, "CORE JAVA Vol-II" Sun Press, 2002.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

MOBILE COMPUTING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 02 Hrs/Week	End Semester Examination: 60 Marks	Theory : 03
Tutorial : 01 Hr/Week	Internal Assessment : 40 Marks	

Course Objectives:

1) To study wireless network for clear understanding of Mobile Network.
2) To understand important terms of data communication required for mobile computing.
3) To apply knowledge of mobile computing for understanding of applications on operating systems used for mobile.

Course Prerequisites:

Students should have knowledge of

1) Operating system.
2) Network communication.

Course Outcome:

Students will be able to:

1) Understand mobile network.
2) Learn mobile communication technologies.
3) Understand GSM.
4) Analyze OS used in Mobile.
5) Design application on Android platform.
6) Design application on ios platform.

UNIT-I Introduction to Mobile Computing: (06 Hours)

Introduction to wireless Network, Concept of Mobile Computing, principles of Mobile

Computing, usage of MAC in Mobile computing, types of Sharing of wireless channels: FDMA, TDMA, CDMA. MAC layer, issues in wireless communication.

UNIT-II Mobile Network: (06 Hours)

Introduction to IP, static and dynamic IP, usage of TCP/IP for communication, IPV6, acknowledgment, wireless network: allocation of channel, interferences, concept of handoffs and management of location, LAN, PAN, Bluetooth, ZigBee

UNIT-III Architecture of GSM: (06 Hours)

GSM Architectures, Radio Interfaces, PLMN Interface, Protocols Localization, Calling, SMS service, Modulation, Multiplexing, controlling the medium access, spread spectrum, methods of coding, CDMA, IMT 2000, WCDMA and CDMA 2000, 4G Networks, introduction to 5G, concept of GPRS.

UNIT-IV Mobile Data communication: (06 Hours)

Communication Asymmetry, classic cation of data delivery mechanism, data dissemination Broadcast models, selective tuning and indexing techniques, synchronization, synchronization software for mobile devices, synchronization protocols.

UNIT-V Mobile Operating System: (06 Hours)

Functions of operating system in mobile, Concept of kernel, interfacing between O.S. used in mobile and hardware, Mobile Computing Environment, protocols used, security in mobile operating system.

UNIT-VI Mobile Application Development: (06 Hours)

Android App development, Android SDK, publishing play store, ios app development, Windows phone app development, publicizing and monetization of App.

Assignment List:

1) Draw and explain wireless architecture.
2) Explain mobile communication in detail.
3) Explain different layers in mobile network.
4) Explain synchronization protocol.
5) Explain MANET in detail.
6) Explain characteristics of mobile OS.
7) Write a complete process of GSM tracking of a mobile.
8) Case study on mobile agents.
9) Implement login system using android sdk.
10) Implement login system using ios.

Text Books:

1) Jochen Schiller, "Mobile communications", Addison wisely, Pearson Education
2) Dr. Sunil kumar S. Manavi, Mahabaleshwar S. Kakkasageri, Wireless and Mobile Networks, concepts and protocols, Wiley, India.

Reference Books:

1) T. Rappaport, "Wireless Communication: Principles and Practice", Pearson Education.
2) Reza B'Far (Ed), "Mobile Computing Principles", Cambridge University Press.
3) AndrewTanenbaum, Modern Operating System, 3rd/e, Pearson Education International, ISBN Q-lB- lBMST-L.
4) Digital Content: iOS Technology Overview: IOSTechOverview.pdf, Apple Inc. Copyright 2014.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

DISTRIBUTED COMPUTING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 2 Hrs/Week	End Semester Examination : 60 Marks	Theory : 03
Tutorial : 1 Hr/Week	Internal Assessment : 40 Marks	

Course Objectives:

The course is aimed to provide an understanding of key concepts underlying the function of distributed computing systems along with issues in its design and implementation.

Course Prerequisites:

Students should have knowledge of

1) Fundamentals of Data Structures, Operating Systems, Networking concepts.

Course Outcome:

Students will be able to:

1) Understand the fundamentals of distributed computing environment.
2) Implement inter process communication.
3) Learn of process and threads and implement threads.
4) Understand the concepts of clock synchronization and distributed transaction.
5) Learn distributed file system and distributed shared memory.
6) Understand the concepts of distributed system security.

