1. Approval of structure for B.Tech (Electronics & Tele-communication) effective from A.Y.2021-22 Semester – I & II

B.Tech (Electronics & Tele-communication) Semester –I & II

- Linear Algebra and Calculus
- Physics for Electronics Engineering
- Electrical Technology
- Elementary Electronics
- 'C' Programming
- MATLAB Fundamentals
- Differential Equations and Complex Analysis
- Chemistry of Electronic Materials
- Digital Electronics
- Semiconductor Devices and Circuits-I
- Python Programming
- Computer Aided Drafting

Resolution:

The structure for the courses at B.Tech (Electronics &Tele-Communication) SemI & Sem II were discussed & finalized as per choice based credit system structure. The same is forwarded to Faculty of Engineering & Technology for consideration.

2. Approval of structure for B.Tech (Electronics & Tele-communication) effective from A.Y.2021-22 Semester –III & IV.

B.Tech (Electronics & Tele-communication) Semester –III & IV

- Advanced Mathematics-for Electronics
- Semiconductor Devices and Circuits-II
- Signals and Linear Systems
- Network Analysis and Synthesis
- Database Management Systems*
- EDA Tool Practices
- PCB Design and Soldering

- Vocational Course - I: Networking
- MOOC-I
- Environmental Studies***(Mandatory Audit Course)
- Control Systems and Application
- Integrated Circuits and Applications
- Electromagnetics and Transmission Lines
- Analog Communication
- Data Science**
- Advanced Computer Programming
- Sensor Modelling and Simulation Laboratory
- Vocational Course-II Calibration and repair of lab equipments
- Social Activities-I
- Disaster Management***(Mandatory Audit Course)

*Industry taught course-I
**Industry taught course-II
***100 marks end semester exam

Resolution:

The structure for the courses at B.Tech (Electronics &Tele-Communication) Sem III & Sem IV were discussed & finalized as per choice based credit system structure. The same is forwarded to Faculty of Engineering & Technology for consideration.

3. Approval of structure for B.Tech (Electronics & Tele-communication) effective from A.Y.2021-22 Semester –V&VI.

B.Tech (Electronics &Tele-Communication) Semester –V & VI

- Embedded systems
- Digital Communication System
- Power Electronics
- Microwave and Antenna

- Data Communication and Networking*
- Microcontroller Programming
- Project-I-Stage –I
- Vocational course III: PLC
- MOOC- II
- Photonics
- Quantitative techniques, Communication and Values
- Digital Signal Processing
- CMOS Design
- Internet of Things**
- VHDL
- Project-I- Stage-II
- Vocational 4: Web App development
- *** Internship

*Industry taught course-III
**Industry taught course-IV

Resolution:

The structure for the courses at B.Tech (Electronics &Tele-Communication) Sem V&VI were discussed & finalized as per choice based credit system structure. The same is forwarded to Faculty of Engineering & Technology for consideration.

4.Approval of structure for B.Tech (Electronics & Tele-communication) effective from A.Y.2021-22 Semester –VII&VIII.

B.Tech (Electronics &Tele-Communication) Semester –VII& VIII

- Soft Computing
- Radio Frequency Engineering
- Elective- I
- Industrial Wireless Sensor Network*

- Project II-Stage I
- Electronic Product Design
- Research paper publication
- MOOC-III
- Mobile Communication
- Satellite Communication & Radar
- Elective II
- Cyber security**
- Cloud Computing
- Project –II-Stage-II
- Social Activities-II

Professional Elective-I i) Telecom Network Management ii) Advanced Embedded System Design iii) Image processing

Professional Elective-II i) Software Defined Radio ii) Automotive Electronics iii) Computer Vision

*Industry taught course-V
**Industry taught course-VI

Resolution:

The structure for the courses at B.Tech (Electronics &Tele-Communication) Sem VII&VIII were discussed & finalized as per choice based credit system structure. The same is forwarded to Faculty of Engineering & Technology for consideration.

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – I (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW& OR**	**TW& PR**	**Total**	**L**	**P TW/OR/PR**	**T**	**Total**
1	Linear Algebra and Calculus	03	00	01	60	40	00	00	00	100	03	00	01	04
2	Physics for Electronics Engineering	03	02	00	60	40	50	00	00	150	03	01	00	04
3	Electrical Technology	04	02	00	60	40	50	00	00	150	04	01	00	05
4	Elementary Electronics	04	02	00	60	40	00	50	00	150	04	01	00	05
5	‘C’ Programming	04	02	00	60	40	50	00	00	150	04	01	00	05
6	MATLAB Fundamentals	00	04	00	00	00	50	00	00	50	00	02	00	02
	Total	18	12	01	300	200	200	50	00	750	18	06	01	25

Bharati Vidyapeeth (Deemed to be) University, Pune.
Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – II (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW & OR**	**TW& PR**	**Total**	**L**	**P** **TW/OR/PR**	**T**	**Total**
7	Differential Equations and Complex Analysis	03	00	01	60	40	00	00	00	100	03	00	01	04
8	Chemistry of Electronic Materials	03	02	00	60	40	50	00	00	150	03	01	00	04
9	Digital Electronics	04	02	00	60	40	00	50	00	150	04	01	00	05
10	Semiconductor Devices and Circuits-I	04	02	00	60	40	00	00	50	150	04	01	00	05
11	Python Programming	04	02	00	60	40	50	00	00	150	04	01	00	05
12	Computer Aided Drafting	00	04	00	00	00	50	00	00	50	00	02	00	02
	Total	18	12	01	300	200	150	50	50	750	18	06	01	25

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – III (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW & OR**	**TW& PR**	**Total**	**L**	**P TW/OR/PR**	**T**	**Total**
13	Advanced Mathematics- for Electronics	03	00	01	60	40	00	00	00	100	03	00	01	04
14	Semiconductor Devices and Circuits-II	04	02	00	60	40	00	00	50	150	04	01	00	05
15	Signals and Linear Systems	04	02	00	60	40	25	00	00	125	04	01	00	05
16	Network Analysis and Synthesis	04	02	00	60	40	00	00	50	150	04	01	00	05
17	Database Management Systems*	03	02	00	60	40	25	00	00	125	03	01	00	04
18	EDA Tool Practices	00	02	00	00	00	50	00	00	50	00	01	00	01
19	PCB Design and Soldering	00	04	00	00	00	00	50	00	50	00	02	00	02
20	Vocational Course - I: Networking	00	00	00	00	00	00	50	00	50	00	02	00	02
21	MOOC-I	00	00	00	00	00	00	00	00	00	00	00	00	02
22	Environmental Studies** (Mandatory Audit Course)	00	00	00	00	00	00	00	00	00	00	00	00	00
	Total	18	14	01	300	200	100	100	100	800	18	09	01	30

*Industry taught course-I

**100 marks end semester exam

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – IV (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW& OR**	**TW& PR**	**Total**	**L**	**P TW/OR/ PR**	**T**	**Total**
23	Control Systems and Application	04	02	00	60	40	25	00	00	125	04	01	00	05
24	Integrated Circuits and Applications	04	02	00	60	40	00	00	50	150	04	01	00	05
25	Electromagnetics and Transmission Lines	03	00	01	60	40	00	00	00	100	03	00	01	04
26	Analog Communication	04	02	00	60	40	00	50	00	150	04	01	00	05
27	Data Science*	03	02	00	60	40	25	00	00	125	03	01	00	04
28	Advanced Computer Programming	00	04	00	00	00	00	50	00	50	00	02	00	02
29	Sensor Modelling and Simulation Laboratory	00	02	00	00	00	00	50	00	50	00	01	00	01
30	Vocational Course-II Calibration and repair of lab equipments	00	00	00	00	00	00	50	00	50	00	02	00	02
31	Social Activities-I	00	00	00	00	00	00	00	00	00	00	00	00	02
32	Disaster Management** (Mandatory Audit Course)	00	00	00	00	00	00	00	00	00	00	00	00	00
	Total	18	14	01	300	200	50	200	50	800	18	09	01	30

*Industry taught course-II

**100 marks end semester exam

Bharati Vidyapeeth (Deemed to be) University, Pune.

Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – V (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW & OR**	**TW & PR**	**Total**	**L**	**P** **TW/OR/ PR**	**T**	**Total**
33	Embedded systems	03	02	00	60	40	00	50	00	150	03	01	00	04
34	Digital Communication System	03	02	00	60	40	25	00	00	125	03	01	00	04
35	Power Electronics	03	02	00	60	40	25	00	00	125	03	01	00	04
36	Microwave and Antenna	04	02	00	60	40	00	50	00	150	04	01	00	05
37	Data Communication and Networking *	03	00	00	60	40	00	00	00	100	03	00	00	03
38	Microcontroller Programming	00	04	00	00	00	00	00	50	50	00	02	00	02
39	Project-I Stage –I	00	02	00	00	00	00	100	00	100	00	04	00	04
40	Vocational course III: PLC	00	00	00	00	00	00	50	00	50	00	02	00	02
41	MOOC- II	00	00	00	00	00	00	00	00	00	00	00	00	02
	Total	16	14	00	300	200	50	250	50	850	16	12	00	30

*Industry taught course-III

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – VI (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW & OR**	**TW & PR**	**Total**	**L**	**P** **TW/OR/PR**	**T**	**Total**
42	Photonics	04	02	00	60	40	25	00	00	125	04	01	00	05
43	Quantitative techniques, Communication and Values	02	02	00	60	40	00	00	00	100	03	00	00	03
44	Digital Signal Processing	03	02	00	60	40	25	00	00	125	03	01	00	04
45	CMOS Design	04	02	00	60	40	00	50	00	150	04	01	00	05
46	Internet of Things*	03	00	00	60	40	00	00	00	100	03	00	00	03
47	VHDL	00	02	00	00	00	00	00	50	50	00	01	00	01
48	Project-I Stage-II	00	02	00	00	00	00	100	00	100	00	04	00	04
49	*Vocational 4: Web App development	00	00	00	00	00	00	50	00	50	00	02	00	02
50	*** Internship	00	00	00	00	00	00	50	00	50	00	03	00	03
	Total	16	12	00	300	200	50	250	50	850	17	13	00	30

*Industry taught course-IV

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – VII (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW& OR**	**TW & PR**	**Total**	**L**	**P** **TW/OR/PR**	**T**	**Total**
51	Soft Computing	04	02	00	60	40	00	00	50	150	04	01	00	05
52	Radio Frequency Engineering	04	00	01	60	40	00	00	00	100	04	00	01	05
53	Elective- I	04	02	00	60	40	00	50	00	150	04	01	00	05
54	Industrial Wireless Sensor Network*	04	02	00	60	40	00	50	00	150	04	01	00	05
55	Project II Stage I	00	04	00	00	00	00	200	00	200	00	04	00	04
56	Electronic Product Design	00	04	00	00	00	00	100	00	100	00	02	00	02
57	Research paper publication	00	00	00	00	00	00	00	00	00	00	00	00	02
58	MOOC-III	00	00	00	00	00	00	00	00	00	00	00	00	02
	Total	16	14	01	240	160	00	400	50	850	16	09	01	30

Elective-I

1) Telecom Network Management
2) Advanced Embedded System Design
3) Image processing

*Industry taught course-V

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

	Programme:B.Tech (E &Tc) Sem – VIII (2021 Course)												
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**		
		L	**P**	**T**	**UE**	**IA**	**TW**	**TW & OR**	**TW & PR**	**Total**	**L**	**P** / **TW/OR/PR**	**T**	**Total**
59	Mobile Communication	04	02	00	60	40	00	50	00	150	04	01	00	05
60	Satellite Communication & Radar	04	02	00	60	40	00	00	50	150	04	01	00	05
61	Elective II	04	02	00	60	40	00	50	00	150	04	01	00	05
62	Cyber security*	04	00	01	60	40	00	00	00	100	04	00	01	05
63	Cloud Computing	00	04	00	00	00	00	100	00	100	00	02	00	02
64	Project -II Stage-II	00	04	00	00	00	00	200	00	200	00	06	00	06
65	Social Activities-II	00	00	00	00	00	00	00	00	00	00	00	00	02
	Total	**16**	**14**	01	240	160	00	400	50	850	**16**	11	**01**	**30**

Elective-II

1) Software Defined Radio
2) Automotive Electronics
3) Computer Vision

*Industry taught course-VI

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - LINEAR ALGEBRA and CALCULUS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites: Class XII Mathematics

Course Objectives:

1.	To teach the differential calculus.
2.	To teach linear algebra and linear transformation.
3.	To introduce ordinary differential equations.

Course Outcomes: After learning this course students will be able to

1	Evaluate the matrices and its application to the system of linear equations.
2	Evaluate vector spaces and linear transformation
3	Solve numerical problems involving differential calculus.
4	Compute maxima, minima, and multiple integrals.
5	Evaluate the theorems in integral Calculus.

6	Use the methods of first order and first-degree differential equation.	
UNIT – I	**Linear algebra: Matrices**	**(06 Hours)**
	Algebra of Matrices, System of Linear Equations, Linear Dependence and Independence, rank, row operations and Gauss elimination, Applications to systems of linear equations, Cayley – Hamilton Theorem	
UNIT – II	**Vector space and Linear Transformations**	**(06 Hours)**
	Vector spaces, subspaces, Eigen values and Eigen Vectors and their basic properties, Linear and Orthogonal Transformations, rank -nullity theorem, Existence and Uniqueness Theorem for Linear Systems, product spaces, Gram-Schmidt process, Diagonalization	
UNIT - III	**Differential Calculus**	**(06 Hours)**
	Limits of sequences and functions, continuity, uniform continuity and differentiability, Mean value theorems, L' Hospital's Rule. Euler's Theorem on Homogeneous Functions. Taylor's theorem with proof, Partial derivatives, Chain rule.	
UNIT -IV	**Maxima and Minima for several**	**(06 Hours)**
	Maxima, minima, saddle points. gradient, directional derivatives, Lagrange multipliers, Exact differentials, Errors, and approximations. Repeated and multiple integrals applications to volume, surface area, moments of inertia, etc.	

UNIT -V	**Integral Calculus**	**(06 Hours)**
	Riemann integral and the fundamental theorem of integral calculus, Rolle's theorem, Applications to length, area, volume, surface area of revolution. Moments, centers of mass and gravity.	
UNIT -VI	**Ordinary differential equation**	**(06 Hours)**
	Ordinary differential equations of the 1st order, exactness and integrating factors,applications of first order and first-degree differential equation in orthogonal trajectories and electrical circuits. Picard's iteration method.	

Topics for projets based learning*
1. Cramer’s rule
2. System of linear equations solution
3. Rank of matrix
4. Gauss elimination
5. LU-decomposition method
6. Dimension and basis
7. Gram Schmidt Orthogonalization
8. rank -nullity theorem
9. Euler's Theorem on Homogeneous Functions
10. Maxima and minima for two variable function
11. Eigen values and Eigen vectors
12. Multiple integrals applications
13. Formation of differential equation
14. Linear differential equation
15. Kirchhoff’s voltage law
*Students in a group of 3 to 4 shall complete any one project from the above list

Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics(VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S.Grewal
5.HigherEngineeringMathematicsbyB.V.Ramana
6.AdvancedEngineeringMathematics

Bharati Vidyapeeth
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College of Engineering, Pune

B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - PHYSICS FOR ELECTRONICS ENGINEERING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 04

Course Pre-requisites:	
	Basic Physics and Calculus.

Course Objectives:	
	To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the Electronics and Telecommunication.

Course Outcomes:	
After learning this course students will be able to	
1	Demonstrate the knowledge of properties of charged particles and their use in modern instruments
2	Solve the quantum physics problemsat micro level phenomena.
3	Explain mechanical properties of solid matter and connect to applications in the field of engineering.
4	Demonstrate the working of PN junctions in semiconductor devices under various conditions.

5	Demonstrate the wave nature of light and apply it to measure stress, pressure and dimension.	
6	Analyze the problems associated with architectural acoustics and give their remedies.	
UNIT – I	**Modern Physics**	**(06 Hours)**
	Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focusing, Electron microscope, Wavelength and resolution, Specimen limitation, Depth of field and focus, TEM, SEM and EDS, Separation of isotopes by Bainbridge mass spectrograph, CRT.	
UNIT – II	**Quantum mechanics**	**(06 Hours)**
	Dual nature of matter, concept of wave packet, group and phase velocity and relation between them, Physical significance of wave function, Schrodinger's time dependent and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, Applications of Schrodinger's Equation: Infinite Potential Well and the Potential Barrier.	
UNIT - III	**Solid state Electronics-I**	**(06 Hours)**
	Superconductors, properties, Meissner effect, Type I and Type II superconductors, BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation. Formation of Energy Bands, E-k Diagram, Origin of band gap, Energy bands in solids, Effective mass of electron, Fermi-Dirac Distribution, Conductivity in conductor and semi-conductors.	

UNIT -IV	**Solid State Electronics-II**	**(06 Hours)**
	Review of intrinsic and Extrinsic semiconductors, The no and po equations, Drift and Diffusion Currents, Regeneration process, Recombination Process, Derivation of Current Continuity Equation, Position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Minority Carrier injection and recombination in Homogeneous Semiconductor, p-n junction formation, Band structure of p-n junction diode under forward and reverse biasing, Junction Capacitance, Photovoltaic effect, Solar cell and its characteristics.	
UNIT -V	**Interference, Diffraction and Polarization**	**(06 Hours)**
	Interference: Interference due to thin film of uniform thickness, engineering applications of interference (optical flatness, non-reflecting coatings). **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. **Polarization**: Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism	
UNIT -VI	**Acoustics**	**(06 Hours)**
	Elementary Acoustics, reverberation and reverberation time, Sabine's formula, pressure and intensity level, different types of noise and their remedies, Electro Acoustic transducers	

	(piezoelectric transducers, electrostatic transducer, magnetic transducer, magneto strictive transducer), Types of Microphones, Loudspeaker, stereophony, sound recording and Sound reinforcement systems.	

Lab Experiment :(Any Eight of the Following)

1. Study of Lissajous figure by Cathode Ray Oscilloscope (CRO)
2. Determination of e/m by Thomson method.
3. Plotting the hysteresis loop for given magnetic material.
4. To study Hall effect and determine the Hall voltage.
5. Calculation of conductivity by four probe methods.
6. Study of solar cell characteristics and calculation of fill factor.
7. Determination of band gap of semiconductor.
8. Determination of radius of Plano convex lens/wavelength of light/Flatness testing by Newton's rings
9. Determination of wavelength of light using diffraction grating.
10. Determination of resolving power of telescope.
11. Determination of thickness of a thin wire by air wedge.
12. Determination of refractive index for O-ray and E-ray.
13. To determine the velocity of sound.
14. Measurement of average SPL across spherical wavefront and behavior with the distance.
15. Expansion chamber muffler: investigation of muffler response as a filter in the low frequency approximation by determining insertion loss.
16. Interference of sound using PC speakers.

Assignments

Six assignments to be given by the subject teacher (Theory)-one from each unit/one mini project with report-students can work in group of 4 Maximum

Topics for projets based learning*

1. Design and simulation of automatic solar powered time regulated water pumping

2. Solar technology: an alternative source of energy for national development
3. Comparison of various method used in measuring the gravitational constant g
4. Possible effects of electromagnetic fields (emf) on human health
5. The design and construction of the hearing aid device
6. Design and construction of digital distance measuring instrument
7. Design and construction of automatic bell ringer
8. Design and construction of sound or clap activated alarm
9. Electronic eye (Laser Security) as autoswitch/security system
10. Electric power generation by road power
11. Wireless power transfer
12. Determination of velocity of O-ray and E-ray in different double refracting materials
13. Quantum confinement effect in wide band semiconductors
14. Tesla Coil
15. LiFi- wireless data transfer system using light
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
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, John Wiley 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)

Bharati Vidyapeeth
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B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - ELECTRICAL TECHNOLOGY**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits :04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credits: 5

Course Pre-requisites:	
	Physics and Mathematics

Course Objectives:	
1.	To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2.	To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3.	To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits
4.	To provide knowledge of Electrical Measurement technique and Electrical Safety Practices.

Course Outcomes: After learning this course students will be able to	
1	Calculate the circuit parameters using dc network theorems.
2	Demonstrate the knowledge of various parameters related to magnetic circuit and single-phase ac circuits.
3	Classify the various parameters of 3-phase AC circuits and apply the concepts of single-phase transformer.

4	Demonstrate the knowledge of various power generation and transmission techniques.	
5	Explain the Construction and working principle of DC and AC machines.	
6	Apply the various measurement techniques of circuit parameters and safety norms.	
UNIT – I	**DC Circuit Analysis and Network Theorems:**	**(08 Hours)**
	Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation. Kirchhoff's laws; loop and nodal methods of analysis; star-delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem (simple numerical problems).	
UNIT – II	**Magnetic Circuit and Single-Phase AC Circuits**	**(08 Hours)**
	Magnetic Circuit: 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 **Single Phase AC Circuits:** AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally 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, quality factor (simple numerical problems	
UNIT - III	**Three Phase AC Circuits:**	**(08 Hours)**
	Three Phase AC Circuits: 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 (Simple derivations), three-phase power and its measurement (simple numerical problems). **Single Phase Transformer:** Principle of operation, construction, e.m. f. equation, equivalent	

	circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer. Three phase transformer and its different winding connections	
UNIT -IV	**Power Generation and Power System**	**(08 Hours)**
	Power Generation: Power Generation techniques using conventional (Hydro, Thermal, nuclear, Gas) & non-conventional resources (Solar, Wind, biogas). **Introduction to Power System:** General layout of electrical power system and functions of its elements, standard transmission, and distribution voltages, layout. Concept of grid (elementary treatment only)	
	DC Machines and AC Machines	**(08 Hours)**
	DC Machines: Principle**s** of electromechanical energy conversion, DC machines: types, Construction & working, e. m. f. equation of generator and torque equation of motor, speed control, characteristics and applications of dc motors (simple numerical problems). **AC Machines:** Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Induction Motor: Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only	
UNIT -VI	**Electrical Measurement technique**	**(08 Hours)**
	Electrical Measurement technique: Electrical instruments such as wattmeter, energy meter, tong-tester, megger, and power analyzer. Measurement of circuit parameters like resistance, inductance and capacitance using DC and AC bridges. **Electrical Safety Practises:**Electric shock, precautions against shock, First aid for electric shock other hazards of electrical laboratories & safety rules, Objectives of Earthing, types of earthing;	

	pipe and plate earthing, Residual current circuit breaker (RCCB).	

Term Work:

1. Find the current in the given network using Super position Theorem
2. Find the current in the given network using Thevenin's and Notton's Theorem
3. To Plot the B-H characteristics for a magnetic material
4. To find the voltage and current relationships in R-L series, R-C series, R-L-C series circuit
5. To find the voltage and current relationships in R-L-C series resonance circuit.
6. Verification of voltage and current relationships in star and delta connected 3-phase networks
7. To find efficiency and regulation of single-phase transformer
8. To control the speed of DC shunt motor using fulx control and armature voltage control method.
9. To control the speed of DC shunt motor using fulx control and armature voltage control method.
10. Find the unknown resistance using Kelvin's double bridge.
11. Find the unknown inductance using Anderson's bridge.
12. Measurement of power and energy in single phase ac circuit.

Note: The term work shall be the record of minimum eight experiments performed from the above list.

Topics for projets based learning*

1.Design a small circuit for superposition theorem.
2. Design small circuit to study Thevenin's Theorem.
3. Design Small circuit to study Norton's Theorem.
4. Design small circuit to study R-C series circuit.
5. Design small circuit to study R-L series circuit.
6. Design small circuit to study R-L-C series circuit.
7. Design of Tesla Coil.
8. Design small two winding transformer.
9. Design small electromagnet.
10. Design a small doorbell.

11. Design of wireless power transmission.
12. Design of electric buzzer.
13. Design of small wind farm.
14. Design of small solar power plant.
15. Design of small galvanometer.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text-books:
1. Electrical Technology - Edward Huges (Pearson
1. Basic Electrical Engineering - D. P. Kothari, J Nagarath (TMC)
2. Electrical power system technology - S. W. Fordo, D. R. Patric (Prentice Hall)
Reference Books:
1. Principles of Electronics-Dr. H. M. Rai (Satya Prakashan)
2. Electronic Devices and Circuit Theory- R. L. Boylestad and L. Nashelsky (PHI)
3. Electrical, Electronics Measurements and Instruments - (SatyaPrakashan)
4. Principles of Communication Engineering - Anokh Singh, A. K. Chhabra (S Chand)
5. Electrical Technology - Volume I & volume – II by B L Theraja and AK Theraja*(S Chand)*

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B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - ELEMENTRY ELECTRONICS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 05

Course Pre-requisites:	
	Physics, Chemistry, Mathematics (Class XII)

Course Objectives:	
1.	To teach the construction, working, ratings and application of passive devices like resistors, capacitors, inductors, transformers, and relays
2.	To introduce types of Voltage and current sources
3.	To teach the construction, working and ratings of devices like PNjunction diode, Schottky diode, Zener diode, bipolar junction transistor
4.	To teach the construction, working and ratings of field effect transistor and MOSFET
5.	To teach the construction, working and ratings of optoelectronic devices like LDR, LED, phototransistor, and photovoltaic cell
6.	To introduce the concept of grounding and shielding, PCB layout design, PCB fabrication process, with the aid of an EDA tool.

Course Outcomes: After learning this course students will be able to		
1	Classify resistors, capacitors, inductors, and transformer based on their construction, types and ratings and analyze simple circuits consisting of passive devices	
2	Analyze circuits using voltage and current sources	
3	Classifyactive devices based on their types and ratings and plot their characteristic curves	
4	Classifyoptoelectronic devices based on their types and ratings and plot their characteristic curves.	
5	Use the concepts of grounding and shielding while designing PCB, explain the PCB design and fabrication and assembly process	
6	Use EDA tools for designing single sided PCB for simple circuits	
UNIT – I	**Passive Electronic Components**	**(08 Hours)**
	Introduction to the concept of active and passive electronic devices, Types of resistors, construction, ratings and typical applications, Types of capacitors, construction, ratings and typical applications, Types of inductors, construction, ratings and typical applications, Types of transformers, construction, ratings and typical applications, Construction of relays, types and ratings, Analysis of series and parallel resistors and capacitor circuits	
UNIT – II	**Sources**	**(08 Hours)**
	Types of voltage and current sources (AC and DC), Concept of ideal and non-ideal voltage source, Concept of ideal and non-ideal current source, Series and parallel combinations of sources, Loading effect, Dependent voltage and current sources, Electrochemical cells and batteries, Types and characteristics, Regulation concept (Line regulation, load regulation, temperature stability factor)	

UNIT - III	**Diodes and BJT**	**(08 Hours)**
	Classification of material based on band gap theory, Types of semiconductors (p-type and n-type), PN junction diode and its characteristics, Schottky diode, Zener diode, Diode models, Concept of DC and AC load line and ratings of PN junction diode, Introduction to BJT (NPN and PNP) and its construction and working mechanism, BJT configurations and their input and output characteristics, Types and ratings of BJT	
UNIT -IV	**FET and MOSFET**	**(08 Hours)**
	Construction and working mechanism of FET, Input and output characteristics of FET, FET configurations, Ratings of FET, Construction and working of DMOSFET and EMOSFET, Characteristics of DMOSFET and EMOSFET, Configurations and ratings of EMOSFET	
UNIT -V	**Opto-Electronics**	**(08 Hours)**
	Construction and working of LDR and its characteristics, simple application, Construction and working of LED and its characteristics and ratings, Photo-transistor and its characteristics, Introduction to the concept of electrical isolation and its importance, Construction of opto-isolator(opto-coupler) and its ratings, Construction and working of photovoltaic cell and its characteristics and ratings	
UNIT -VI	**PCB (Printed Circuit Board)**	**(08 Hours)**
	Concept of grounding, shielding and its importance, building blocks of PCB (track, pads, fills) and design rules, PCB fabrication and assembly, Introduction to EDA tool for artwork design of a simple single sided PCB Soldering: Types of solder alloys, soldering equipment, specifications of solder alloys	
List of experiments:		

1. Study of resistors, capacitors, and inductors
2. Plot V-I Characteristics of PN Junction Diode
3. Plot V-I Characteristics of Zener Diode
4. Plot Input and Output Characteristics of BJT in CE Configuration
5. Plot Transfer and output characteristics of FET
6. Plot Transfer and output characteristics of EMOSFET
7. Plot characteristics of LDR
8. Plot characteristics of Opto-isolator
9. Study of Relays
Topics for projets based learning*
1.Survey report of types of resistors, capacitors, transformers their form factors, specifications and price
2.Survey report of types of batteries, their form factors, specifications and price
3.Survey report of types of low power relays, their form factors, specifications and price
4.Survey report of types of diodes, BJT, MOSFET, their form factors, specifications and price
5.Build a shunt regulator and measure its line and load regulation
6.Build a full-wave rectifier with capacitor input filter and test it
7.Build a small signal voltage amplifier (BJT) and test it
8.Build a switch using BJT, MOSFET, relay and test it
9.Build a simple day light switch with an LDR, BJT and Relay
10.Build a motion sensor switch
11.Build a fire alarm circuit
12.Implement and test a given circuit on a general purpose PCB

13.Build a simple water level indicator
14.Build a simple temperature indicator
15.Build a LED Light Bulb Circuit
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books/ Reference Books:
1. Passive Components for Circuit Design, Ian Sinclair,1st Edition 2000, ISBN: 9780750649339, Newnes
2Grob's Basic Electronics, Mitchel Schultz,11th Edition,2010, ISBN-13: 978-0-07-351085-9, McGraw Hill
3.Fundamentals of Electronic Devices and Circuits, David A. Bell, 5th Edition,2008, Oxford University Press,
4Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015,Oxford University Press
5.Linden’s Handbook of Batteries, Thomas Reddy,4th Editiion,2010, ISBN: 978-0-07-162419-0, McGraw Hill
6.Printed circuit boards: design, fabrication, assembly and testing, Raghbir Singh Khandpur,2006, ISBN 10:0071464204, McGraw Hill
7. The Circuit Designer’s Companion, Peter Wilson, 4th Edition,2017, ISBN: 978-0-08-101764-7, Newnes

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B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - C PROGRAMMING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:	
	Flow charts
Course Objectives:	
	• A student will gain a thorough understanding of the fundamentals of C programming. • A student will be able to code, compile, and test C programs. • A Student will be able to solve Problems using C language.
Course Outcomes: After learning this course students will be able to	
1	Apply the basic concepts of programming using C language.
2	Write basic programs using conditional statement.
3	Use 2 D Array in programming
4	Create functions and Pass parameters.
5	Construct structures using Pointers.
6	Apply basic concepts of graphics using C language.

UNIT – I	**Introduction Basic of C**	**(08 Hours)**

	Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators Managing input and output operations, Sample programs.	
UNIT – II	**Conditional Statements and Loops**	**(07 Hours)**
	Decision making within a program, conditions, if statement, if-else statement, loops: while loop, do while, for loop. Nested loops, infinite loops, switch statement, sample programs	
UNIT - III	**Arrays & Strings**	
	Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, , Array applications: Matrix Operations.	**(08 Hours)**
UNIT -IV	**Functions & Pointers**	**(07 Hours)**
	Basics, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, , recursive functions, Recursive solutions for Fibonacci series, example c programs. Passing arrays & strings to functions.	
UNIT -V	**Pointers and Structures**	**(10 Hours)**
	Derived types- structures- declaration, definition, and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, bit-fields, program applications. Different types of stacks and queues.	

UNIT -VI	**Basic of Graphics**	**(08 Hours)**
	Introduction, what is computer Graphics? Area of Computer Graphics. Graphics programming, initializing the graphics, C Graphical functions, simple programs	

List of Experiments:

1.
   - Write a C program to take user Input and print it on the screen.
   - Write a C program to perform addition or subtraction of two numbers.
   - Write a C program to find whether the number is Odd or Even.
   - Write a C program to find out Prime numbers.
   - Write a C program to find out Fibonacci series.

2.
   - Write C programs to print different patterns.
   - Write a C program to do factorial using recursion.
   - Write a C program to find out Armstrong number

3.
   - Write a C program to sort the array in Ascending & Descending order.
   - Write C programs to perform operations on 2-D arrays.
   - Write a C program to perform different operations on strings.

4.
   - Use of Pointers
   - Write a C program to swap numbers using pointers.

5. Write a C program to show the use of pointers in arrays.
6. Write a C program to use functions using pointers.
7. Write a C program to create student mark sheet using structures.
8. Write a C program to show the use of structure using pointers.
9. Write a program showing functions of Graphics programming
10. Mini Project.
Topics for projets based learning*
1.Employee Record System Project
2. Build Calculator (GUI Optional)
3. Customer Billing System Project:
4. Medical Store Management System Project
5. Currency Converter (GUI Optional)
6. Modern Periodic Table (GUI Optional)
7. Number System Conversion Project
8. Phone book / Contact Management System
9. 100 Years Calender
10. Hospital Management System Project
11. Customer Billing system
12. Tic Tac Toe Game (GUI Optional)
13. Departmental Store Management.
14. Build Rock , Paper & Scissors Game (GUI Optional)
15. Bank Management System
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Programming in ANSI C – E Balagurusamy (5^{th} Edition-TMH)

2. C Graphics & Projects – By B M Havaldar
Reference Books:
1. Let Us C- Yashwant Kanitkar
2. Computer Graphics – By Hearn & Baker
3. The C Programming Language. 2nd Edition By Brian Kernighan and Dennis Ritchie

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B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: -MATLAB FUNDAMENTALS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 04	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 02
		Total Credit: 02

Course Pre-requisites:	
	Mathematics (Class XII) and Linear Algebra and Calculus
Course Objectives:	
1.	To teach basics of MATLAB software and programming.
2.	To teach the students Vectors, Arrays and Strings in programming
3.	To introduce Conditional Statements, Loops and Functions
4.	To teach the students to perform different operations on Matrices in programming.
5.	To introduce MATLAB Simulink.
6.	To introduce MATLAB GUI.
Course Outcomes: After learning this course students will be able to	
1	Use MATLAB for basic programming.

2	Use Vectors, Arrays and Stringsin programming.
3	Apply knowledge of conditional statements, loops, and functions in programming.
4	Use different operations of Matrices in programming.
5	Design different models using MATLAB Simulink.
6	Design GUI for different applications.

List of experiments:

1. **Introduction to MATLAB**
   a) Basics of MATLAB
2. **Commands, Variables and Operators.**
   a) Write a program to perform arithmetic and logical operations on scalar data.
   b) Write a program to display sine and cos wave of particular amplitude and frequency.
3. **Vectors**
   a) Write a program to find addition, subtraction, multiplication, transpose, and magnitude of given vector.
   b) Write a program to find mean, standard deviation, and variance of given vector.
4. **Conditional Statements and Functions**
   a) Write a program to show use of if-then-else statement and while loop
   b) Write a program to import and export data from .csv file.
5. **Arrays and Strings**
   a) Write a program to display data using string.
   b) Write a program to compare two given arrays or array elements.
6. **Operations on Matrix**

a) Write a program to find transpose, determinant, concatenation, and inverse of given matrix.

b) Write a program to solve given linear equation.

7. GUI

a) To introduce basics of GUI

b) To design GUI for any one of the programs mentioned above.

8. Simulink

a) To introduce basics of Simulink

b) Develop a model to differentiate and integrate sine wave using Simulink.

Text Books:

1. MATLAB for Beginners-A Gentle Approach, Peter I. Kattan, 2010, ResearchGate publication
2. Getting started with MATLAB, RudraPratap, 2010, Oxford university press.

Reference Books:

1. A Guide to MATLAB, Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, 3rd Edition, Cambridge University Press.
2. Introduction to MATLAB for Engineers,WilliamJ.Palm, 3rd Edition, McGraw-Hill Education.

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites:	
	Class XII Mathematics, Linear Algebra and calculus
Course Objectives:	
1.	To introduce ordinary differential equations for higher order.
2.	To introduce partial differential equations.
3.	To introduce complex analysis and conformal mapping.
4.	To teach sequences, series, and series expansion.
5.	To introduce ordinary differential equations for higher order.
6.	To introduce partial differential equations.
Course Outcomes: After learning this course students will be able to	
1	Solve higher differential equations by different methods

2	Solve partial differential equations by different methods
3	Demonstrate the methods of Complex Analysis technique.
4	Implement the Complex Analysis for potential application
5	Demonstrate the knowledge of series and sequences.
6	Solve series expansion problems.