UNIT-I Fundamentals: (06 Hours)

Definition and evolution of Distributed Computing System, Models and Types of Distributed Computing Systems, Issues and Goals in designing Distributed System, Distributed Computing Environment, Peer to peer systems and its middleware, Routing overlays, Mobile and Ubiquitous computing.

UNIT-II Communication: (06 Hours)

Interprocess communication (IPC): Introduction and need Message Passing system: Desirable features of good message passing system, Issues in IPC, Group and multicast communication, Remote Procedure Calls (RPC): The RPC Model, Implementation of RPC mechanisms (Stubs and marshalling) Java RMI: Architecture, Implementation (Stubs and Skeletons) Web services and SOAP.

UNIT-III Processes and Threads: (06 Hours)

Process Migration: Introduction, Features, Mechanisms, Advantages, use in heterogeneous systems. Threads: Concept, Motivation, Models, Issues, Synchronization, Scheduling, Implementing.

UNIT-IV Synchronization and Distributed Transactions: (06 Hours)

Clock synchronization: Drifting, Issues, Algorithms, Event Ordering Deadlock: Conditions, Modeling, Handling, Avoidance, Prevention, Detection, Election Algorithms Distributed Transaction: Introduction, Locks, Optimistic Concurrency Control, Timestamp Ordering

UNIT-V Distributed File system and Distributed Shared memory: (06 Hours)

Distributed Files Systems: Advantages, Features, Models, Caching, Replication, Fault Tolerance Distributed Shared Memory: Architecture, Design and Implementation Issues, Advantages, Granularity, Structure of Shared Space, Consistency Models, Replacement Strategy, Thrashing

UNIT-VI Distributed System Security: (06 Hours)

Distributed System Security: Goals, Design Principles, Attacks, Confinement Problem, Cryptography, Authentication, Access control, Digital Signatures.

Assignment List:

1) Study the details of IPC mechanism used by Sun RPC for DCE

2) Implement Java RMI client and server programs using stub and skeleton.

3) Elaborate the life cycle of process and threads.
4) Implement Threads in java and explain each step of its life cycle.
5) Compare the various algorithms available for clock synchronization.
6) Study any one journal paper which has proposed/ implemented any new mechanism for concurrency control.
7) Case study of Open Software Foundation's distributed file service.
8) Study of any one journal paper which has implemented/ proposed any one meachnism related to any issue of distributed shared memory.
9) Consider any one security mechanism you know and discuss how it achieves the goals and design principles of distributed system security.
10) Study any real-time security attack and propose alternate strategies that could have been used to counteract those.

Text Books:

1) Pradeep K. Sinha, "Distributed Operating Systems: Concepts and Design", Wiley-IEEE Press.
2) Andrew S. Tanenbaum, Maarten van Steen, "Distributed Systems: Principles and Paradigms", Prentice Hall India Learning Private Limited, Second edition
3) George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, "Distributed Systems: Concepts and Design", Pearson Education India; 5th edition

Reference Books:

1) Ajay D. Kshemkalyani, Mukesh Singhal, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press- South Asian edition
2) Abraham Silberschatz, Peter B. Galvin, Greg Gagne , "Operating System Concepts", Wiley, 8th Edition
3) Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson, 2nd edition
4) Cay Horstmann and Gary Cornell, Core Java, Volume II - Advanced Features, Prentice Hall, 7 edition.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE-IV : 1) ADVANCE TCP/IP

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 2 Hrs/ Week	End Semester Examination : 60 Marks	Theory : 02
	Internal Assessment : 40 Marks	

Course Objectives:

The course is headed for afford theoretical and practical understanding regarding the TCP/IP networking. Concepts similar to multiplexing, switching, addressing, naming, quality of service, routing, flow and congestion control are explored all the way through their implementation in TCP/IP protocol suite.

Course Prerequisites:

Students should have knowledge of

1) A preliminary TCP/IP course or else has equivalent knowledge.
2) TCP/IP and it's configuration in addition to a operational knowledge of LAN plus WAN networking.
3) An admiration of the TCP/IP suit of protocols in addition to protocol stacks.

Course Outcome:

Students will be able to:

1) Enumerate layers of the OSI model as well as TCP/IP.
2) Describe the functioning of Internet Protocol.
3) Demonstration IP Address of allocation methods.
4) Understand and building the skills of routing mechanisms and sub netting.
5) Explain the Transmission Control Protocol concepts.
6) Understandthe basic structure of IP Version 6.