UNIT – I	**Ordinary linear differential equations**	**(06 Hours)**
	Ordinary linear differential equations of nth order, solution of homogeneous and non-homogeneous equations. Operator method. Methods of undetermined coefficients and variation of parameters, Systems of differential equations. Mass spring system.	
UNIT – II	**Partial Differential Equations**	**(06 Hours)**
	Partial differential equations, variable separable method, complementary function and particular integral, initial and boundary value problems (wave equation,1-D and 2-D heat Equation).	
UNIT - III	**Complex Differentiation and Integration**	**(06 Hours)**
	gebra of Complex Number (Polar and exponential form, Power and roots, Regions in a complex plan), Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Singularities, Residues, Poles and Zeros of Analytic Functions, The Residue Theorem	

UNIT -IV	**Conformal mapping**	**(06 Hours)**
	G Geometry of analytic functions: conformal mapping, points linear fractional transformations, conformal mapping for other function. Conformal mappings to potential problems: electrostatic fields, use of conformal mapping: modelling, heat problems, fluid flow, Poisson's Integral formula for potentials, General properties of harmonic functions, uniqueness theorem for the Dirichlet problem.	
UNIT -V	**Sequences and Series**	**(06 Hours)**
	Review of sequences, series and convergence tests, Power Series, Power Series Expansions of Analytic Functions, Taylor Series (Taylor's Theorem with Proof), Laurent series (Laurent's Theorem without Proof), Leibnitz's Theorem, Maclaurin's Series	
UNIT -VI	**Series Expansion**	**(06 Hours)**
	Multiplication, Division, Integration and Differentiation of Power Series, methods for solutions of ordinary differential equations. Legendre equation and Legendre polynomials, Bessel equations and Bessel functions of first and second kind. Orthogonal sets of functions	

Topics for projets based learning*
1. Use MATLAB to formulate and solve types of differential equations - Initial value problems and Delay differential equations
2. Use MATLAB to formulate and solve types of differential equations - Boundary value problems and Partial differential equations
3. Ordinary Differential Equation (ODE) solvers in MATLAB, solve initial value problems with a variety of properties
4. Ordinary Differential Equations EULER methods

5. Ordinary Differential Equations Using built-in function
6. Differential Equations in Python
7. Differential Equations with ODE in Python
8. Partial Differential Equations in Python
9. Solving partial differential equations
10.Complex Line Integration
11. Multi dimentional Conformal mapping
12. Sequences & Series using matlab
13.Sequences and Series -circle packing method
14. An End-to-End Project on Time Series Analysis and Forecasting with Python
15.Time Series Analysis in Python
16.Time Series Classification (with Python)
17.Taylor series with Python
18. Program to print binomial expansion series
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics (VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S. Grewal
5.HigherEngineeringMathematicsbyB.V. Ramana
6.AdvancedEngineeringMathematics

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - Chemistry of Electronic Materials**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW: 50 Marks	Credit: 01
		Total Credit: 04

Course Pre-requisites:

Basic knowledge of chemistry,Electrochemical series, Electrode potential, Primary and secondary cells,Capacitor, insulator, classification, and properties of polymers.

Course Objectives:

- To develop the interest among the students regarding chemistry and their applications in engineering
- To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field.
- The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the field such as E&TC Engineering

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of Electrical Insulating Materials with its applications.
2	Demonstrate the knowledge about Dielectric Strength and Insulation Breakdown for various engineering applications.
3	Apply the knowledge of crystallography to study of crystal structure
4	Apply the knowledge Solid Solutions and Two-Phase Solids.
5	Demonstrate the concept of the battery with its applications
6	Demonstrate the concepts of spectroscopy and thermogravimetry for various engineering applications.

UNIT – I	Electronic Materials 1	**(06 Hours)**
	Electrical Insulating Materials: Introduction - Requirements. Classification based on Substances: Gaseous, Liquid and Solid Insulating Materials. Preparation, Properties and Applications of Ceramic Products: White Wares and Glass - Transformer Oil. Electrical Resistivity: Factors influencing Electrical Resistivity of Materials - Composition, Properties and Applications of High Resistivity Materials: Manganin - Constantan - Molybdenum Disilcide – Nichrome.	
UNIT – II	Electronic Materials 2	**(06 Hours)**
	Dielectric Strength and Insulation Breakdown: Dielectric Strength: Definition, Dielectric Breakdown and Partial Discharges: Gases, Dielectric Breakdown: Liquids, Dielectric Breakdown: Solids, Capacitor Dielectric Materials: Typical Capacitor Constructions, Dielectrics: Comparison. Piezoelectricity, Ferroelectricity, and Pyroelectricity: Piezoelectricity: Quartz Oscillators and Filters,Ferroelectricity, and Pyroelectricity Crystals, Introduction to Compound Semiconductors.	
UNIT - III	Electronic Materials 3	
	The Crystalline State: Types of Crystals, Crystal Directions and Planes, Allotropy and Carbon, Crystalline Defects and Their Significance: Point Defects: Vacancies and Impurities, Line Defects: Edge and Screw Dislocations, Planar Defects: Grain Boundaries, Crystal Surfaces and Surface Properties, Stoichiometry, Nonstoichiometric, and Defect Structures, Single- Crystal Czochralski Growth. Glasses and Amorphous Semiconductors: Glasses and Amorphous Solids, Crystalline and amorphous Silicon.	**(06 Hours)**
UNIT -IV	Phase rule and Polymers	**(06 Hours)**
	Solid Solutions and Two-Phase Solids: Isomorphous Solid Solutions: Isomorphous Alloys, Phase Diagrams: Cu–Ni and Other Isomorphous Alloys, Binary Eutectic Phase Diagrams and Pb–Sn Solders. Polymers, Preparation, Properties and Applications of SF6, Epoxy Resin, Conduction Mechanism, Preparation of Conductive Polymers, Polyacetylene, Poly (P- Phenlylene), Polyhetrocyclic Systems, Polyaniline, Poly (Phenylene Sulphide), Poly (1,6-Heptadiyne),	

	Applications.	
UNIT -V	Electrochemistry	**(06 Hours)**
	Introduction, Acids and Bases, Concept of pH and pOH and Numerical Electrode Potential, Electrochemical Cell, Concentration Cell, Reference Electrodes, Overvoltage, Fuel Cells, Construction and Working of - Acid and Alkaline Storage Battery, Dry Cell, Coin Cell Batteries, Ni-Cd Batteries, Ni-MH Batteries, Li-Ion Batteries, Li-Po Batteries.	
UNIT -VI	Instrumental Methods of Analysis	**(06 Hours)**
	Introduction, Absorption of Radiation, Instrumentation and Applications of UV-Visible Spectrophotometer and IR Spectrophotometer. Thermal Methods of Analysis TGA, DTA, DSC, Sensors: Oxygen and Glucose Sensor.	

Term Work:
1. To measure the absorbance of the sample at different wavelengths.
2. Verification of Beer-Lambert's Law.
3. Determination of Viscosity Average Molecular Weight of Polymer
4. Determination of Viscosity of Organic Solvents
5. To find the tensile strength of polymer.
6. To determine the pH value of given solutions using pH meter.
7. To determine pH of soil
8. To find EMF of the cell.
9. To calculate the Equilibrium constant.
10. To predict the spontaneity of the cell reaction.
11. To learn the specific charge/discharge characteristics of a Lithium- ion (Li- ion) battery through experimental testing of a remote triggered Li- ion Battery.
12. To Prepare Phenol formaldehyde/Urea formaldehyde resin.
13. To study set up of Daniel Cell

Topics for projets based learning*
1. To Prepare and for synthesis of the following polymers, a. Bakelite b. Polystyrene c. Epoxy Resin
2. Synthesis properties and applications of polymer.
3. To Prepare one component system with an example
4. To Prepare two component system with an example 5. How to Make a Battery with Metal, Air, and Saltwater 6. Use a Microbial Fuel Cell to Create Electricity from Waste
7. To Prepare fuel cell
8. To prepare lead acid storage battery. 9. To prepare Oxidic Nanomaterials for High Density Storage in Li-ion Batteries
10 Electrochemical forming is a unique additive manufacturing method which uses electrochemical technologies to manufacture, layer-by-layer, parts of complex geometry.
11. The materials chemistry and electrochemistry of the lithium-air battery
12. . Challenges facing all-solid-state batteries
13. The materials chemistry and electrochemistry of lithium and sodium-ion batteries
14 Electroplating- the principles, how different metals can be used and the practical applications.
15. Electroplating, Metal Polishing, Anodizing, Phosphating Metal Finishing
and Powder Coating Projects
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
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 Text Book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co, 2004
4. Engineering Chemistry (16th Edition) Jain, Jain, Dhanpat Rai Publishing Company, 2013.
5. Chemical sensors and Biosensors, Fundamentals and applications, Florinel Gabriel Banica, Wiley.

6. Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015, ISBN 978–0–19–933913–6,Oxford University Press
Reference Books:
1. Inorganic Chemistry (4th edition), D. F. Shrives and P. W. Atkins, Oxford University, Oxford, 2006.
2. Reactions, Rearrangements and Reagents (4th edition), S. N. Sanyal, Bharti Bhawan (P & D), 2003.
3. Applications of Absorption Spectroscopy of Organic Compounds (4th edition), John R. Dyer, Prentice Hall of India Pvt. Ltd., 1978.

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - DIGITAL ELECTRONICS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW& OR: 50 Marks	Credit:01
		Total Credit: 05

Course Pre-requisites:	
	Fundamentals of Number Systems.

Course Objectives:	
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
5.	To introduce the electronic circuits involved in the making of logic gates

Course Outcomes: After learning this course students will be able to	
1	Demonstrate the knowledge of Digital fundamentals and Boolean algebra.
2	Apply different minimization techniques on Boolean expression and design logic diagram
3	Analyze & design digital combinational circuits such as of multiplexers, demultiplexers, encoder, decoder, and arithmetic circuits

4	Demonstrate the knowledge of operations of basic types of flip-flops & the design of FSM.	
5	Analyze & design digital Sequential circuits such as Shift Registers and Counters	
6	Classify the characteristics of different logic families, PLDs, Semiconductor memories and their applications.	
UNIT – I	**Introduction to Digital Systems**:	**(08 Hours)**
	Introduction to Digital electronics Fundamentals **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, Binary to Excess -3 code conversion and vice versa, ASCII code, EBCIDIC code. **Logic Gates**: Logical Operators, Logic Gates-Basic Gates, Active high and Active low concepts, Universal Gates, and realization of other gates using universal gates, Gate Performance Characteristics and Parameters	
UNIT – II	**Boolean Algebra**:	**(08 Hours)**
	Boolean Expressions and Truth Tables, Rules and laws of Boolean algebra, Demorgan's Theorems, Duality Theorem, Simplification of Boolean functions by Boolean laws, Shannon's Theorem. **Boolean Function minimization Technique**: Introduction: Minterms and sum of minterm form, Maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/variable K-maps, grouping of variables in K-maps, minimize Boolean expression using K-map and obtain K-map from Boolean expression, Quine Mc Cluskey Method	
UNIT - III	**Combinational Logic Design**	
	Introduction to Combinational Circuits, Adders: Half-Adder and Full-Adder, Subtractors-Half and Full Subtractor; Parallel adders: Ripple Carry and Look-Ahead Carry Adders.	**(08 Hours)**

	BCD adder, BCD subtractor, Parity Checker/Generator, Multiplexer, Demultiplexer, Encoder, Priority Encoder; Decoder, BCD to Seven segment Display Decoder, ALU, Code converters, Magnitude comparators	
UNIT -IV	**Sequential Logic Design**	**(08 Hours)**
	Introduction to Sequential Circuits: 1 Bit Memory Cell, Latches: SR latch, Gated latch,Flip-Flops: Types of Flip Flops -RS, T, D, JK, Triggering of Flip Flops, Master-Salve JK Flip flop, Characteristic table of Flip-flop, excitation table of Flip-flop, Study of timing parameters of flip-flop.	
UNIT -V	**Shift Registers and Counters**:	**(08 Hours)**
	Data transmission in shift resister: SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. Counters: synchronous counter and asynchronous counter. **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, Effect of clock skew and clock jitter on synchronous designs (Metastability)	
UNIT -VI	**Logic Families and Memory Technology:**	**(08 Hours)**
	Logic Family: Digital IC specification terminology, Logic families: TTL, CMOS, ECL families, Interfacing of TTL to CMOS & CMOS to TTL. **Programmable logic devices**: Study of PROM, PAL, PLAs. Designing combinational circuits using PLDs. **Semiconductor memories:** Classification and characteristics of memory, different types of RAMs, ROMs and their applications	
List of Practicals to be performed in the laboratory		

1. Study of basic gates using TTL, CMOS: 7432, 4011, 4050, 4070,4071,40106 and Universal Gates.
2. K map-based implementation of combinational logic
3. Design and implementation of Half and Full Adder, Half and Full Subtractor
4. Study of four-bit parallel Adder / Subtractor using IC 7
5. Design and implementation of Code Converters (Binary to Gray, Excess 3 to Binary)
6. Design and implementation of Magnitude Comparator
7. Implementation of combinational logic using MUX
8. Study of Decoder and DEMUX
9. Study of 7 segment decoder driver.
10. Study of Flip Flops (SR FF, D FF, JK FF, T FF)
11. Study of Shift Registers
12. Study of Up-Down Counter and Johnson Counter.
13. Study of Static I/O and transfer Characteristic of TTL
Note: The term work shall be the record of minimum eight experiments performed from the above list
Topics for projets based learning*
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.
15. Implement given Boolean Function using PLA.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. R.P. Jain, ―Modern digital electronics‖, 3rd edition, 12threprint Tata McGraw Hill Publication
2. Anand Kumar, ―Fundamentals of digital circuits‖ 1st edition, Prentice Hall of India, 2001
3. P.Raja ,- Digital Electronics , Second Edition,Scitech Publication (India) Pvt.Ltd.
Reference Books:
1. A.P. Malvino, D.P. Leach 'Digital Principles & Applications'' –Vith Edition-Tata Mc Graw Hill, Publication.
2. J.F.Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - SEMICONDUCTOR DEVICES AND CIRCUITS-I**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & PR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:	
	Elementary Electronics, EDA Tool Practice

Course Objectives:	
1.	To introduce the methods of analysis, design, and simulation of diode circuits
2.	To introduce the methods of analysis, design, and simulation of BJT biasing circuits
3.	To introducemethods to analyze and design and simulate BJT amplifier circuits
4.	To introduce methods to analyze and design and simulate JFET circuits
5.	To introduce methods to analyze and design and simulate MOSFET circuits
6.	To introduce the concept ofcurrent mirror and transistorized voltage regulator circuits

Course Outcomes: After learning this course students will be able to	
1	Analyze and design the diode circuits
2	Analyze and design the BJT biasing circuits

3	Analyze and design the BJT amplifier circuits	
4	Analyze and design the JFET circuits	
5	Analyze and design the MOSFET circuits	
6	Analyze and design the current mirror and transistorized voltage regulator circuits	
UNIT – I	**DIODE CIRCUITS**	**(08 Hours)**
	Analysis and design of Rectifier circuits (HWR, FWR, Bridge, Dual Complementary), Capacitor input filter, Clippers, Clampers, Voltage Multipliers, Special diodes (Zener diodes, Schottky diodes, Gold-diffused diodes), Switching circuits, Simple shunt regulator using Zener diode (analysis and design)	
UNIT – II	**BJT CIRCUITS I**	**(08 Hours)**
	Need of biasing circuits, Analysis, and design of BJT biasing circuits like fixed bias, collector to base bias, voltage divider bias, split-supply bias, Concept of DC load line, Concept of stability factor, Derivation of stability factor	
UNIT - III	**BJT CIRCUITS II**	**(08 Hours)**
	Concept of AC load line, BJT as two-port networks, BJT Models small signal models (h-parameter, Ebers-Moll, hybrid –pi and T), Analysis of CE, CB, CC Amplifiers (Derivation of Zi, Zo, Av, Ai and Ap), Frequency response of BJTamplifiers,Single stage CE voltage amplifier design, large signal BJT model, BJT as switch, power BJT	
UNIT -IV	**JFET CIRCUITS**	**(08 Hours)**

	Analysis and design of JFET biasing (Fixed bias, Self-bias, Voltage divider bias), JFET models, Analysis of CS, CD, CG Amplifiers, Frequency response of JFET amplifiers, Single stage CS amplifier design, FET as switch.	
UNIT -V	**MOSFET CIRCUITS (8 Hours)**	**(08 Hours)**
	EMOSFET biasing (Fixed bias, negotiated bias/Voltage divide bias), DC load line,MOSFET models, Analysis of MOSFET amplifiers, Single stage CS amplifier design, Frequency response of MOSFET amplifiers,MOSFET as switch, Power MOSFET	
UNIT -VI	**OTHER TRANSISTOR CIRCUITS**	**(08 Hours)**
	Concept of current mirror, Analysis of Widlar current source (BJT and MOSFET), Wilson current mirror (BJT and MOSFET),Gilbert gain cell,Series pass transistor voltage regulator,Variable output voltage regulator	

List of experiments:

1. Observe and measure outputs for rectifier circuits
2. Observe and measure outputs clipper, clamper, voltage multiplier circuits
3. Construct BJT biasing circuits (Fixed, Collector to base bias circuit, Voltage divider bias circuit and verify the Q-point.
4. Measure and plot the frequency response of single stage CE voltage amplifier
5. Construct FET biasing circuits (Fixed, self-bias circuit, Voltage divider bias circuit and verify the Q-point.
6. Measure and plot the frequency response of single stage JFET CS voltage amplifier

7. Construct MOSFET biasing circuits (Fixed, Voltage divider bias circuit and verify the Q-point.
8. Measure and plot the frequency response of single stage MOSFET CS voltage amplifier
9. Construct BJT and MOSFET switch circuits and compare the performance (power dissipation, transient response)
10. Measure and plot regulation characteristics of shunt regulator, series pass transistorized voltage regulator
Topics for projets based learning*
1.Build a voltage quadrupler circuit
2. Build a low current, regulated power supply
3. Build a diode, BJT tester
4. Latching burglar alarm
5. Moisture detector
6. Voltage controlled variable gain amplifier
7. Wind shield wiper control
8. Metal detector
9. Car battery charger
10. Under-voltage/Over-voltage indicator
11. Crystal oscillator
12. DC Flasher with adjustable ON/OFF times
13. Emergency Light
14. Simple intercom
15. Water level indicator with alarm
*Students in a group of 3 to 4 shall complete any one project from the above list
Reference Books:
1. Fundamentals of Electronic Devices and Circuits, David A. Bell, 5th Edition,2008, ISBN:0195425235, 9780195425239, Oxford University Press.
2. Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015, ISBN 978–0–19–933913–6, Oxford University

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - PYTHON PROGRAMMING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credits :01
		Total Credits :5

Course Pre-requisites:

	Basic programming.

Course Objectives:

	• This course will introduce the concepts of Python language as software development tool. • To gain practical experience in Python programming including fundamental concepts, OOPs, Exception handling, Graphics.

Course Outcomes: After learning this course students will be able to

1	Apply the basic concepts of Python programming.
2	Write basic programs using control statements.
3	Use exception handling in Python programs.
4	Apply object-oriented programming concepts in Python.
5	Write Python program for simple applications using existing libraries.

6	Write simple graphics programs.	
UNIT – I	**Python Basics**	**(08 Hours)**
	Python Introduction, Python Installation, Relational operators, Bit-wise operators, Logical operators Python Data Types - Numbers (Integer, Floating Point, Complex Numbers), Strings, Lists, Tuples, Dictionaries, List comprehensions, Python Control Statements	
UNIT – II	**Python Core**	**(08 Hours)**
	Python Modules & Functions, Lambda, Scope, Python File Handling, Python Regular Expressions, Sequence Types, Input and output, Recursion, Flow Control, Immutable and Mutable Objects	
UNIT - III	**Python Exception Handling**	**(08 Hours)**
	Meaning of Exception, Exception Hierarchy Diagram, Types of Exception- Checked Exception, Unchecked Exception, Exception Handling -TRY, CATCH, FINALLY, Raising an Exception, User Defined Exceptions	
UNIT -IV	**OOPS, UML & OOAD**	**(08 Hours)**
	Object Oriented Programming (OOPs) - Class & Object, Abstraction, Inheritance, Polymorphism, Encapsulation, Object Oriented (OO) Modelling, Object Oriented Analysis & Design (OOAD)	

UNIT -V	**Python Multi-Threading**	**(08 Hours)**
	Threads in Python (a) Kernel Threads (b) User Space Threads or User Threads, Advantages of Threading, Thread States: Life Cycle of a Thread, Thread & Threading Modules, Forking & Synchronizing Threads,Networking	
UNIT -VI	**Python Packages and Graphics**	**(08 Hours)**
	Numpy: Introduction, data-types, arrays, arrays manipulation, plotting, testing and debugging, Sharing Data using Sockets, Simple applications of python, Scipy, TKinter	

Term Work: Any 8 of below given list

1. Evaluate any given expression involving arithmetic operators.
2. Evaluate any given expression involving logical operators.
3. Develop python functions to produce given patterns such as diamond, pyramid, triangles.
4. Usage of different functions present in “math” module.
5. Write a function that takes two numbers as input parameters and returns their least common multiple.
6. Write a function that takes two numbers as input parameters and returns their greatest common divisor.
7. Write a program that takes a sentence as an input and displays the number of words in the sentence.
8. Ways to sort list of dictionaries by values in Python – Using lambda function.
9. Write program using “matplotlib” module.
10. Write program using “NUMPY” module.
11. Write program using “Scipy” module.

12. Write program using “TKinter” module.
Topics for projets based learning*
1. Create a Tic-tac-toe game (GUI optional)
2. Build a password encryptor with Hashing.
3. Build Product Price Comparison using webscraping.
4. Create a google image downloader
5. Create a Snake & Ladders game (GUI optional)
6. Build a contact book using indexing
7. Build What’s the word game
8. Build Rock, Paper & Scissors game
9. mp3 file organizer - rebuild a music library's structure from mp3 tag data, and reorganize them in folders. Use Multithreading concepts
10. Create an FTP server
11. Build a functional calculator (GUI optional)
12. Python Email Automation
13. Create a Currency converter (GUI optional)
14. Face Detection using Cv2
15. Biometric Fingerprint detection
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1.Sheetal Taneja,NaveenKumar,PythonProgramming,A modular approach,Pearson publication
Reference Books:
1. Learning Python 5th Edition, Oreilly Publication
2. Beginning Python: From Novic to professional, by Magnus Lie Hetland, Third Edition, Appress Publication
3. Learning with Python by Allen Downey, Jeffrey Elkner, Chris Meyers, Dreamtech Publication

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - COMPUTER AIDED DRAFTING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits:00
Practical: 04	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 02
		Total Credit: 02

Course Pre-requisites:	
	Mathematics (Class XII)

Course Objectives:	
1.	To teach the studentsFundamentals of engineering drawing and curves
2.	To introduce the students Isometric views and projection
3.	To teach the studentsProjections of points, lines, planes & solids
4.	To introduce the students Use of CAD tools.

Course Outcomes: After learning this course students will be able to	
1	Apply dimensioning methods and drawing of engineering curves.
2	Draw orthographic projections using Istangle and IIIrdangle projection Methods*.
3	Draw Isometric views from given orthographic projections*.

4	Draw projection of Lines, its traces and projections of planes*.	
5	Createprojection of different solids*.	
6	Develop lateral surfaces of solids*.	
*Using CAD tools		
UNIT – I	**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 Circles method, Concentric circles method. Involutes of a circle,Cycloid, Archimedean Spiral, Helix on cone & cylinder. Introduction to Auto CAD commands.	
UNIT – II	**Orthographic Projection**	
	Basicprinciples of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only.Procedurefor preparing scaled drawing, sectional views,and types of cutting planes and their representation, hatching of sections. (Also using AutoCAD commands)	
UNIT - III	**Isometric Projections**	
	Isometric view, Isometric scale to draw Isometric projection, Non-Isometriclines, and construction of Isometric view from given orthographic views and to construct Isometric view.	

	(Also using AutoCAD commands)	
UNIT -IV	**Projections of Points & Lines**	
	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. (Also using AutoCAD commands)	
UNIT -V	**Projections of Planes**	
	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 -VI	**Projections of Solids**	
	Projection of prism,pyramid, cone, and cylinder by rotation method. (Also using AutoCAD commands)	
List of sheets:		
1. Types of lines, Dimensioning practice, free-hand lettering, 1st and 3rd angle methods symbol.		
2. Engineering curves.		
3. Orthographic Projections.		
4. Isometric views.		

5. Projections of Points and Lines and planes.
6. Projection of Solids.
7. Enclosure design
Term work: Term work shall consist of half imperial size or A2 size (594 mm x 420 mm) sheets. All sheets should complete in drawing hall manually and sheet no 2-7 also completed using AutoCAD with printout onA2 size papers.
Text Books/Reference Books:
3. “Elementary Engineering Drawing”, N. D. Bhatt, CharotarPublishing house, Anand India,
4. “Text Bookon Engineering Drawing”, K. L. Narayana&P. Kannaiah, Scitech Publications, Chennai.
5. “Fundamentals of Engineering Drawing”, Warren J. Luzzader, Prentice Hall of India, New Delhi,
6. “Engineering Drawing and Graphics”, Venugopal K., New Age International publishers.
7. "Engineering Drawing",M. B. Shah and B.C. Rana,1st Ed, Pearson Education, 2005
8. "Engineering Drawing (Geometrical Drawing)", P. S. Gill, 10thEdition, S. K. KatariaandSons, 2005
9. "Engineering Drawing", P. J. Shah, C. Jamnadasand Co.,1stEdition,1988

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: - ADVANCED MATHEMATICS FOR ELECTRONICS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credit:01
		Total Credits: 04

Course Pre-requisites:	
	Class XII Mathematics, Linear Algebra and calculus, Differential equation, and complex analysis

Course Objectives:	
1.	To introduce the concept of Fourier series.
2.	To introduce Transforms like Fourier Transform, Laplace Transform and Z Transform.
3.	To teach vector analysis.
4.	To introduce optimization and graph theory.
5.	To teach probability and statistics.

Course Outcomes: After learning this course students will be able to	
1	Apply Fourier series for solving engineering problems**.**
2	Solve numerical problems involving Fourier Transform**.**

3	Demonstrate the knowledge of Laplace Transform and Z Transforms**.**	
4	Apply the concept of optimization and graph theory**.**	
5	Applyvector analysis for engineering problems**.**	
6	Solve numerical problems based on probability and statistics**.**	
UNIT – I	**Fourier Series**	**(06 Hours)**
	Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions, Half range series. application to difference equations and Markov chains, Fourier series and KL expansion, Fourier series with an emphasis on the application of solving engineering problems, Develop Fourier series expansion of a function over the given interval.	
UNIT – II	**Fourier Transform**	**(06 Hours)**
	PaFourier transforms, Fourier transform of random process, Fourier sine and cosine transforms, Inverse Fourier, Sine and Cosine Transforms, complex form of Fourier integral, Finite Fourier sine and cosine transforms. Properties of Fourier transform.	
UNIT - III	**Laplace Transform & Z Transform**	**(06 Hours)**
	Laplace Transform:Definition, transforms of elementary functions, properties of Laplace transforms, transforms of derivatives, Properties of Laplace transforms, transforms of integral,	

	periodic functions, Inverse Laplace transforms, Inverse Laplace transforms by using partial fractions, Properties of LT. Z Transform: Definition, properties of z transform, Z Transform of basic sequences, Z transform of some standard discrete function inverse Z transform	
UNIT -IV	**Optimization and graphs**	**(06 Hours)**
	Basics of optimization, Unconstrained optimization: method of steepest descent, linear programming, simplex method, and difficulties. G Graphs and digraphs, shortest path problems, complexities, Bellman's principle, Dijkstra's Algorithm, shortest spanning trees: greedy algorithm, Prim's algorithm, flows in networks, maximum flow: Ford-Fulkerson algorithm	
UNIT -V	**Vector Analysis**	**(06 Hours)**
	Coordinate system, inter-conversion of coordinate systems, Vectors in plane and space, vector operations, gradient, divergence and curl, Gauss's, Green's and Stokes' theorems.	
UNIT -VI	**Probability and Statistics**	**(06 Hours)**
	Mean, median, mode, standard deviation, combinatorial probability, probability distributions, binomial distribution, Poisson distribution, exponential distribution, normal distribution, joint and conditional probability, relation of joint and conditional probability, higher order stats	

Topics for projets based learning*
1. Energy Flow in an Ecosystem: Graphical model
2. Plane Geometry and Vectors
3. Bipartite graph
4. Trellis (graph)
5. Seven Bridges of Königsberg
6. Three-cottage problem
7. Shortest path problem
8. A system of electric charges has a charge density $\rho(x,y,z)$ and produces an electrostatic field $E(x,y,z)$ at points (x,y,z) in space. Gauss' Law states that $\iint \Sigma E \cdot d\sigma = 4\pi \iiint S \rho dV$ for any closed surface Σ which encloses the charges, with S being the solid region enclosed by Σ. Show that $\nabla \cdot E = 4\pi\rho$. This is one of Maxwell's Equations
9. Show that the gradient of a real-valued function $F(\rho,\theta,\varphi)F(\rho,\theta,\varphi)$ in spherical coordinates is:
10. Applications of Vector Fields: in Mechanics
11. Applications of Vector Fields: Electric and Magnetic fields
12. Applications of Vector Fields: Fluids motions
13. Applications of Vector Fields: Heat transfer
14. Routing problems (e.g. Hamiltonian paths, travelling salesman problem)
15. Graph colorings (4-color theorem, chromatic polynomial)
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics (VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S. Grewal

5.HigherEngineeringMathematicsbyB.V. Ramana
6.AdvancedEngineeringMathematics

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<table>
<tr><td colspan="3">B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - SEMICONDUCTOR DEVICES AND CIRCUITS II</td></tr>
<tr><td><u>TEACHING SCHEME:</u></td><td><u>EXAMINATION SCHEME:</u></td><td><u>CREDITS ALLOTTED:</u></td></tr>
<tr><td>Theory: 04</td><td>End Semester Examination: 60 Marks</td><td>Credits: 04</td></tr>
<tr><td>Practical: 02</td><td>Internal Assessment: 40 Marks</td><td></td></tr>
<tr><td>Tutorial: 00</td><td>TW &PR: 50 Marks</td><td>Credit: 01</td></tr>
<tr><td colspan="2"></td><td>Total Credit: 5</td></tr>
<tr><td colspan="3">Course Pre-requisites:</td></tr>
<tr><td></td><td colspan="2">Network theory-Current divider rule, Voltage divider rule, KVL, KCL, Network theorems, h-parameters, passive elements and their response (initial final conditions), Semiconductor theory, semiconductor devices like diodes, BJT, FET, MOSFET, Biasing methods, Single stage amplifier-design and analysis</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Course Objectives:</td></tr>
<tr><td></td><td colspan="2">The objective of this course is to cover performance evaluation of various amplifiers by
• Introducing a concept of the multistage amplifiers, parameter evaluation and related design aspects of multistage amplifiers with the help of derivations.
• Teaching a concept of the feedback in the amplifiers, feedback topologies with the help of derivations and their advantages and disadvantages.
• Gauging the efficiencies of various types of power amplifiers with the help of derivations.
• Teaching a concept and design of the RC and LC oscillators with the help of derivations.
• Introducing a concept and types of the differential amplifiers, current mirrors.
• Introducing a concept and types of the tuning amplifiers.</td></tr>
<tr><td colspan="3"></td></tr>
</table>

Course Outcomes: After learning this course students will be able to		
1	Analyze and designdiscrete multistage amplifier.	
2	Analyze and design negative feedback amplifier.	
3	Classify and analyze discrete power amplifiers.	
4	Analyze and design discrete oscillator circuits.	
5	Analyze various types of the differential amplifiers.	
6	Analyze the effect of tuning in the amplifiers, and the applications where the tuning amplifiers are useful.	
UNIT – I	**Multistage Amplifiers**	**(08 Hours)**
	Need of the Multistage amplifiers, Types of Multistage Amplifiers-Cascade and Cascade, Cascade-Coupling methods, Frequency response, Parameter evaluation - Ri, Ro, Av, Ai & Bandwidth for general multistage amplifier, Choice of the transistor configuration in cascade amplifier, Analysis & design of direct coupled, RC coupled (Low frequency, high frequency, and medium frequency analysis), transformer coupled (Low frequency, high frequency and medium frequency analysis) amplifier. Darlington Amplifier, Design of Cascade amplifier	
UNIT – II	**Negative feedback Amplifiers**	**(08 Hours)**
	Types of basic Amplifiers, Concept and types of feedback, Transfer gain with feedback, Negative feedback topologies with their block Schematics, Effect of negative feedback on Input impedance; Output impedance; Gain and Bandwidth with derivation, Analysis of one circuit for each feedback topology for input impedance, output impedance, gain and bandwidth.	

UNIT - III	**Power Amplifiers**	**(08 Hours)**
	Need of Power amplifiers, classification; applications; advantages of power amplifiers - Class A, Class B, Class C, class D and Class AB. Operation of - Class A with resistive load; Transformer coupled class A Amplifier; Class B Push – pull; Class AB Complementary symmetry and Quasi – complementary. Efficiency analysis for Class A transformer coupled amplifier, Class B push – pull amplifier. Comparison of efficiencies of other configurations. Distortion in amplifiers; concept of Total Harmonic Distortion (THD).	
UNIT -IV	**Oscillators**	**(08 Hours)**
	Concept of Positive feedback, Condition, and principle of oscillations (Barkhausen criterion), Classification of oscillators, Design analysis of RC and LC oscillators, RC oscillators: Phase shift, Wien bridge Oscillators; LC Oscillators: Hartley, Colpitt's and Clap; Piezo-electric effect in crystals and Crystal Oscillator.	
UNIT -V	**Differential Amplifiers**	**(08 Hours)**
	Limitations of CE amplifier, Split supply biasing, Differential amplifier configurations, Dual Input, balanced output differential amplifier, Dual input, unbalanced output differential amplifier, Single input, balanced output differential amplifier, Single input, unbalanced output differential amplifier, FET differential amplifiers, Constant current bias, Current mirrors (revision), Differential mode gains, common mode gain, CMRR calculation, Derivation for output voltage, input and output impedances	

UNIT -VI	**Tuned Amplifiers**	**(08 Hours)**
	Introduction, Q-factor, small signal tuned amplifiers, Effect of cascading Single tuned amplifiers on Bandwidth, Effect of cascading Double tuned amplifiers on Bandwidth, Stagger tuned Amplifiers, Comparison of Tuned amplifiers, large signal tuned amplifiers, Stability of Tuned amplifiers, Neutralization	

Term Work: Any 8 of below given list
1. To find the gain and bandwidth of a 2-stage CE RC coupled amplifier.
2. To find the gain and bandwidth of a 2-stage transformer coupled amplifier.
3. To find the gain of a direct coupled amplifier.
4. To find the gain and bandwidth of a voltage series negative feedback amplifier.
5. To find the gain and bandwidth of a voltage shunt negative feedback amplifier.
6. To find the gain and bandwidth of a currentseries negative feedback amplifier.
7. To find the gain and bandwidth of a current shunt negative feedback amplifier.
8. To study the response of a Class A direct coupled/ transformer coupled amplifier.
9. To study the response of a Class B power amplifier.
10. To find the oscillations frequency of the RC amplifiers-RC phase shift/ Wien bridge oscillator.
11. To find the oscillations frequency of LC amplifiers-Colpitt's Oscillator/Hartley Oscillator.
12. To plot frequency response of tuned amplifiers.
Topics for projets based learning*
1.Prepare survey report on types of multistage amplifiers.

2. Build and analyze the 2-stage RC coupled amplifier.
3. Build and analyze the 2-stage transformer coupled amplifier.
4. Build and analyze the 2-stage direct coupled amplifier.
5. Prepare survey report on types of negative feedback amplifiers.
6. Build and analyze 2-stage voltage series negative feedback amplifier.
7. Build and analyze single stage current series negative feedback amplifier.
8. Build and analyze single stage voltage shunt negative feedback amplifier.
9. Build and analyze 2-stage current shunt negative feedback amplifier.
10. Prepare survey report on types of power amplifiers.
11. Implement and analyze class A direct coupled power amplifier.
12. Implement and analyze class B push pull power amplifiers.
13. Prepare survey report on types of oscillators.
14. Implement RC phase shift oscillator and verify it for oscillations frequency.
15. Prepare survey report on types of differential amplifier.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. S. Salivahanan and N Suresh Kumar, 'Electronic devices and circuits', Mc Graw Hill Education India Private Limited, Third Edition.
Reference Books:
1. Ramakant A.Gayakwad “Op-amps and Linear Integrated Circuit Technology”Fourth edition
2. Adel S. Sedra, Kenneth C. Smith “Microelectronic Circuits” Oxford series in Electrical and computer engineering

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B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - SIGNALS AND LINEAR SYSTEMS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 Marks	Credit: 01
		Total Credit: 05

Course Pre-requisites:	
	Linear algebra,calculus, MATLAB fundamentals,Differential equations, and complex analysis

Course Objectives:	
1.	To teach the basic concepts of signals.
2	To introduce the basic concepts of systems analysis
3	To introduce the tools in the time and frequency domain.
4	To provide knowledge of correlation function and sampling.