UNIT-I Introduction: (06 Hours)

History of TCP/IP :The Internet, TCP/IP Architecture, The TCP/IP Suite. Standards Bodies – ISO, Open System Interconnection. ISO- OSI 7 - layer model, Layered Protocols Model, TCP/IPwithProtocol Encapsulation.

UNIT-II Internet Protocol (IP): (06 Hours)

What is Internet Protocol, IPv4 Address Classes, Classful IPv4 Address Ranges, Internet Protocol Addressing, Multicast Addresses, IPv4 Reserved Addresses.IPv4 Address Assignment, IPv4 Private Network Addressing, Internet Protocol Routing, The IPv4 Header, Protocol Numbers, IP Fragmentation.

IP Precedence (Type Of Service),Differentiated Services – DiffServ, Per Hop Behavior (PHB), Commonly Used DSCP's.

UNIT-III Address Resolutionand Address Allocation (06 Hours)

Address Allocation :

Dynamic IP Address Allocation – RARP, BOOTP, BOOTP Message format, Operations. Dynamic IP Address Allocation – DHCP, The DHCP Server, DHCP Address Acquisition States, DHCP Operations, DHCP Relay, Windows DHCP Commands.

Address Resolution:

Address Resolution Protocol (ARP), Default Gateway, Connecting Hosts – Similar Network, Connecting Hosts – Dissimilar Network, ARP Message Format, Network Protocol Analyzers.

UNIT-IV Internet Protocol Routing: (06 Hours)

Introduction to Routers and Routing,Structure of a Basic Router,Types of Routing - Static Routing, Dynamic Routing, Distance-Vector, Link State, Hop Count, Metrics and Costs. Routing Protocols, Protocols of Dynamic Routing, Protocol Comparison. The Default Route.

UNIT-V Host to Host Communication and IP Address Translation: (06 Hours)

Transmission Control Protocol (TCP) Concepts, Simple Reliability, TCP Segment, Port Numbers (TCP), Connection Set-up (TCP), Connection Closure (TCP),Protocol of Sliding Windows, User Datagram Protocol (UDP), UDP Segment, UDP vs. TCP.

IP Address Translation :

Network Address Translation, Configuring NAT, Port Address Translation with NAT, Dynamic NAT with Port Address Translation.

UNIT-VI IP Version 6: (06 Hours)

Introduction: What is IPv6? , Comparison of IPv4 VS IPv6, IPv6 Header. Address Representation, Address Types of IPv6, UnicastIPv6, AnycastIPv6, IPv6 extension headers. DNS enhancements for IPv6.

Assignment List:

1) Define following 1) Talk 2) Echo 3) Ping Network Commands.

2) Describe (RCE) Remote Command Execution.

3) Discuss simulating of ARP /RARP.

4) Relate how HTTP used for web page upload as well as Download.

5) Define TCP module Implementation. (TCP services).

6) Define how File Transfer within client-server architecture by subsequent methods.

(a) TCP/IP (b) USING RS232C.

7) Illustrate Remote Method Invocation (RMI).

8) Explain IPv6 with header format.

9) Outline Case study regarding the different routing algorithms to choose the network path by its best possible and economical during data transfer. • Shortest path routing• Flooding • Distance vector.

10) Write Case study of building a firewall for BVDUCOEP campus network.

Text Books:

1) Dougles E.Comer, “Internetworking with TCP/IP–Principles, Protocols & Architecture”, Pearson education, 4th Edition, 2000.
2) Behrouz A. Forouzam, TCP/IP Protocol Suite, Tata McGraw Hill, 4th Edition 2010.

Reference Books:

1) Douglas E.Comer, Internetworking with TCP/IP, 5th Edition Pearson Education Asia 2005.
2) Behrouz Forouzan, “TCP/IP protocol suite”,Tata Mc Grawhill, Fourth Edition,2012.
3) Richard Stevens, — TCP/IP Illustrated, Vol 1,2,3 Pearson education India, 1st edition,2001.
4) Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE IV: 2) GENETIC ALGORITHM

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 2 Hrs/Week	End Semester Examination : 60 Marks	Theory :02
	Internal Assessment : 40 Marks	

Course Objectives:

1) Learn basics of Evolutionary Computation and Genetic Algorithm.
2) Understandterminologies and operators of GA.
3) Understand Advanced operators and techniques in Genetic Algorithm.
4) classify of GA Algorithms.
5) Implement Genetic Programming.
6) Understand practical approach of Genetic Algorithm Optimization Problems.

Course Prerequisites:

Students should have knowledge of

1) A programming language.
2) Linear algebra, probability and calculus.

Course Outcome:

Students will be able to:

1) Analyze the concept of evolutionary computation.
2) Understand the basic concepts of genetic algorithms.
3) Understand the result of applying various genetic operators.
4) Develop GA problem using different GA operators.
5) Understand about the way GA is used and the domain of application.
6) Develop a different application using GA Optimization problem.

UNIT-I Evolutionary Computation and Introduction to Genetic Algorithms:(06 Hours)

Introduction to Evolutionary Computation, Historical Development of EC, Features of Evolutionary Computation, Applications of Evolutionary Computation, Introduction to Genetic Algorithm: Biological Background, What is Genetic Algorithm? Conventional Optimization and Search, A Simple Genetic Algorithm, Comparison of Genetic Algorithm with Other Optimization Techniques, Advantages and Limitations of Genetic Algorithm, Applications of Genetic Algorithm. Theoretical Analysis of Evolutionary Algorithms: Schema theorems, convergence of the algorithms, computational time complexity of the algorithms, no free lunch theorem, Evolutionary applications to medicine and public health, Applications of evolutionary biology for veterinarians.

UNIT-II Terminologies and Operators of GA: (06 Hours)

Introduction, Key Elements, Genes, Populations, Data, Search Strategies, Encoding, Breeding, Search Termination (Convergence Criteria), Why do Genetic Algorithms Work?, Solution Evaluation , Search Refinement, Constraints, Fitness Scaling, Example Problems: Maximizing a function, Travelling Salesman Problem.

UNIT-III Advanced Operators and Techniques in Genetic Algorithm: (06 Hours)

Introduction, Diploidy, Dominance and Abeyance, Multiploid, Inversion and Reordering, Niche and Speciation, Few Micro-operator, Non-binary Representation, Multi-Objective Optimization, Combinatorial Optimizations, Knowledge Based Techniques.

UNIT-IV Classification of Genetic Algorithm: (06 Hours)

Introduction, Simple Genetic Algorithm (SGA), Parallel and Distributed Genetic Algorithm (PGA and DGA), Hybrid Genetic Algorithm (HGA), Adaptive Genetic Algorithm(AGA), Fast Messy Genetic Algorithm (Fm GA), Independent Sampling Genetic Algorithm(ISGA).

UNIT-V Genetic Programming: (06 Hours)

Introduction, Comparison of GP with Other Approaches, Primitives of Genetic Programming, Attributes in Genetic Programming, Steps of Genetic Programming, Characteristics of Genetic Programming, Application of Genetic Programming, Haploid Genetic Programming with Dominance.

UNIT-VI Genetic Algorithm Optimization Problems: (06 Hours)

Introduction, Fuzzy Optimization Problems: Fuzzy Multi objective Optimization, Interactive Fuzzy Optimization Method, Genetic Fuzzy Systems. Multi objective Reliability Design: Network Reliability Design, Bicriteria Reliability Design. Combinational Optimization problem: Linear Integral Model, Applications of Combinatorial Optimization Methods. Scheduling Problems: Genetic Algorithm for Job Shop Scheduling Problems (JSSP). Transportation Problems: Genetic Algorithm in Solving Transportation, Location-Allocation Problems with Euclidean Distances. Network Design and Routing Problems: Planning of Passive Optical Networks, Planning of Packet Switched Networks, Optimal Topological Design of All Terminal Networks, Learning with Genetic Fuzzy Systems: An Application, Pittsburgh Approach

Assignment List:

1) Define Evolutionary computation? State three fundamental features of biological evolutionary computation.
2) Explain difference between Genetic algorithm and Genetic Programming. Describe how evolutionary computation is applied to engineering applications.
3) Give a suitable example for the Genetic Algorithm principle "Survival of the fittest".
4) What is Search space? Describe various conventional optimization and search techniques.
5) How genetic algorithms work? Explain the building block hypothesis and schema theorem.
6) Find the safe light combinations for 8 traffic lights, four of which are vehicle lights having four possible colors (red, yellow/red, yellow and green) and the other four pedestrian lights having only two colors (red and green).

7) Describe the various knowledge-based techniques that improve the efficiency of simple genetic algorithm.

8) Implement Travelling Salesman Problem using advanced operators and techniques.

9) Discuss the operations involved in the Fast messy Genetic Algorithm.