Course Outcomes: After learning this course students will be able to	
1	Characterize and analyze the properties of signals.
2	Classify the systems and analyze in time domain using convolution.
3	Apply Fourier transform for analysis of LTI systems.

4	Apply Laplace transform for analysis of LTI systems.	
5	Apply discrete transforms for analysis of LTI systems.	
6	Evaluate the effects of sampling on signal and describe the auto correlation and cross correlation between signals.	
UNIT – I	**Introduction to signals**	**(08 Hours)**
	Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal, basic operations on signals.	
UNIT – II	**Classification of systems**	**(08 Hours)**
	Definition, Classification of System, System Interconnections, state space analysis, Linear & non -linear, Time-Invariant & Time variant, causal & non-causal, static & dynamic, stable & unstable systems, stability & impulse response of systems to standard signals.	
UNIT - III	**Continuous Time System Analysis**	**(08 Hours)**
	Response of LTI Systems to exponential signals, periodic signals. Derivation Fourier series, Discrete time Fourier series and properties, Fourier Transforms, Duality and Parseval's theorem, Fourier analysis examples: Output of LTI Systems Described by Differential, convolution with FT , unit step response of RC circuit, filtering, FT of Gaussian Pulse, Example of the brain waves.	
UNIT -IV	**Laplace Transform and Application**	**(08 Hours)**
	Review of Laplace transform and properties, Concept of ROC and properties of ROC, pole	

	zero concepts. Transfer function and condition of stability, Application of Laplace transforms to the LTI system analysis, Convolution with LT, Inversion using duality, Laplace Transform of electrical Circuit, example of control system, calculation of harmonic vibration of the beam, Mathematical models of physical system- Electrical & Mechanical System	
UNIT -V	**Discrete Transforms and Applications**	**(08 Hours)**
	Z-Transform: The Region of Convergence for the Z-Transform, Application of Z-Transform to the LTI system analysis. Discrete time Fourier transform, Properties of DTFT, Fast Fourier transform algorithm, Use of FFT in Windows Media Player.	
UNIT -VI	**Correlation and Spectral Density**	**(08 Hours)**
	Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density, Sampling theorem & its proof, aliasing, reconstruction of sampled signals, interpolation.	
<u>Term Work:</u> Any 8 of below given list		
1. Perform the operations on signals 2. Perform the convolution of signals using formula using MATLAB.		
3. Analyze the synthesis of signals using Fourier Series.		
4. Find the Fourier Transform using MATLAB.		
5. Find the Laplace Transform using MATLAB.		

6. Find the Z-Transform using MATLAB.
7. Find the autocorrelation of sine sequence x[n] with frequency 50Hz and sampling frequency 200Hz, using MATLAB.
8. Find the cross correlation for different signals.
9. Find the Inverse Fourier Transform using MATLAB.
10. Find the Inverse Laplace transform using MATLAB.
11. Find the inverse Z Transform using MATLAB.
12. Find the circular convolution using MATLAB.
Topics for projets based learning*
1. Signals In Natural Domain
2. Signal operations for navigation/obstacle detection
3. Speech production
4. Speech hearing
5. LTI Systems – Eigenfunctions, System Described by differential Equation, Homogenous and Particular Solution
6. LTI Systems-Convolution applications,
7. Periodic Convolution applications,
8. BIBO Stability applications
9. z–Transform Applications– Impulse Response of LTI System Described by Difference Equation
10. Complex Exponential Fourier Series and Trigonometric Fourier Series of Periodic Triangular Wave, Periodic Convolution
11. Real life example on DTFT – Sampling
12. Group/ Phase Delay for LTI systems
13. Implement DFT in Matrix form
14. Implement IDFT in Matrix form
15. FAST FOURIER TRANSFORM ANALYZER
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Roberts M. J., Signals & Systems, TMH.
2. Oppenheim, Wilsely&Nawab, Signals & Systems, MGH.
Reference Books:

1. B.P.Lathi, Signal Processing & Linear Systems, Berkeley Cambridge, 1998 Edition.

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<table>
<tr><td colspan="3">B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - NETWORK ANALYSIS AND SYNTHESIS</td></tr>
<tr><td><u>TEACHING SCHEME:</u></td><td><u>EXAMINATION SCHEME:</u></td><td><u>CREDITS ALLOTTED:</u></td></tr>
<tr><td>Theory: 04</td><td>End Semester Examination: 60 Marks</td><td>Credits: 04</td></tr>
<tr><td>Practical: 02</td><td>Internal Assessment: 40 Marks</td><td></td></tr>
<tr><td>Tutorial: 00</td><td>TW & PR: 50 Marks</td><td>Credit: 01</td></tr>
<tr><td colspan="2"></td><td>Total Credits: 5</td></tr>
<tr><td colspan="3">Course Pre-requisites:</td></tr>
<tr><td></td><td colspan="2">Knowledge of KCL and KVL Laws from ‘Electrical Technology’,Linear Differential Equations, Systems of Linear Equations and complex numbers from ‘Differential Equations and Complex Analysis’</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Course Objectives:</td></tr>
<tr><td></td><td colspan="2">The objective of this course is to cover various methods to find the network parameters as listed below:
To teach how to find network parameters (voltages, currents, power) in a given passive circuit by the use of methods- MeshAnalysis, Node Analysis and Network Theorems.
To teach how to find voltages and currents in a given circuit by formulating the network equilibrium equations by the use of graph theory.
To teach how to find the transient response of the series RLC circuits by the use of homogeneous and non-homogeneous equations.
To introduce the resonance phenomenon, curves and related parameters in a given series and a parallel resonant circuit with the help of derivations.
To introduce the two port network parameters, their interrelationships, and interconnections with the help of derivations.</td></tr>
</table>

	• To teach how to design a constant K prototype low pass, high pass, band pass and a band stop passive filters for different bandwidths by using filter topologies.	
Course Outcomes: After learning this course students will be able to		
1	Analyze passive circuits using Mesh Analysis, Node Analysis and Network Theorems.	
2	Apply graph theory by formulating the network equilibrium equations for circuit analysis.	
3	Perform Transient Analysis of the Series Reactive Circuits	
4	Sketch the resonance curves for a given series and parallel resonant circuits.	
5	Compute two port parameters for a given network	
6	Design constant-k prototype low pass, high pass, band pass and band stop passive filters.	
UNIT – I	**DC circuit Analysis and Network Theorems**	**(08 Hours)**
	KCL, KVL, Source Transformation, Source Shifting, Mesh Analysis, Node Analysis, Super Mesh, Super Node, Network Theorems- Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem	
UNIT – II	**Formulation of network equilibrium equations using Graph Theory**	**(08 Hours)**
	Network Graph, tree, co-tree & loop, Incidence Matrix, Tie-set matrix, Cut-set matrix, Formulation of the equilibrium equations in the matrix form, Solution of the resistive and non-resistive networks, Principle of Duality	
UNIT - III	**Transient Analysis of the Series Reactive Circuits**	**(08 Hours)**

	Initial Conditions in the networks, A procedure for evaluating initial conditions, the step response in RC, RL, RLC circuits using classical method and using Laplace Transform for driven and undriven circuits, Time specifications of RLC circuits, Concept of the natural frequency and damping frequency, Zeta.	
UNIT -IV	**Resonance in Series and Parallel RLC Circuits**	**(08 Hours)**
	Resonant condition, Quality factor, Resonant frequency, impedance at resonance, voltage and current variation with frequency, bandwidth, selectivity, magnification factor for series and parallel resonant circuits. Effect of Generator resistance on bandwidth and Selectivity, Comparison of series and parallel resonant circuits, Applications of resonant circuits	
UNIT -V	**Two Port Networks**	**(08 Hours)**
	Concept of Two port network, Z, Y, H, ABCD and other parameters, Relationships between two-port network parameters, Reciprocity and Symmetry conditions, Interconnections of two-ports, Analysis of some circuits using two port network parameters theory.	
UNIT -VI	**Passive Filter Analysis**	**(08 Hours)**
	Filter Fundamentals, Electrical Properties-Image impedance, Characteristic impedance, Propagation constant, Constant K prototype for LPF, HPF, BPF and BSF, m-derived LPF, HPF, Terminating half sections, Composite filters, Applications of passive filters.	

Term Work: Any 8 of below given list
1. To verify Thevenin's and Norton's Theorem for a given circuit.
2. To verify Superposition and Reciprocity Theorem for a given circuit.
3. To find the resonant frequency of a series RLC circuit.
4. To find the resonant frequency of a parallel RLC circuit.
5. To find the Z parameters of a given two port network.
6. To find the Y parameters of a given two port network.
7. To find the H parameters of a given two port network.
8. To find the ABCD parameters of a given two port network.
9. To find the cut-off frequency and to plot the frequency response of a constant-k LPF.
10. To find the cut-off frequency and to plot the response of a constant-k HPF.
11. To find the cut-off frequencies and to plot the frequency response of a constant-k BPF.
12. To find the cut-off frequencies and to plot the frequency response of a constant-k BSF.
Topics for projets based learning*
1.Build and analyze resistive circuit for current usage.
2. Build and analyze resistive circuit for voltage usage.
3. Build and analyze resistive circuit for power usage.
4. Implement the series RL circuit and verify the initial and final conditions of it.
5. Implement the series RC circuit and verify the initial and final conditions of it.
6. Build and verify series resonance circuit.
7. Build and verify parallel resonance circuit.
8. Verify Z parameters for unknown circuit.
9. Verify Y parameters for unknown circuit.

10. Verify H parameters for unknown circuit.
11. Verify ABCD parameters for unknown circuit.
12. Design and implement prototype Low pass filter and verify its bandwidth.
13. Design and implement prototype High pass filter and verify its bandwidth.
14. Design and implement prototype Band pass filter and verify its bandwidth.
15. Design and implement prototype Band stop filter and verify its bandwidth.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition.
Reference Books:
1. Franklin F. Kuo, 'Network Analysis and Synthesis', John Wiley & Sons (Second Edition)
2. M. E. Van Valkenburg, 'Network Analysis', PHI (3rd Edition)
3. John D. Ryder, 'Networks, Lines and Fields', PHI Learning Pvt. Ltd., Second Edition

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: - DATABASE MANAGEMENT SYSTEMS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 Marks	Credit: 01
		Total Credits: 04

Course Pre-requisites:	
	Python Programming

Course Objectives:	
1	To provide a strong formal foundation in database concepts, technology, and practice
2	To give systematic database design approaches covering conceptual design, logical design, and an overview of physical design
3	To have good understanding of different type of databases.
4	To learn a powerful, flexible, and scalable general-purpose database to handle big data

Course Outcomes: After learning this course students will be able to	
1	Design E-R Model for given requirements and convert the same into database tables.
2	Apply BCNF Algorithm for Decomposition

3	Use SQL for query processing.	
4	Use algorithms to solve scheduling conflict	
5	Apply Concurrency algorithm in distributed database	
6	Use NOSQL in database creation.	
UNIT – I	**Introduction to Databases**	**(06 Hours)**
	Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables, Introduction to normalization.	
UNIT – II	**Relational Database Design**	**(06 Hours)**
	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules, Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF, Modeling Temporal Data	
UNIT - III	**SQL AND PL/SQL**	
	SQL: Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. PL/SQL: concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles and privileges, Embedded SQL, Dynamic SQL.	**(06 Hours)**

UNIT -IV	**Database Transactions and Query Processing**	**(06 Hours)**
	Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Timestamping Methods, Recovery methods: Shadow-Paging and Log-Based Recovery, Checkpoints, Query Processing, Query Optimization, Performance Tuning	
UNIT -V	**Parallel and Distributed Databases**	**(06 Hours)**
	Introduction to Database Architectures: Multi-user DBMS Architectures, Case study- Oracle Architecture. Parallel Databases: Speedup and Scale up, Architectures of Parallel Databases. Distributed Databases: Architecture of Distributed Databases, Distributed Database Design, Distributed Data Storage, Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database. Cloud database examples.	
UNIT -VI	NoSQL Database	**(06 Hours)**
	Introduction to NoSQL Database, Types, and examples of NoSQL Database- Key value store, document store, graph, Performance, Structured verses unstructured data, Distributed Database Model, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, NoSQL Data Models, Case Study- unstructured data from social media. Introduction to Big Data, HADOOP: HDFS, MapReduce. JSON	
List of Experiments:		
1. Write a query to display all the columns from salesman table. First create a Salesman table.		
2. Design and Develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence, Synonym		
3. Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator.		

4. Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.

5. Unnamed PL/SQL code block: Use of Control structure and Exception handling is mandatory.

Write a PL/SQL block of code for the following requirements: -

1. Schema:

1.Borrower(Rollin, Name, Date of Issue, NameofBook, Status)

2. Fine(Roll.no,Date,Amt)

- Accept roll.no & name of book from user.
- Check the number of days (from date of issue), if days are between 15 to 30 then fine amount will be Rs 5per day.
- If no. of days>30, per day fine will be Rs 50 per day & for days less than 30, Rs. 5 perday.
- After submitting the book, status will change from I to R.
- If condition of fine is true, then details will be stored into fine table.

Frame the problem statement for writing PL/SQL block in line with above statement.

6. Cursors: (All types: Implicit, Explicit, Cursor FOR Loop, Parameterized Cursor) Write a PL/SQL block of code using parameterized Cursor, that will merge the data available in the newly created table Rollcall with the data available in the table Rollcall. If the data in the first table already exist in the second table, then that data should be skipped. **Frame the separate problem statement for writing PL/SQL block to implement all types of Cursors in line with above statement. The problem statement should clearly state the requirements.**

7. PL/SQL Stored Procedure and Stored Function. Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in examination is <=1500 and marks>=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement. Stud_Marks(name, total_marks) Result (Roll,Name, Class) Frame the separate problem statement for writing PL/SQL Stored Procedure and function, inline with above statement. The problem statement should clearly state the requirements

8. PL/SQL Stored Procedure and Stored Function. Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in examination is <=1500 and marks>=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement. Stud Marks (name, total marks) Result (Roll, Name, Class) Frame the separate problem

statement for writing PL/SQL Stored Procedure and function, in line with above statement. The problem statement should clearly state the requirements
9. Write a program to implement Mogo DB database connectivity with python Implement Database navigation operations (add, delete, edit etc.) using ODBC/JDBC.
10. Implement MYSQL/Oracle database connectivity with python Implement Database navigation operations (add, delete, edit,) using ODBC/JDBC
11. **Mini Project:**
Topics for projets based learning*
1.Library Management System An online library management system offers a user-friendly way of issuing books and viewing different books and titles available under a category. This type of Management Information System (MIS) can be easily developed. And SQL queries enable quick retrieval of the required information.
2. Centralized College Database A college has academic departments, such as the Department of English, Department of Mathematics, Department of History, and so on. And each department offers a variety of courses. Now, an instructor can teach more than one course. Let's say a professor takes a class on Statistics and on Calculus.
3. Student Database Management Similarly, you can do a student record-keeping project. The database would contain general student information (such as name, address, contact information, admission year, courses, etc.), attendance file, marks or result file, fee file, scholarship file, etc. An automated student database streamlines the university administration process to a considerable degree.
4. Online Retail Application Database As e-commerce experiences remarkable growth around the world, online retail application databases are among the most popular SQL project ideas.
5.Inventory Control Management Inventory control is the process of ensuring that a business maintains an adequate stock of materials and products to meet customer

demands without delay
6. Hospital Management System It is a web-based system or software that enables you to manage the functioning of a hospital or any other medical setup. It creates a systematic and standardized record of patients, doctors, and rooms, which can be controlled only by the administrator.
7. Railway System Database In this database system, you need to model different train stations, railway tracks between connecting stations, the train details (a unique number for each train), rail routes and schedule of the trains, and passenger booking information.
8. Payroll Management System It is one of the most preferred SQL database project ideas due to its extensive usage across industries. An organization's salary management system calculates the monthly pay, taxes, and social security of its employees.
9. An SMS-based Remote Server Monitoring System Such systems are particularly beneficial for large corporate organizations having massive data centers and multiple servers. Since these servers host many applications, it becomes tricky to monitor their functionality. Usually, when a server is down or has crashed, the clients inform the organization about it.
10. Blood Donation Database This database would store interrelated data on patients, blood donors, and blood banks.
11. Art Gallery Management Database If you are running an art store, you can also organize and manage all your customer information, including names, addresses, the amount spent, liking and interests.
12. Cooking Recipe Portal This is another application of SQL databases in the creative field. You can model a web portal where a stored procedure will display your cooking recipes under different categories.

13. Carbon Emissions Calculator

Lately, environmental conservation has been receiving a lot of attention globally. You can also contribute to the cause by developing a web application that measures the carbon footprint of buildings.

14. A Voice-based Transport Enquiry System

This innovative tool helps you save time while travelling. You would have noticed long queues outside the transport controller's office at public transport terminals. This is where commuters make inquiries about the different types of transport facilities available. In this scenario, technology-enabled transport enquiry systems can result in huge savings of time and effort. You can develop an automated system for bus stands, railway stations, and airports that can receive voice commands and answer in a voice-based format.