10) Build a C program to implement simple genetic algorithm for a multi objective optimization problem.

11) Discuss the crossover and mutation operation of GP. Explain with suitable examples, the characteristics of GP.

12) Write a computer program to implement GP for a function optimization problem.

Text Books:

1) Mitchell Melanie, "An Introduction to Genetic Algorithms", MIT publications.

2) S.Rajasekaran, G.A.Vijayalakshmi Pai, " Neural Networks, Fuzzy Logic and Genetic Algorithms ", PHI.

Reference Books:

1) S.N.Sivanandam, S.N.Deepa, "Introduction to Genetic Algorithms", Springer Publications.

2) David A, "An Introduction to Genetic Algorithms for Scientists and Engineers", World Scientific Publishing.

3) David E. Gold Berg, "Genetic Algorithms in Search, Optimization & Machine Learning", Pearson Education.

4) L. D. Davis, Evolutionary algorithms, Springer-Verlag, 1999.

5) K. Deb, Multi-Objective Optimization Using Evolutionary Algorithms, Wiley and Sons, 2009.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE-IV :3) NETWORK SECURITY AND CRYPTOGRAPHY

Teaching Scheme	Examination Scheme	Credit Allotted
Theory:02 Hrs/Week	End Semester Examination:60 Marks	Theory:02
	Internal Assessment : 40Marks	

Course Objectives:

1) To know the main beliefs of encryption algorithms, public key cryptography.
2) To Depth knowledge regarding authentication.
3) To understand the application level security mechanisms.
4) To be familiar with the network security tools in addition to applications.

Course Prerequisites:

Students should have knowledge of

1) Computer Networks & Security associated issues.
2) Some understanding of linear algebra as well as statistics.

Course Outcome:

Students will be able to:

1) Recognize the methods of conventional encryption.
2) Understand the concepts of number theory and public key encryption.
3) Learn Hash functions and authentication.
4) Understand stream cipher models and various block cipher.
5) Learn the system level security used.
6) Distinguish the network security tools along with applications.

UNIT-I Introduction to Mathematical Foundation: (06 Hours)

Introduction to Security trends, Attacks along with services, Classical Crypto systems, Types of ciphers – LFSR sequences. Overview on Modern Cryptography.

Finite Fields and Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclids algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermats and Eulers theorem-Testing for primality. The Chinese remainder theorem- Discrete logarithms.

UNIT-II Network Security Model: (06 Hours)

The OSI security architecture, Network security Model, Model for CNSS Security, Access and Information Security, Approaches toward Information Security Implementation, The Security Systems Development Life Cycle. Model for Symmetric cipher, techniques of Substitution, Techniques of Transposition, Rotor machines, Steganography, Simplified DES, Principles of Block cipher.

UNIT-III Public Key Cryptography&Block Ciphers: (06 Hours)

Data Encryption Standard (DES) – Principals of Block cipher, Modes of operation for Block cipher. Advanced Encryption Standard (AES), Triple DES, Algorithm forBlowfish-RC5. Public key cryptography: Public key cryptosystemsPrinciple's, The RSA algorithm, Key management, Diffie Hellman Key exchange, Elliptic curve cryptography, Elliptic curve arithmetic, Other attacks on RSA and Semantic Security of RSA. Primarily test, Cayley Purser algorithm, Factoring Technique, Probabilistic public key encryption.

UNIT-IV Hash Functions and Authentication: (06 Hours)

Requirements of Authentication,Functionsof Authentication. Message Authentication Codes (MAC) - Hash Functions,Security of hash function and MAC, MD5, SHA, HMAC, CMAC, RIPEMD. Digital signature: Protocols for Authentication, Digital Signature Standard (DSA), Digital signatures -RSA, SecureID, ElGamal, DSA Quantum Cryptography-Okamoto to Uchiyama cryptosystem.

UNIT-V System Security and Security Practice: (06 Hours)

Introduction to Applications for Authentication, Kerberos – X.509 Authentication services, Internet Firewalls for Trusted System: Roles of Firewalls, Terminology related to Firewall. Types of Firewalls,Secure Electronic Transaction (SET) for E-Commerce Transactions.

Intruder: Intrusion detection system, Virus furthermore related threats, Countermeasures, Principle's of Firewalls design. Trusted systems – Realistic implementation of cryptography along with security.