15. Pharmacy Management System

Pharmacy Management System is the process of ensuring that a business maintains an adequate stock of medicines and tablets to meet customer demands without delay

*Students in a group of 3 to 4 shall complete any one project from the above list

Text Books:

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Connally T, Begg C., "Database Systems", Pearson Education, ISBN 81-7808-861-4
3. Pramod J. Sadalage and Martin Fowler, "NoSQL Distilled", Addison Wesley, ISBN10: 0321826620, ISBN-13: 978-0321826626

Reference Books:

1. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
2. S.K.Singh, "Database Systems : Concepts, Design and Application", Pearson, Education, ISBN 978-81-317-6092-5
3. Kristina Chodorow, Michael Dirolf, "MangoDB: The Definitive Guide",O'Reilly Publications, ISBN: 978-1-449-34468-9.
4. Adam Fowler, "NoSQL For Dummies", John Wiley & Sons, ISBN-1118905628
5. Kevin Roebuck, "Storing and Managing Big Data - NoSQL, HADOOP and More", Emereopty Limited, ISBN: 1743045743, 9781743045749
6. Joy A. Kreibich, "Using SQLite", O'REILLY, ISBN: 13:978-93-5110-934-1
7. Garrett Grolemund, "Hands-on Programming with R", O'REILLY, ISBN : 13:978-93- 5110-728-6

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: EDA TOOL PRACTICES**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 01

Course Pre-requisites:	
	Elementary Electronics, Electrical Technology.
Course Objectives:	
1	To introduce the students to transient analysis of electronic circuits using simulation software (EDA tool)
2	To teach the students to carry out AC analysis of amplifiers using simulation software (EDA tool)
3	To introduce the students to simulation tools for basic analog electronic circuits
4	To introduce the students to simulation tools for basic digital electronic circuits
5	To teach the students to use virtual instruments in an EDA tool
6	To train the students to troubleshoot basic circuits with an EDA tool

Course Outcomes: After learning this course students will be able to	
1	Perform Transient Analysis of simple circuits using EDA tool.
2	Perform AC Analysis of simple circuits using EDA tool.

3	Use an EDA tool for simulating basic analog electronic circuits.
4	Use an EDA tool for simulating basic digital electronic circuits.
5	Use virtual instruments in an EDA tool for analyzing and testing basic electrical and electronic circuits.
6	Use EDA tool for troubleshooting basic circuits.

List of experiments:

1. Study of an EDA tool, concept of simulation, different types of analyses, simulation errors
2. Study and use virtual instruments, signal, and power sources
3. Verify Basic circuit laws and theorems using MULTISIM
4. Construct diode circuits and simulate the same
5. Construct and analyze BJT biasing circuits
6. Construct single stage CE amplifier circuit and carry out transient and AC analysis
7. Implement Boolean equations and implement the same using basic logic gates
8. Implement circuits with multiplexers and decoders
9. Troubleshooting a given circuit using EDA tool

Reference Books:

4. Circuit Analysis with Multisim, David Báez-López Félix E. Guerrero-Castro, Morgan & Claypool Publishers.
5. Advanced Circuit Simulation Using Multisim Workbench, David Báez-López Félix E. Guerrero-Castro, Morgan & Claypool Publishers

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B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - PCB DESIGN AND SOLDERING

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 04	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit:02
		Total Credit: 02

Course Pre-requisites:

	Elementary Electronics

Course Objectives:

1	To introduce the basic building blocks for PCB artwork design
2	To train the student to create simple PCB artwork design using an PCB design tool
3	To expose the students to soldering process and tools
4	To train the students to make reliable solder joints
5	To train the students to de-solder the solder joints
6	To teach the art of inspecting solder joints

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of selecting proper PCB primitives (track width, pad size, hole size, clearance between pads and tracks,

	footprints)
2	Use PCB design software for simple single sided PCB artwork design
3	Identify and select appropriate soldering tools for the soldering job
4	Use solder iron for soldering through hole components
5	Use solder iron and de-solder pump /wick for de-soldering through hole components
6	Perform electrical (continuity) and visual inspection for solder joints

List of experiments:

1. Design a simple (only discrete components) single sided PCB using PCB design software (PCB artwork design flow)
2. Design a single sided PCB using PCB design software for a circuit with IC components
3. Design a double-sided PCB using PCB design software
4. Study and use of tools like solder iron (types and temperature profile), wire-strippers, cutters
5. Study of solder alloys, flux and rosin
6. Solder basic electronic components like resistors, capacitors, IC bases (through hole)
7. Use de-solder pump/wick for de-soldering components
8. Carry out electrical continuity test and visual inspection for a soldered board

Reference Books:

1. Getting Started with Soldering: A Hands-On Guide to Making Electrical and Mechanical Connections, Marc de Vinck, Maker Media, Inc, 2017
2. Soldering in electronics assembly, MIKE JUDD, Keith Brindley, Newnes,1999

3. Printed Circuits Handbook, Clyde F. Coombs, Jr.,McGraw-Hill, 2008
4. User Manual for the selected PCB Design Software
5. Getting Started with Soldering: A Hands-On Guide to Making Electrical and Mechanical Connections, Marc de Vinck, Maker Media, Inc, 2017

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: - NETWORKING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 00	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit: 02
		Total Credit: 02

Course Pre-requisites:	
The Students should have knowledge of	
1.	Understanding of personal computers and operating systems

Course Objectives:	
1	To explain the fundamental concepts of networking
2	To educate with the architecture, protocols, and networking
3	To update the trends in innovation approach towards development of high-speed networks
4	To analyze the challenges involved in developing TCP/IP suite
5	To compare wired and wireless real networks
6	To explain network security system

Course Outcomes: After learning this course students will be able to	
1	Design, install, and troubleshoot networks

2	Identify the protocol in networking
3	Analyze the required technical competencies for traffic management to embark on growing career as Network Engineer/ Network Administrator
4	Demonstrate the knowledge of TCP and its application scenarios
5	Compare different constraints in wired and wireless domain
6	Identify the systems, protocols, and mechanisms to support network security

UNIT – I	**Network& Service**	
	Approaches to Network design, Network topologies and design constraints, Transmission media – unguided and guided, OSI Reference Model; TCP/ IP protocol suite, Application Layer Protocols and TCP/IP. Peer-to-peer protocols, Service Models, ARQ Protocols and reliable data transfer service, sliding Window Flow Control.	
UNIT – II	**Medium Access Control Protocol**	
	Multiple access communication, Random access scheduling approaches to medium access control, Delay performance of MAC and channelization schemes, LAN Access methods, Introduction to LAN, MAN, WAN Standards, FDDI, WLAN, Hubs, Bridges and Switches Ethernet networking.	
UNIT - III	**Packet Switching Networks**	
	Network Services and Internal Network Operation, Packet Network Topology, Routing in packet Networks, shortest path Algorithms, and Introduction to traffic management & QoS.	

UNIT -IV	**TCP/IP Architecture**	
	Medium Access control (MAC) sub layer: MAC protocols: ALOHA, Slotted ALOHA, The Internet Protocol, IP addressing and subnetting, Limitations of IPv4 and Introduction to IPv6, User Datagram protocol, Transmission Control Protocol, Introduction to Internet Routing Protocols.	
UNIT -V	**Wireless Routing Protocols and Wired Connectivity**	
	Introduction to radio transmissions, Packet radio Routing Internet based mobile ad-hoc networking, communication strategies, routing algorithms Destination sequenced Distance Vector (DSDV), Dynamic source Routing (DSR),Ad-hoc On demand Distance Vector(AODV) &Temporarily Ordered Routing algorithm (TORA), Quality of service. Introduction to optical network, SONET / SDH, Broadcast and select WDM Networks	
UNIT -VI	**Network Security &Software Defined Networks**	
	Introduction to security, Security approaches, Principles of security, Types of Security attacks, Cryptography: plain text and cipher text, substitution techniques, encryption, and decryption, Software Defined Network: Comparison between SDN and traditional networks, SDN controller, Switch design, Switch Protocols, Control Overhead & Handoff algorithms.	
List of Experiments:		
1. Connecting two or more computers using RJ45		

2. Implementation of bus topology in MATLAB/ NS-2.
3. Implementation of star topology in MATLAB/ NS-2.
4. Simulation of sliding window protocolsMATLAB/ NS-2.
5. Describe functions of OSI layers and its architecture.
6. Explain TCP / IP protocol suite.
7. Explain cryptography, symmetric-key algorithms.
8. Simulation of basic optical network using Optisystem.
Text Books:
1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013
3. William Stallings, High speed Networks TCP/IP & ATM Design Principles, PH, NY
Reference Books:
1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education
2. Rottinghous, John W., and James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - CONTROL SYSTEMS AND APPLICATIONS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 Marks	Credit: 01
		Total Credit: 05

Course Pre-requisites:

The Students should have knowledge of

1.	Basic knowledge of signals.
2.	Basic mathematical tools like Laplace transform
3.	Basic knowledge of software like MATLAB

Course Objectives:

- To provide in depth knowledge of the various types of control systems and determination of transfer function using different methods.
- To analyze the first order and second order system in time domain.
- To introduce the concept of different types of controllers and compensators.
- To analyze the control system in frequency domain.

	• To analyze the digital control systems in time domain. • To provide state variable analysis.	
Course Outcomes: After learning this course students will be able to		
1	Identify various control systems and determine the 'Transfer Function' of a system using block diagram reduction technique and signal flow graph.	
2	Determine the time response for different system, the errors in various control systems; evaluate the stability of a system using Routh's Stability Criterion and analysis graphical technique such as root locus.	
3	Demonstrate the knowledge of control actions such as Proportional (P), Integral (I), Derivative (D), PI, PID and compensators.	
4	Determine frequency response and different graphical methods like Bode plot and polar plot.	
5	Calculate the time response for digital control systems and design digital control system.	
6	Implement the state variables for state variable model for linear as well as digital control systems.	
UNIT – I	**Introduction to Control System**	**(08 Hours)**
	Introduction to analog as well as digital control system, Classification of Control System, control problem, Feedback and Non-feedback Systems, Transfer Function, Block diagram and signal flow graph analysis, Pulse transfer function, Sampled Signal Flow Graph.	
UNIT – II	**Time Domain Analysis**	**(08 Hours)**
	Time response of first order & second order system using standard test signal, steady state errors	

	and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system, Hurwitz and Routh stability criteria.	
UNIT - III	**Controllers and Compensators**	**(08 Hours)**
	Effect of Poles and Zeros on the System Stability, Types of Compensators, Lead, Lag, Lead-Lag Compensators design, Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram, Examples of ladder diagram.	
UNIT -IV	**Frequency Domain Analysis**	**(08 Hours)**
	Relationship between time & frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist stability criterion.	
UNIT -V	**Digital control systems**	**(08 Hours)**
	Time Response of discrete time systems: Time response specifications, Steady state error, error constants, time response for 1st order and 2nd order systems. Design of sampled data control system: Root locus technique, Bode plot, Nyquist stability criteria, lead compensator design using Bode plot, lead compensator design using Bode plot, lead compensator design using Bode plot.	
UNIT -VI	**State variable analysis**	**(08 Hours)**
	State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of	

	Controllability and Observability-Stability of linear systems-Equivalence between transfer functionand state variable representations-State variable analysis of digital control system-Digitalcontroldesign using state feedback.	

Term Work: Any 8 of below given list
1. Unit Step and Impulse response of the Transfer function using MATLAB.
2. Transient response of second order system using MATLAB
3. To draw Root Locus theoretically (analog and digital) and verify it using MATLAB.
4. To draw Bode plot theoretically (analog and digital) and verify it using MATLAB.
5. Magnitude and phase plot of Lead network (analog and digital).
6. Magnitude and phase plot of Lag network (analog and digital).
7. To study architecture of PLC.
8. Ladder diagram example using Virtual Lab
9. Implementation of DOL Starter Virtual Lab
10. Implementation of On-Delay Timer Virtual Lab
11. Implementation of Off-Delay Timer Virtual Lab
12. Implementation of Up-Down Counter Virtual Lab
13. Implementation of PLC Arithmetic Instructions Virtual Lab
14. Implementation of PID Controller Virtual Lab

Topics for projets based learning*
1. Maintaining constant speed (cruise control) and constant temperature (climate control) and maintaining pressure
2. Engine control, steering control, suspension control
3. Control skidding (antiskid system)
4. Automatic warehousing
5. Inventory control
6. Automation of farming
7. Commercial rail transportation
8. Biomedical CS
9. Design and Experimentation of Cable-Driven Platform Stabilization and Control Systems
10. Minimization of Energy Consumption in Underfloor Heating Systems
11. Automatic Water Pump Controller
12. Design, Analysis and Testing of a Flapping Wing Miniature Air Vehicle
13. Design Cognitive mobile robot model
14. PLC Based Performance Analysis Of Range Sensors For A Real-Time Power Plant Coal Level Sensing System.
15. Mine Water Level Fuzzy Control System Design Based On PLC.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. I.J. Nagrath, M.Gopal “Control Systems Engineering”, 5th Edition, New Age International Publication
2. Schaum’s Series book “Feedback Control Systems”.
3. Les Fenical “Control Systems”, 1st Edition, Cengage Learning India.
4. R. Anandanatarajan, P. Ramesh Babu, “Control Systems Engineering”, Scitech Publications
Reference Books:
1. Norman S. Nise “Control Systems Engineering”, 4th edition, Wiley edition.
2. Samarjeet Ghosh, “Control Systems Theory & Applications”, 1st edition, Pearsoneducation.
3. S.K. Bhattacharya, “Control Systems Engineering”, 1st edition, Pearson education.

4. Hackworth, “Programmable Logic Controller”, 1st edition, Pearson education.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - INTEGRATED CIRCUITS AND APPLICATION**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW & PR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:	
	SDC-I, SDC-2, Electronics Network Theory

Course Objectives:	
1.	To introduce the OPAMP and its internal building blocks
2.	To provide the basics of analysis and design of linear and nonlinear applications of Op-Amp
3.	To introduce the students to design of active filters
4.	To introduce the students to analysis and design of OPAMP based waveform generators
5.	To introduce the Timer IC 555 and its applications
6.	To introduce PLL, Three terminal voltage regulators and ADC/DAC and their applications

Course Outcomes: After learning this course students will be able to	
1	Visualize the internal blocks of a typical OPAMP IC and interpret the OPAMP parameters
2	Analyze and design linear and nonlinear applications of OP-AMP.

3	Analyze and design first and second order active filters using OP-AMP..
4	Analyze and design Waveform Generators using OP-AMP.
5	Design of multivibrators using Timer IC 555
6	Demonstrate knowledge of Phase Locked Loop IC 565 and its application and design linear power supply using three terminal voltage regulators, classify ADC and DAC devices

UNIT – I	**OPAMP Internals**	**(08 Hours)**
	Amplifier types (voltage, current, transconductance, trans resistance), Limitations of CE amplifiers, Block diagram of OPAMP, Differential amplifier with and without constant current tail (review), Level Shifter, Complementary Symmetry Output power amplifier, Frequency compensation, Ideal and practical characteristics of OPAMP, Parameters of practical OPAMP, Offset voltage balancing.	
UNIT – II	**Linear Applications of OPAMP-I**	**(08 Hours)**
	DC and AC inverting amplifier, DC and AC Non-Inverting Amplifier, DC and AC Voltage Follower circuit, Summing Amplifier, Difference Amplifier, Instrumentation Amplifier, I-V and V-I converters	
UNIT - III	**Linear Applications of OPAMP-II**	**(08 Hours)**
	Integrator, Differentiator, Active Filters, Log, and anti-log amplifiers	
UNIT -IV	**Non-Linear Applications of OPAMP**	**(08 Hours)**
	Comparator and Schmitt Trigger circuit, Window detector, Precision rectifiers, Peak detector,	

	Sample and Hold circuit	
UNIT -V	**Waveform Generators**	**(08 Hours)**
	Positive Feedback and Barkhausen criteria, Wein bridge oscillator, RC Phase shift oscillator, Colpitts oscillator, Hartley oscillator, square wave generator, Triangular wave generator, IC 555 astable and monostable circuits	
UNIT -VI	**Voltage Regulators, PLL and Mixed Signal Circuits**	**(08 Hours)**
	Three terminal IC voltage regulators, Voltage Controlled Oscillator and Phase Locked Loop, Parameters of DAC, Digital-to-Analog Converters (Binary weighted, R-2R ladder network type), Analog to Digital Converters (Flash, Successive Approximation, Integrating) Parameters of ADC, Introduction to sigma-delta ADC.	

List of experiments:

1. Design, build and test DC inverting, non-inverting, and voltage follower circuits
2. Design, build and test AC inverting, non-inverting and voltage follower circuits, plot frequency response
3. Design, build and test inverting, non-inverting summing amplifier circuits
4. Design, build and test integrator circuit and plot frequency response
5. Design, build and test differentiator circuit and plot frequency response
6. Design, build and test 1st order active LPF and HPF and plot frequency responses
7. Design, build and test Wein bridge oscillator
8. Design, build and test RC phase shift oscillator
9. Design, build and test astable multivibrator using IC555

10. Measure line and load regulation of three terminal regulator
Topics for projets based learning*
1.Audio Mixer
2. Stereo Pre-amplifier
3. Graphic Equalizer
4. Burglar alarm
5. Tachometer
6. Universal Battery charger
7. Function Generator
8. Fixed voltage regulated power supply
9. Variable output voltage regulated power supply
10. Dual polarity regulated power supply
11. Electronic stethoscope
12. Digitally selectable precision attenuator
13. Bridge amplifier for stereo
14. Bar graph battery voltage indicator
15. Touch sensitive switch
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks:
1. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition,2008, ISBN:0195696131, 9780195696131, Oxford University Press
2. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco, 4th Edition, McGraw-Hill

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - ELECTROMAGNETICS AND TRANSMISSION LINE**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits:01
		Total Credit: 04

Course Pre-requisites:	
	Fundamentals of Vector Analysis and Mathematical Calculus
Course Objectives:	
	• To analyze basic Electrostatic laws such as Coulomb's law and Gauss law • To compute boundary conditions with electrostatic parameters • To analyze basic Magnetostatic laws such as Biot-Savart's Law and Ampere's Law • To evaluate Maxwell's equation • To demonstrate wave propagation through different media • To examine transmission Line and impedance matching techniques
Course Outcomes: After learning this course students will be able to	
1	Analyze electric field in different field distributions

2	Identify the Electrostatic parameters	
3	Analyze magnetostatic field in different field distributions	
4	Evaluate time varying Electric and Magnetic Fields	
5	Characterize wave equation	
6	Compute Transmission Line and its applications	
UNIT – I	**Electrostatic-I**	**(06 Hours)**
	Coulomb's law, Electrostatic Field Intensity, Calculation of Electric field for: infinite line, surface, volume charge distribution, Electric flux density, Concept of Divergence, Gauss Law, Application of Gauss's law for: point, infinite line, infinite sheet, uniformly charged sphere.	
UNIT – II	**Electrostatic-II**	**(06 Hours)**
	Electric Potential, Relation between Electric Field and Potential, Energy Density, Resistance, Capacitance, Boundary Condition	
UNIT - III	**Magnetostatics**	**(06 Hours)**
	Biot-Savart's Law, Application of Biot-Savart's Law, Stoke's Theorem, Ampere's Law, Application of Ampere's Law, Forces due to Magnetic Field, Boundary Conditions, Inductor, and Inductance. Standard inductance configurations: Toroid, Solenoid. Materials in magnetic fields.	