UNIT-VI Network Security: (06 Hours)

Introduction to Security Services intended for E-mail-attacks possible through E-mail, Establishing privacy of keys, source authentication, Integrity of Message -Non-Repudiation-Pretty Good Privacy (PGP), S/MIME.

Internet Protocol (IP) Security: Abstract of IPSec, IPv4 and IPv6, Authentication Header, Encapsulation Security Payload (ESP), Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding).

Web Security: SSL/TLS Essential Protocol-computing the keys, authentication of client, PKI as deployed by SSL Attacks fixed in v3.

Assignment List:

1) Explain Port Scanning via virtual network environment accessible through a VPN connection.
2) Extend Network Intrusion Detection via virtual network environment accessible throughout a VPN connection.
4) Describe Public Key Security Experimenting with RSA, Encryption as well as Decryption.
5) Explain Host - Based Intrusion Detection with virtual network environment accessible through a VPN connection.
6) SummarizeMan-in-the-Middle Attackswithexample.
7) DefineRemote buffer overflow attack.
8) Explain Logic-based Authentication and Authorization.
9) State Android security auditing with Genymotion virtual machine and Burp Suite proxy.
10) Illustrate Capturing and monitoring android network traffic.

Text Books:

1) Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2) William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.
3) Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007.

Reference Books:

1) Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.
2) Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
3) Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
4) Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
5) Man, Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV, V and VI

ELECTIVE: 4)SEMANTIC WEB MINING

Teaching Scheme	Examination Scheme	Credit Allotted
Theory : 02 Hrs/Week	End Semester Examination : 60 Marks	Theory: 02
	Internal Assessment : 40 Marks	

Course Objectives:

1) Understand a detailed overview of the data mining process and techniques, specifically those that are relevant to Web mining.
2) Understand the basics of Information retrieval and Web search with special emphasis on web crawling.
3) Apply the use of machine learning approaches for Web Content Mining.
4) Understand the role of hyper links in web structure mining.
5) Learn the various aspects of web usage mining.

Course Prerequisites:

Students should have knowledge of

1) Concepts of data mining.
2) Concepts of Web Technology/Web Engineering.

Course Outcome:

Students will be able to:

1) Build a sample search engine using available open source tools.
2) Identify the different components of a web page that can be used for mining.
3) Apply machine learning concepts to web content mining.
4) Implement Page Ranking algorithm and modify the algorithm for mining information.
5) Design a system to harvest information available on the web to build recommender systems.
6) Analyze social media data using appropriate data/web mining techniques and modify an existing search engine to make it personalized.

UNIT-I Introduction: (06 Hours)

Introduction – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval Models-Relevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming. The Syntactic and the Semantic Web, Logics of the Semantic Web. The world of the semantic web-WWW-Meta data-Search engine-Search engine for traditional web-Semantic web-Search engine for semantic web-Traditional web to semantic web.

UNIT-II Semantic Web Technology : (06 Hours)

RDF,- Elements of RDF, Basic Syntax and Fundamental rules of RDF-Aggregation-Distributed information-RDFS-core elements of RDFS-Ontology-Taxonomy -Inferencing based on RDF schema. OWL: OWL syntax, OWL and RDF semantics, OWL document, Using OWL to define classes-Set operators-Enumerations-Define propertiesontologymatching-Three faces of OWL-Validate OWL.

Swoogle : FOAF-Semantic markup-Issues-prototype system-Design of Semanticweb search engine-Discovery and indexation-prototype system-case study.

UNIT-III Web Content Mining & Semantic Web Services; (06 Hours)

Web Content Mining – Supervised Learning – Decision tree - Naïve Bayesian Text Classification -Support Vector Machines - Ensemble of Classifiers. Unsupervised Learning - K-means Clustering -

Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-BasedClustering - Evaluating Classification and Clustering – Vector Space Model – Latent semanticIndexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification. Introduction to web services- SOA, Limitations of web services. Semantic web services-OWL-S-Upper ontology-WSDL-S,OWL-S to UDDImapping, Design of the search engine, implementations.

UNIT-IV Web Link Mining : (06 Hours)

Link mining, common link mining tasks, link-based object ranking Web Link Mining – Hyperlink based Ranking – Introduction -Social Networks Analysis- Co-Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search - Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A Basic Crawler Algorithm- Implementation Issues- Universal Crawlers- Focused Crawlers- Topical Crawlers- Evaluation - Crawler Ethics and Conflicts - New Developments

UNIT-V Structured Data Extraction: (06 Hours)

Structured Data Extraction: Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning •- Automatic Wrapper Generation: Problems - String Matching and Tree Matching - Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages- Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analyzing Web Social Networks.