UNIT -IV	**Time Varying Fields and Maxwell's Equation**	**(06 Hours)**
	Faraday's Law, Transformer and Motional Electromotive Forces, Displacement Current, Maxwell's Equation in both differential form and integral form.	
UNIT -V	**Wave Propagation/ Uniform Plane Wave**	**(06 Hours)**
	Wave Propagation in Lossy Dielectrics, Plane Waves in Lossless Dielectrics, Plane Waves in Free Space, Plane Waves in Good Conductors, Power and Poynting Vector, Reflection of a Plane Wave at Normal Incidence.	
UNIT -VI	**Transmission Lines and Impedance Matching Techniques**	**(06 Hours)**
	Transmission Line Parameters, Transmission Line Equations, Input Impedance, Standing Wave Ratio and Power, Smith Chart, Stub Matching Technique, QWT, Single Stub Matching, Double Stub Matching, EMC-EMI, Types of EMC.	

List of Tutorials:

1. Application of Stoke's theorem.
2. Application of Gauss's law
3. Energy stored in capacitor.
4. Application of Poission's and Laplace's equations.
5. Boundary conditions for magnetic fields.
6. Poynting theorem and their applications.

7. Applications of Smith Chart.
8. Simulation on Electromagnetic Interference and Compatibility
Topics for projets based learning*
1.Design Electrostatic Speakers using the concept of Electrostatic Forces and Energy
2. Study the Faraday Cage
3. Build Lightning Rod
4. Study and survey on Xerography – Electrostatic Imaging
5. Design any Electrostatic Filters
6. Design a gauge that is sensitive to the fluid level in the capacitive gauge.
7. Calculate characteristic impedance and propagation speed of a coaxial cable based on measured dimensions
8. Design a metal detecting device based on mutual inductance
9. Design a non-contact probe that can detect the presence and polarity of a static (or slowly varying) electric field in air
10. Design a non-contact AC current meter
11. Study and survey on Heart Defibrillators
12. Study and survey on Hard Disk Reading and writing process
13. Design Metal detectors
14. Study and survey on Magnetic Resonance Imaging (MRI)
15. Design Magnetic Brakes
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1.Matthew N. O. Sadiku, “Principles of Electromagnetics”, 4th Edition, Oxford University Press.
Reference Books:
1. John D. Kraus “Electromagnetic”, McGraw Hill.
2. William Hyte “Electromagnetic Engineering”, McGraw Hill
3. Edminister J.A, Electromagnetics, Tata McGraw-Hill.

4. R.K Shevgaonkar, Electromagnetic waves,Tata McGraw-Hill.
5. S Salivahanan& S Karthie, “electromagnetic Field Theory” Vikas Publishing House Ltd.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - ANALOG COMMUNICATION**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:	
	Signals and Linear Systems.

Course Objectives:	
1.	To introduce essential components of communication system.
2.	To teach the students DSB-FC modulation and demodulation and its mathematical background
3.	To teach the students DSB-SC & SSB modulation and demodulation and its mathematical background
4.	To teach the students frequency modulation and demodulation and its mathematical background
5.	To introduce the students working of radio receivers.
6.	To introduce the studentsanalog to digital conversion technique in communication system

Course Outcomes: After learning this course students will be able to	
1	Identify the basic components and effect of noise on communication system
2	Demonstrate the knowledge of DSB-FC modulation and demodulation and its mathematical background

3	Demonstrate the knowledge of DSB-SC & SSB modulation and demodulation and its mathematical background	
4	Demonstrate the knowledge of frequency modulation and demodulation and its mathematical background	
5	Identify components of communication receiver system.	
6	Demonstrate the knowledge of Pulse Modulation technique	
UNIT – I	**Principles of Communication Systems**	**(08 Hours)**
	Review of signals and systems, Frequency domain of signals, Block schematic of communication system, base band signals, RF bands, Necessity of modulation, Types ofchannels, Noise types - Internal & External, Noise Calculations, Signal to Noise ratio, Noise figure, Noise Temperature	
UNIT – II	**Amplitude Modulation-I**	**(08 Hours)**
	Amplitude Modulation principles, Representation of AM, Frequency spectrum & BW, Modulation index, % modulation, Power relations in AM, Trapezoidal patterns-, high- and low-level AM transmitters, DSB-FC Generation-linear and non-linear modulator, Linear modulators-low- and high-level linear modulators, Non-linear modulators- square law modulator and switching modulator, DSB-FC Demodulation- square law detector and envelope/diode detector.	
UNIT - III	**Amplitude Modulation-II**	**(08 Hours)**
	DSB-SC Principles, DSB-SC Generation Methods: Multiplier modulator, linear modulator, non-linear modulator and switching modulator, DSB-SC Demodulation-synchronous and coherent detection, SSB Principles, SSB Generation Methods: Filter method, phase shift method &the	

	third method,SSB Demodulation, Comparison of AM,DSB-SC and SSB, Independent sideband system (ISB), Vestigial sideband (VSB).	
UNIT -IV	**Frequency Modulation**	**(08 Hours)**
	Angle Modulation, Principles, mathematical analysis of FM, frequency deviation and percentage modulation, modulation index, deviation ratio, Bessel function,BW requirements, Narrow band & wide band FM, Pre-emphasis and de-emphasis, FM modulators - Direct & Indirect modulator, Direct modulator- varactor diode modulator, reactance modulator-frequency stabilized reactance modulator, Indirect modulator- Armstrong method, FM demodulators - Direct & Indirect detector, Types of direct detectors, Indirect detector-phase locked loop.	
UNIT -V	**Radio Receivers**	**(08 Hours)**
	Block diagram of AM receiver- TRF and Super heterodyne receiver,FM receiver, receiverperformance and measurement parameters: Sensitivity, Selectivity, fidelity, Image Frequency Rejection, Automatic Gain Control (AGC)- simple and delayed AGC, IF Amplifiers, Tracking- Two point and three-point tracking, Mixers-separately excited mixers and self-excited mixers.	
UNIT -VI	**Pulse Modulation**	**(08 Hours)**
	Sampling process, Sampling Theorem,Nyquist criteria, Sampling types: Natural & flat top sampling, aliasing error and aperture effect, Pulse Modulation-PAM modulator & demodulator, PWM modulator& demodulator, PPM modulator& demodulator, Comparison of PAM,PWM and	

	PPM, Multiplexing, TDM- transmitter and receiver, FDM- transmitter and receiver.	
List of experiments:		
1. Write a MATLAB program for generation of AM signal		
2. Write a MATLAB program for generation of DSB-SC signal		
3. Write a MATLAB program for generation of FM signal		
4. To perform Amplitude Modulation and Demodulation.		
5. To performDSB-SC Modulation & Demodulation.		
6. To performFrequency Modulation and Demodulation		
7. To perform sampling and Reconstruction of a signal.		
8. To performPulse Amplitude Modulation (PAM.)		
9. To performPulse Width Modulation (PWM)		
10. To performPulse Position Modulation (PPM)		
Topics for projets based learning*		
1. Survey report on types of noise and its impact on communication system		
2. Survey report on types of AM modulators and demodulators		
3. Build simple AM transmitter system using linear modulator		
4. Build simple AM transmitter system using non-linear modulator		
5. Build simple AM receiver system		
6. Survey report on types of FM modulators and demodulators		

7. Build simple FM transmitter system using direct modulator
8. Build simple FM transmitter system using indirect modulator
9. Build simple FM receiver system using direct demodulator
10. Build simple FM receiver system using indirect demodulator
11. Build a circuit for sampling and seconstruction of a signal.
12. Build the Pulse Amplitude Modulation circuit
13. Build the Pulse Width Modulation circuit
14. Build the Pulse Position Modulation circuit
15. Build the Pulse Position demodulation circuit
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Electronics Communication System, George Kennedy, 4th Edition, Tata McGraw HillPublication.
2. Modern Digital and analog Communication System, B.P.Lathi, Oxford University press.
Reference Books:
1. Principles of Communication Systems,Taub&Schilling,Tata McGraw-Hill Publication.
2. Communication Systems, Simon Haykin, 4th Edition, John Wiley & Sons.
3. Electronics Communications, Dennis Roddy, John Coolen, 4th Edition- PearsonEducation.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - DATA SCIENCE**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 Marks	Credits: 01
		Total Credits: 04

Course Pre-requisites:

	Python Programming and DBMS.

Course Objectives:

	• To acquire in-depth understanding of the fundamental concepts in data modeling, data analysis, statistics, machine learning techniques. • To strengthen the analytical and problem-solving skill through developing real time Use cases. • To gain practical experience in programming tools for data sciences, database systems, machine learning and Visualization tools. • To empower students with tools and techniques for handling, managing, analyzing and interpreting data.

Course Outcomes: After learning this course students will be able to

1	Develop a schema design, perform ETL operations with normalized techniques.
2	Visualize the data and detect anomalies with the help of statistical methods.
3	Implement ANOVA test, Regression & Dimensionality Reduction Techniques.

4	Model different machine learning algorithms and draw predictive outcomes.	
5	Develop an interactive and functional Dashboard using Power BI.	
6	Visualize the data using Power BI	
UNIT – I	**Fundamentals of Data Analysis using MySQL**	**(06 Hours)**
	Introduction to Data Science, DBMS approach to analytics, ER Diagram and Schema design, Normalization techniques, data cleaning and transforming – Extract, Transform & Load.	
UNIT – II	**Data Analysis and Visualization with Excel, Python**	**(06 Hours)**
	with Excel: Descriptive statistics, Outlier detection, Visualization: Box plot, Line chart, Pie chart, Bar charts, Histogram. **With Python:** Pandas and Numpy, Data modelling and transforming, dealing with null values, different data types, preparing data for the model, Visualization with Matplotlib, Seaborn.	
UNIT - III	**Advanced Statistics**	**(06 Hours)**
	Analysis of Variance (ANOVA), Regression Analysis: linear regression, multiple linear, and non-linear regression, Dimension Reduction Techniques.	
UNIT -IV	**Machine Learning-I**	**(06 Hours)**
	Introduction to Supervised and Unsupervised Learning, Clustering, Decision Trees, Random Forest, Multiple Linear Regression, Logistic Regression, Linear Discriminant Analysis	

UNIT -V	**Machine Learning-II**	**(06 Hours)**
	Time Series Forecasting: Introduction to Time Series, Correlation, Forecasting, Autoregressive models; Model Validation, Handling Unstructured Data.	
UNIT -VI	**Data visualization using Power BI**	**(06 Hours)**
	Introduction to Power BI, Basic charts and dashboard, Descriptive Statistics, Dimensions and Measures, Visual analytics: Storytelling through data, Dashboard design & principles.	

Term Work: Any 8 of below given list

1. SQL - Northwind Trader Database: Schema Design, Normalization & Cleaning.
2. Northwind Trader Database: Querying.
3. Statistics & Visualization with Excel.
4. Handling data using Python Pandas – Load (Multiple sources such as – Excel, SQL, CSV, URL), Transform.
5. Exploratory Data Analysis & Visualization using Python.
6. Machine Learning [Supervised] – Regression (Linear, Logistic & Multi-Linear.
7. Machine Learning [Supervised] – Classification (Logistic Regression, Decision Tree & Random Forest, KNN, K Mean Clustering, SVM).
8. Machine Learning [Time series] – ECG Analysis.
9. Machine Learning – Titanic Dataset Analysis (EDA)-1 .
10. Machine Learning – Titanic Dataset Analysis (Visualization & Prediction)-2.

11. Power BI – Input & Transforming Data.
12. Power BI – Creating Visuals & Reports.
13. Power BI – Dashboard.
Topics for projets based learning*
1. Design/Model a database without normalizing from scratch and create an E-R diagram as schema. Apply normalization techniques to previous created tables and perform Data Wrangling & Data Cleaning.
2. Implement an Email automation system using SQL & Python.
3. Create a Spotify Music Analysis visualization using Python pandas.
4. Create a Crypto currency Analysis visualization using Python pandas.
5. Build a Netflix like Movie recommendation model using Machine Learning.
6. Build a Song recommendation model using Machine Learning.
7. Build a Book recommendation model using Machine Learning.
8. Create a Credit Card Fraud Detection system using Machine Learning Algorithms.
9. Create a cheque clearance model using Machine Learning Algorithm.
10. Twitter Sentiment Analysis.
11. Uber Dataset Time Series Analysis.
12. Build a dynamic functional ChatBot using reddit conversations as dataset.
13. Build a Machine Learning Model with Health Care Data.
14. Create an interactive Super Store Dataset using PowerBI.
15. Create a Dashboard on Covid Vaccine Tracker using PowerBI.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas C. Mueller, Sarah Guido, O′Reilly Publication.

2. Practical Statistics for Data Scientists by Peter Bruce, Andrew Bruce, O′Reilly Publication.
3. Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life, by Devin Knight , Brian Knight, Packt Publishing.

Reference Books:

1. Python Machine Learning By Example: The easiest way to get into machine learning, by Yuxi (Hayden) Liu, Packt Publishing.
2.Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence, by Brett Powell, Packt Publishing.

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - ADVANCED COMPUTER PROGRAMMING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 04	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit: 02
		Total Credit: 02

Course Pre-requisites:

1.	C programming.

Course Objectives:

1. To introduce the basic building blocks for JAVA programming
2. To teach the concept of multithreading and exception handling.
3. To teach the lambda functions.
4. To train the student to use java script.
5. To train the student to use HTML.

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of basic programming in JAVA.
2	Implement the concept of multithreading and exception handling.

3	Use the lambda functions.
4	Implement the concept of JavaScript.
5	Implement the concept ofHTML.
6	Design webpage using JavaScript and HTML.

Term Work: Any 16 of below given list

1. Introduction to basics of JAVA and JAVA installation.
2. WAP to implement static and non-static members and their execution control flow.
3. WAP to implement wrapper class.
4. WAP to implement flow control statements, looping statements and arrays.
5. WAP to implement:
    a. Inheritance
    b. Abstraction
6. WAP to implement:
    a. Polymorphism
    b. Encapsulation
7. WAP to implement exception handling and assertions.
8. WAP to implement multithreading.
9. WAP to implement callable and future.
10. WAP to implement string handling.

11. WAP to implement IO streams.
12. WAP to implement collection Array List.
13. WAP to implement collection LinkedList.
14. WAP to implement lambda functions with predicates.
15. WAP to implement lambda functions with streams.
16. WAP to implement annotations.
17. WAP to implement the basics of HTML
18. WAP to implement the basics of java script
19. WAP to implement handling of events and errors, debugging with java scripts.
20. A mini-project to create Web Pages using HTML and JavaScript.
Text Books:
1. Programming with Java: A Primer, 3E by E Balagurusamy, Tata McGraw Hill Publishing Company.
Reference Books:
1. Java Complete Reference, Herbert Schildt, McGraw Hill Publishing Company
2. Java: How to Program by Deitel and Deitel
3. Ivan Bayross, "Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, Perl – CGI", BPB Publication.

Bharati Vidyapeeth
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College of Engineering, Pune

B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - SENSOR MODELLING AND SIMULATION LABORATORY

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 1

Course Pre-requisites:

	signals and systems and control systems.

Course Objectives:

1.	To introduce the transducers and sensors which will help direct measurement of electronic, electrical, and communication parameters.

Course Outcomes: After learning this course students will be able to

1	Characterize the temperature sensors.
2	Simulate the performance of a bio-sensor.
3	Measurement of level in a tank using capacitive type level probe.
4	Characterize the LVDT
5	Design an orifice plate for a typical application.

6	Simulate the performance of a chemical sensor.
7	Characterize the strain gauge sensor.

List of Practicals to be performed in the laboratory

1. To learn the various static and dynamic characteristics of measurement systems.
2. Characterize the temperature sensor (RTD) on virtual lab
3. Measurement of level in a tank using capacitive type level probe on virtual lab
4. Characterize and analyze the working of the LVDT.
5. Characterize the strain gauge sensor.
6. To measure and study of Pressure indicator With Pressure Output in percentage
7. To measure and study of Flow Indicator with Flow rate, Totalizer
8. To measure and study of Level Indicator with MM, CM and percentage
9. To study Inductive rotor position sensor with four inductive coils using MATLAB
10. To study Electrothermal converter using MATLAB.
11. To study Rotary transformer for measurement of angle of rotation using MATLAB
12. To study Exponential light-emitting diode with optical power output port using MATLAB

Text Books&Reference Books:

1. H. S. Kalsi, “Digital Instrumentation”, Tata McGraw Hill
2. Clyde F. Coombs “Electronic Instrumentation Handbook” McGraw Hill
3. Cooper Helfric, “Electronic Instrumentation & Measurement Techniques”, Prentice Hall Publication

Bharati Vidyapeeth
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College of Engineering, Pune

B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - Calibration and Repair of Lab Equipments**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 00	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit: 02
		Total Credits: 2

Course Pre-requisites:	
	Fundamentals of Electrical Engineering,Basic Electronics,Digital Electronics
Course Objectives:	
	• To teach the student to use and measurement of Lab Equipment's. • To teach measurement characteristics of Lab Equipment's • To provide the basics knowledge of analysis and design of Lab Equipment's. • To train the students for troubleshoot Lab Equipment's. • To train the students for repair Lab Equipment's. • To train the students for calibrate Lab Equipment's.
Course Outcomes: After learning this course students will be able to	
1	Identity and detect fault in power supply.
2	Analyze and repair True RMS meter and DMM.
3	Analyze and repair of Energy meter

4	Identify and detect fault in Different Indicators.
5	Identify and repair different faults in function generator and Oscilloscope.
6	Measure and Repair Electrosmog Meter.