UNIT-VI Web Usage Mining & Semantic Web Applications: (06 Hours)

Web Usage Mining - Click stream Analysis -Web Server Log Files - Data Collection and Pre-Processing - Cleaning and Filtering- Data Modeling for Web Usage Mining - The BIRCH Clustering Algorithm -Affinity Analysis and the A Priori Algorithm – Binning. Discovery and Analysis of Web Usage Patterns – Modeling user interests – Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering- Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models . Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics,Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services,Semantic Search Technology, Web Search Agents and Semantic Methods.

Assignment List:

1) Discuss the Meta-Search and Web Spamming concepts in detail.
2) Determine the location of a resource with the help of ontologies and reasoning using router.

3) What are various steps in designing a search engine? Take a case study of designing your own search engine.

4) Design a crawler program to list out the URL's on the page, modify the program for again crawl those founded URL's to find more URL's using High speed computer (Hint : call the crawl_site function to crawl a URL.).

5) Write a Script/ program to perform Analysis of User's Browsing Behavior and Their Categorization Using Markov Chain Model.

6) What are various applications of semantic web? What are web search agents? Explain in detail.

Text Books:

1) Bing Liu, " Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-Centric Systems and Applications)", Springer; 2nd Edition 2009.

2) GuandongXu ,Yanchun Zhang, Lin Li, "Web Mining and Social Networking: Techniques and Applications", Springer; 1st Edition.2010.

3) "Thinking on the Web" - Berners Lee, Godel and Turing, Wiley inter science, 2008.

4) "Social Networks and the Semantic Web", Peter Mika, Springer, 2007.

Reference Books:

1) Zdravko Markov, Daniel T. Larose, "Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usage", John Wiley & Sons, Inc., 2007.

2) SoumenChakrabarti, "Mining the Web: Discovering Knowledge from Hypertext Data", Morgan Kaufmann; edition 2002.

3) Adam Schenker, "Graph-Theoretic Techniques for Web Content Mining", World Scientific Pub Co Inc , 2005.

4) Min Song, Yi Fang and Brook Wu, "Handbook of research on Text and Web mining technologies", IGI global, information Science Reference – imprint of :IGI publishing, 2008.

Syllabus for Unit Test:

Unit Test -1	Unit I,II and III
Unit Test -2	Unit IV,V and VI

ITL-V

Teaching Scheme	Examination Scheme	Credit Allotted
Practical :02 Hrs/Week	Practical and Term Work: 50 Marks	Term Work:01

Course Objectives:

1) Understand emerging Web technologies concepts and tools.
2) Understand client side and server side scripting languages and validation techniques.
3) Learn database access technologies and state management techniques.
4) Develop real life Web applications using ASP.NET and PHP.

Course Prerequisites:

Students should have knowledge of

1) Knowledge of programming language C, C++.
2) Knowledge of application development tool.

Course Outcome:

Students will be able to:

1) Design web applications using ASP.NET.
2) Use ASP.NET controls in web applications.
3) Implement ASP.NET web applications.
4) Design database driven ASP.NET web applications and web services.
5) Implement Object handling using Collections and Generics.
6) Implement Database Connectivity using LINQ and ADO.NET.

UNIT-I Introduction of .NET: (06 Hours)

Evolution of .NET, Benefits of .NET framework, Introduction to Visual Studio, Introducing C#, Namespaces, Classes, Objects and Struts, Object-Oriented Programming, Pointers, Delegates and Events

UNIT-II Data Access with ADO.NET and Working with LINQ: (06 Hours)

Understanding Databases, Understanding SQL, Understanding ADO.NET,Data Reader, Creating Command Object, Working with DataAdapter,

Defining LINQ Queries, Exploring standard Query Operators, Introducing LINQ to Objects, Introducing LINQ to ADO.NET

UNIT-III Collections and Generics: (06 Hours)

System.Collections.Concurrent namespace, SortedSet<T> class, Understanding Collections, Collection classes in .NET, Understanding Generics, Generic Collection Classes in .NET, Creating your own Generic Classes

UNIT-IV Threading: (06 Hours)

The Thread Class, Difference between Processes and Threads, Working with Thread, Multithreading, Thread Priorities, Thread States, Thread Synchronization, Joining Threads

UNIT-V Web Applications: (06 Hours)

Developing a Web Application, Application Structure and State, Web Forms: Standard Controls, Navigation Controls: Tree View, Menu and Site Map Path, Validation Controls, Introducing Web Parts Controls, Working with Database Controls.

UNIT-VI Managing Web Applications: (06 Hours)

Managing Web Applications: The ASP.NET Configuration File, The process model Configuration, Configuring ASP.NET Applications in IIS Working with Login Controls: The Login Control, The LoginView Control, The Login Status Control, The LoginName Control, Working with User Profiles: Understanding ProfileProvider Class, Creating Authenticated Profiles, Creating Custom Profile Provider

Assignment List:

1) Accepting and validating user entered data using ASP.NET.
2) Accepting and validating book catalog information using validating controls.

3) Write a program to demonstrate session management in ASP.Net.
4) Display database contents from SQL server or Oracle database using SQL Command class from ASP.NET.
5) Display parameterized data using SQLDataReader and GridView in ASP.NET.
6) Database access using DataSet in ASP.NET.
7) Displaying data using DataView in ASP.NET.
8) Write a program to read, add, update and delete record from database using ADO.Net control SqlDataSource.
9) Create a login page in your web application. Login page musthave user name and password fields. If user enters correct ID,Password, he must be redirected to the homepage of yourwebsite.
10) Create a webpage, that allows user to add a new username ifuser doesn't exist in the database. Also, create a forgotpassword link, to redirect user to set up his new password on authentication.

Text Books:

1) .NET 4.5 Programming 6-in-1, Black Book, Kogent Learning Solutions Inc.

Reference Books:

1) ASP.NET 4.5, Covers C# and VB Codes, Black Book; Kogent Learning Solutions Inc.
2) C# 2012 Programming Black Book Covers .NET 4.5; Kogent Learning Solutions Inc.
3) Professional ASP.NET 4.5 in C# and VB; Jason N. Gaylord, Christian Wenz, Pranav Rastogi, Todd Miranda, Scott Hanselman, Scott Hunter; Web Platform Team, Microsoft
4) Beginning ASP.NET for Visual Studio 2015 Paperback – 18 Apr 2016 by William Penberthy

PROJECT STAGE - II

Teaching Scheme	Examination Scheme	Credit Allotted
Practical : 04 Hrs/Week	Oral and Term Work : 50 Marks	Term Work : 08
	Practical and Term Work : 50 Marks	

Course Objectives:

1) To choose the hardware, software needed accordingto the proposed in the design.
2) To check the quality of work and adherence to the requirements by rigorous testing.
3) To implement requirements mentioned in the design.

Course Prerequisites:

Students should have knowledge of

1) Platform, programming languages.
2) Hardware, drivers and tools required at various phases of SDLC.

Course Outcome:

Students will be able to:

1) Implement solution for the given problem.
2) Learn various ways to tackle the new problem faced during the development of project.
3) Implement the code to minimize time and space required by setting new benchmarks.
4) Coordinate with project mates to solve the problem.
5) Apply integration of software and/or hardware components, APIs, modules.
6) Apply concepts learn in Seminar, In-plant training, Project Stage –I to effectively implement the project.

Guidelines for the project

1) Divide the work according to the plan.
2) Focus on the solution to excel the research or startup in respective domain.
3) Apply deadline, quality checks for every phase of project development.
4) Identify novel component to draft patent and copyright accordingly.
5) Present the implementation work in research journals and conferences.
6) Target to prepare a research proposal to acquire a grant for the institute.

Exam

Parameter	**Marks**
Implementation of project according to the work and quality.	10
Validation of Results	10
Contribution in terms of novelty	10
Comments received from journals like IEEE, Springer, Elsevier, ACM, WOS and Scopus indexed journals.	10
Patent, copyright, Application for grant.	10

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standards of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

   OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50% Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.50 ≤ CGPA ≤ 10.00	0	Outstanding	80 ≤ Marks ≤ 100
9.00 ≤ CGPA ≤ 9.49	A+	Excellent	70 ≤ Marks ≤ 80
8.00 ≤ CGPA ≤ 8.99	A	Very Good	60 ≤ Marks ≤ 70
7.00 ≤ CGPA ≤ 7.99	B+	Good	55 ≤ Marks ≤ 60
6.00 ≤ CGPA ≤ 6.99	B	Average	50 ≤ Marks ≤ 55
5.00 ≤ CGPA ≤ 5.99	C	Satisfactory	40 ≤ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40