Term Work:

1. Troubleshoot and Repair of power supply.
2. Troubleshoot and Repair megger digital.
3. Troubleshoot and Repair Digital Multi-Meter.
4. Troubleshoot and Repair True RMS meter.
5. Troubleshoot and Calibrate 1 phase and 3 phase Energy meter.
6. Troubleshoot and Calibrate Pressure indicator.
7. Troubleshoot and Calibrate Flow Indicator.
8. Troubleshoot and Calibrate Level Indicator.
9. Troubleshoot and Repair function generator
10. Troubleshoot and Repair CRO and DSO
11. Troubleshoot and Repair ELECTROSMOG Meter

Text Books:

6. "Troubleshooting Electronic Equipment" by R. Khandpur
7. "How to Diagnose and Fix Everything Electronic" , Second Edition by Michael Jay Geier

Reference Books:

1. H. S. Kalsi, "Digital Instrumentation", Tata McGraw Hill

2. Clyde F. Coombs “Electronic Instrumentation Handbook” McGraw Hill
3. Cooper Helfric, “Electronic Instrumentation & Measurement Techniques”, PrenticeHall Publication

BHARATI VIDYAPEETH (DEEMED TO BE) UNIVERSITY, PUNE

Syllabus for

MASTER OF SCIENCE

M.Sc. in ENVIRONMENT SCIENCE AND TECHNOLOGY

Under

FACULTY OF SCIENCE

Course Structure and Detailed Syllabus

Semester I, II, III and IV

(UNDER CHOICE BASED CREDIT SYSTEM)

Effective from the Academic Year 2019-2020

SEMESTER WISE COURSE INFORMATION

Semester I

Course Number	Course Title	Credit Value	Hours per week	Weightage (UE)	Weightage (IA)	EoTM
	Core Courses					
EST 101	Ecosystem Studies	3	3	60	40	University
EST 102	Environmental Chemistry and Microbiology	3	3	60	40	University
GEO 102	Fundamentals of Geoinformatics	3	3	60	40	University
EST 103	Sustainable development	3	3	60	40	University
EST 111	Field techniques - I	2	3	60	40	University
EST 112	Lab Analytical techniques - I	2	3	60	40	University
GEO 112	Techniques in Geographical Information Systems	2	3	60	40	University
	Pre-requisites					
EST 104	Basic Statistical Methods	3	3		100	Continuous
EST 105	Introduction to Data Analysis	3	3		100	Continuous
	Total Credits / Hours	**22**	**27**			

From the core courses:

Course Nos EST 101, EST 102, Geo 102, EST 103 are theory courses
Course Nos EST 111, EST 112, GEO 112 are practical courses

Total credits offered in Semester I : 22

Semester II

Course Number	Course Title	Credit Value	Hours per week	Weightage (UE)	Weightage (IA)	EoTM
	Core Courses					
EST 201	Biodiversity Assessment and Conservation	3	3	60	40	University
EST 202	Engineered Systems for Water and Waste Water	3	3	60	40	University
EST 203	Solid and Hazardous Waste Management	3	3	60	40	University
EST 204	Air and Noise Pollution Management	3	3	60	40	University
EST 205	Research Methodology	2	3		100	Continuous
EST 211	Field Techniques - II	2	3	60	40	University
EST 212	Lab Analytical techniques - II	2	3	60	40	University
EST 213	Field Work	2	60 (cumulative)		100	Continuous
	Electives (any two)					
EST 206	Natural Resource Management	3	3		100	Continuous
EST 207	Environment and Health	3	3		100	Continuous
EST 208	Climate Change Science and Strategies	3	3		100	Continuous
EST 209	Data Analysis with R	3	3		100	Continuous
EST 2010	Instrumentation and Lab Management for environmental analysis	3	3		100	Continuous
EST 2011	Environmental biotechnology	3	3		100	Continuous
	General Courses (any one)					
GEN 201	General English	2	2		50	Continuous
GEN 202	Project Management	2	2		50	Continuous
	Total	**28**	**32**			

From the core courses:

Course Nos EST 201, EST 202, EST 203, EST 204 and EST 205 are theory courses
Course Nos EST 211, EST 212, EST 213 are practical courses

Total Credits offered in Semester II : 28

Semester III

Course Number	Course Title	Credit Value	No. of hours per week	Weightage UE	Weightage IE	EoTM
	Core Courses					
EST 301	Integrated Impact Assessment	3	3	60	40	University
EST 302	Environmental Policies and Law	3	3	60	40	University
EST 311	Dissertation	12	14	60	40	University
EST 303	Technical Writing	2	3		100	Continuous
	Electives (any three)					
EST 304	Environment Management Techniques	3	3		100	Continuous
EST 305	Water Management	3	3		100	Continuous
GEO 303	Applications of geospatial technologies	3	3		100	Continuous
EST 306	Urban Environment Management	3	3		100	Continuous
EST 307	Advanced Pollution Control Technology	3	3		100	Continuous
	General Courses (any one)					
GEN 301	Swaach Bharat Abhiyan Internship	2	2		50	Continuous
GEN 302	Education for Sustainable Development	2	2		50	Continuous
	Total	**31**	**34**			

From the core courses:

Course Nos EST 301, EST 302, EST 303 are theory courses
Course Nos EST 311 is dissertation.

Total Credits offered in Semester III : 31

Semester IV

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
EST 411	Dissertation	12	14	60	40	University
	Electives (any four)					
EST 401	Ecorestoration	3	3		100	Continuous
EST 402	Corporate Social Responsibility and Sustainability	3	3		100	Continuous
EST 403	Certification for ISO 14001	3	3		100	Continuous
EST 404	Urban Sustainability	3	3		100	Continuous
EST 405	Industrial Safety and Occupational Health (certifications)	3	3		100	Continuous
EST 406	Green technology and Management	3	3		100	Continuous
EST 407	Green Buildings	3	3		100	Continuous
	General Courses (any one)					Continuous
GEN 401	Entrepreneurship Development	2	2		50	Continuous
GEN 402	Soft Skills	2	2		50	Continuous
	Total	**26**	**28**			

From the core courses:

Course Nos EST 411 is dissertation.

Total Credits offered in Semester IV : 30

BHARATI VIDYAPEETH (DEEMED TO BE) UNIVERSITY, PUNE

Syllabus for

MASTER OF SCIENCE

M.Sc. in GEOINFORMATICS

Under

FACULTY OF INTERDISCIPLINARY STUDIES

Course Structure and Detailed Syllabus

Semester I, II, III and IV

(UNDER CHOICE BASED CREDIT SYSTEM)

Effective from the Academic Year 2019-2020

Semester I

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
GEO101	Fundamentals of remote sensing	3	3	60	40	University
GEO 102	Fundamentals of Geoinformatics	3	3	60	40	University
GEO 103	Fundamentals of programming	3	3	60	40	University
EST 101	Ecosystem Studies	3	3	60	40	University
EST 306	Urban Environment Management	3	3	60	40	University
EST 111	Field techniques –I	2	3	60	40	University
GEO 111	Techniques in image interpretation and remote sensing	2	3	60	40	University
GEO 112	Techniques in Geographical Information Systems	2	3	60	40	University
	Pre-requisites					
EST 104	Basic Statistical Methods	3	3		100	Continuous
EST 105	Introduction to Data Analysis	3	3		100	Continuous
	Total	**27**	**30**			

From the core courses:

Course Nos GEO 101, GEO 102, Geo 103, EST 101, EST 306 are theory courses
Course Nos EST 111, GEO 111, GEO 112 are practical courses

Total credits offered in Semester I : 27

Semester II

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
GEO 201	Geodatabase Management	3	3	60	40	University
GEO 202	Advanced Remote Sensing	3	3	60	40	University
GEO 203	Digital Image Processing	3	3	60	40	University
GEO 204	WebGIS	3	3	60	40	University
GEO 205	Research Methodology	2	2		100	Continuous
GEO 211	Techniques in database management	2	3	60	40	University
EST 212	Techniques in digital image processing	2	3	60	40	University
GEO 213	Programming for GIS-I	2	3	60	40	University
GEO 214	Field Work	2	60 (cumulative)		100	Continuous
	Electives (any two)					
EST 201	Biodiversity assessment and conservation	3	3		100	Continuous
EsT 206	Natural resource management	3	3		100	Continuous
EST 207	Health GIS	3	3		100	Continuous
EST 208	Climate change science and strategies	3	3		100	Continuous
EST 209	Data Analysis with R	3	3		100	Continuous
	General Courses (any					

	one)					
GEN 201	General English	2	2		100	Continuous
GEN 202	Project Management	2	2		100	Continuous
	Total	**30**	**31**			

From the core courses:

Course Nos GEO 201, GEO 202, GEO 203, GEO 204, are theory courses

Course Nos GEO 211, GEO 212, Geo 213, GEO 214 are practical courses

Total Credits offered in Semester II : 30

Semester III

Course Number	Course Title	Credit Value	No. of Hours/ week	Weightage UE	Weightage IA	EoTM
	Core Courses					
GEO 301	Spatial analysis and modeling	3	3	60	40	University
GEO 311	Programming for GIS-II	3	3	60	40	University
GEO 312	Dissertation	12	14	60	40	University
GEO 313	Programming for GIS-III	2	3	60	40	University
GEO 314	Techniques in Spatial Statistics, Analysis and Modeling	2	3	60	40	University
	Electives (any two)					
GEO 302	Geospatial Modeling	3	3		100	Continuous
GEO 303	Applications of geospatial technologies	3	3		100	Continuous
GEO 304	Photogrammetry	3	3		100	Continuous
GEO 305	Water management and Geospatial Technologies	3	3		100	Continuous
	General Courses (any one)					
GEN 301	Technical Writing	2	2		100	Continuous
GEN 302	Soft Skills	2	2		100	Continuous
	Total	**30**	**34**			

From the core courses:

Course Nos GEO 301 is a theory course.

Course Nos GEO 311, GEO 313, GEO 314 are practical courses

Total Credits offered in Semester III : 30

Semester IV

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
GEO 411	Dissertation	12	14	60	40	University
GEO 412	Internship	10	20	60	40	University
	General Courses (any one)					
GEN 401	Entrepreneurship Development	2	2		100	Continuous
	Total	**24**	**36**			

Total Credits offered in Semester IV : 24

BHARATI VIDYAPEETH (DEEMED TO BE) UNIVERSITY, PUNE

Faculty Of Interdisciplinary Studies

M.Sc. (Wildlife Conservation Action)

COURSE STRUCTURE AND DETAILED SYLLABUS

OF

SEMESTER I, II, III and IV (UNDER CREDIT SYSTEM)

EFFECTIVE FROM 2019-2020 AT SEMESTER I

At the

INSTITUTE OF ENVIRONMENT EDUCATION AND RESEARCH

BHARATI VIDYAPEETH UNIVERSITY, PUNE

In collaboration with

WILDLIFE TRUST OF INDIA, NEW DELHI

SEMESTER WISE COURSE INFORMATION

Semester I

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
EST 101	Ecosystem Studies	3	3	60	40	University
CA 101	Sustainability Of Socio-Ecological Systems	3	3	60	40	University
CA 102	Wildlife Law And Trade Control	3	3	60	40	University
CA 103	Conservation Problems And Practices	3	3	60	40	University
GEO 102	Fundamentals Of Geoinformatics	3	3	60	40	University
EST 111	Field Techniques I	2	3	60	40	University
GEO 112	Techniques In Geographical Information Systems	2	3	60	40	University
CA 104	Research Methodology	2	2		100	Continuous
CA 111	Field Taxonomy I	2	60 hours cumulative		100	Continuous
	General Courses					
EST 104	Statistical Methods	3	3		100	Continuous
EST 105	Introduction To Data Analysis	3	3		100	Continuous
	Total	**29**	**32**			

From the core courses:

Course Nos EST 101, CA 101, CA 102, CA 103, GEO 102, CA 104 are theory courses
Course Nos EST 111, GEO 112, CA 111 are practical courses

Total Credits offered in Semester I : 29

Semester II

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
EST 201	Biodiversity Assessment And Conservation	3	3	60	40	University
CA 201	Wildlife Health, Rescue And Rehabilitation	3	3	60	40	University
CA 202	Behavioural Ecology	3	3	60	40	University
CA 211	Advanced Statistics	2	3		100	Continuous
CA 212	Field Techniques II	2	3	60	40	University
CA 213	Field Taxonomy II	2				
CA 214	Field Work	2	60 (cumulative)		100	Continuous
	Electives (any two)					
EST 206	Natural Resource Management	3	3		100	Continuous
EST 401	Ecorestoration	3	3		100	Continuous
CA 203	Urban Biodiversity	3	3		100	Continuous
	General Courses					
GEN 201	General English	2	2		100	Continuous
GEN 202	Technical Writing	2	2		100	Continuous
	Total	**25**	**26**			

From the core courses:

Course Nos EST 201, CA 201, CA 202 are theory courses
Course Nos CA 211, CA 212, CA 213, CA 214 are practical courses

Total Credits offered in Semester II: 24

Semester III

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
CA 311	Dissertation	24	40	60	40	University
	General Courses					
GEN 301	Project Management	2	2		100	Continuous
	Total	**26**	**42**			

Total Credits offered in Semester III : 26

Semester IV

Course Number	Course Title	Credit Value	Hours per week	Weightage UE	Weightage IA	EoTM
	Core Courses					
CA 411	Internship	10	40	60	40	University
	Electives (any three)					
CA 401	Conservation Leadership	3	3		100	Continuous
CA 402	Conservation Communication, Education And Public Awareness	3	3		100	Continuous
CA 403	Conservation Management	3	3		100	Continuous
EST 208	Climate Change Science And Strategies	3	3		100	Continuous
	General Credit Course					
GEN 401	Entrepreneurship Development	2	2		100	Continuous
GEN 402	Soft Skills	2	2		100	Continuous
	Total	**24**	**54**			

Total Credits offered in Semester IV : 24

Bharati Vidyapeeth (Deemed to be University) Institute of Management & Entrepreneurship Development, Pune

1.1.3 Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year: 64

Name of the Course	Course Code	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
115 Data Analysis using Software Tools (MS Excel)	115	1st July 2016	Skill Development
211 Data Analysis using Software Tools (SPSS)	211	1st July 2016	Skill Development
303 Entrepreneurship Development	303	1st July 2016	Entrepreneurship
304 Summer Internship	304	1st July 2016	Employability
305 Innovation, Technology & Change Management	305	1st July 2016	Skill Development
306 Digital Marketing	306	1st July 2016	Employability and Entrepreneurship
401 Project Management	401	1st July 2016	Employability and Entrepreneurship
414 HR Analytics	414	1st July 2016	Employability
410 Financial Modeling using MS Excel	410	1st July 2016	Skill Development
406 Social Media Marketing	406	1st July 2016	Employability
419 Big Data Analysis	419	1st July 2016	Employability
PO 03 Logistics and Supply Chain Management	PO 03	1st July 2016	Employability
102 -Business Organization & Systems	102	1st July 2018	Entrepreneurship
106 - Career & Life Skills	106	1st July 2018	Skill Development
206 - Sectoral Analysis	206	1st July 2018	Employability
305 - Entrepreneurship Development	305	1st July 2018	Entrepreneurship
401 - Enhancing Personal & Professional Skills	401	1st July 2018	Skill Development
406 - Basics of Taxation	406	1st July 2018	Employability
506- Social Media Management	506	1st July 2018	Employability
601 - Industrial Exposure.	601	1st July 2018	Employability
506 - Event Management	506	1st July 2018	Skill Development
M603 - Integrated Marketing communication	M603	1st July 2018	Skill Development
M604- Digital Marketing	M604	1st July 2018	Employability and Entrepreneurship
F503 - Elements of Financial Services	F503	1st July 2018	Employability
HR503- Performance & Compensation Management	HR503	1st July 2018	Employability
IB504- Export Import Procedures and Documentation	IB504	1st July 2018	Employability and Entrepreneurship
ED503- Entrepreneurship & New Ventures Creation	ED503	1st July 2018	Entrepreneurship Development

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Entrepreneurship Development
Pune - 411 038.

ED603- E - Commerce	ED603	1st July 2018	Entrepreneurship
ED604- Managing Family Business	ED604	1st July 2018	Entrepreneurship
FM503-Introduction to Financial Markets and Financial Institutions	FM503	1st July 2018	Skill Development and Employability
Algorithm and program Design (102)	102	1st July 2018	Skill Development (Logical skills)
C Programming – I (103)	103	1st July 2018	Employability
Business Mathematics (105)	105	1st July 2018	Skill Development
Lab on MS-Office Suite (106)	106	1st July 2018	Employability
Lab on C Programming – I (107)	107	1st July 2018	Employability
General course-I:Community Work I / Career & Life Skills / Waste Management (108)	108	1st July 2018	Skill Development
C Programming - II (203)	203	1st July 2018	Employability
Lab on C Programming - II (206)	206	1st July 2018	Employability
Lab on Oracle and Multimedia (306)	306	1st July 2018	Employability
Lab on Linux Operating System (307)	307	1st July 2018	Employability
Entrepreneurship Development (405)	405	1st July 2018	Entrepreneurship
Lab on Java (406)	406	1st July 2018	Employability
Minor Project – I (407)	407	1st July 2018	Employability
Lab on Internet Technology and C# Programming (506)	506	1st July 2018	Employability
Minor Project II (507)	507	1st July 2018	Employability
C Programming (101)	101	1st July 2018	Employability
Discrete Structures (104)	104	1st July 2018	Skill Development
Web Supporting Technologies (106)	106	1st July 2018	Employability
C Lab (107)	107	1st July 2018	Employability
Soft Skills (108)	108	1st July 2018	Skill Development
Self learning-1 (Societal Related Topic) (109)	109	1st July 2018	Skill Development
Data structure and Algorithms (201)	201	1st July 2018	Skill Development
Statistical Techniques (204)	204	1st July 2018	Skill Development
Database Management Systems Lab (206)	206	1st July 2018	Employability
DataStructures Lab (207)	207	1st July 2018	Skill Development
Project-I (208)	208	1st July 2018	Employability
Object Oriented Analysis And Design (303)	303	1st July 2018	Employability
Probability and Graph theory (304)	304	1st July 2018	Employability

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Pune - 411 038.

Data Warehousing and Data Mining (401)	401	1st July 2018	Employability
Information Security (402)	402	1st July 2018	Employability
Design Patterns (403)	403	1st July 2018	Employability
Linux Lab (407)	407	1st July 2018	Employability
Data Science (501)	501	1st July 2018	Employability
Internship Project (601)	601	1st July 2018	Employability

1.2.1 Number of new courses introduced of the total number of courses across all programs offered during the year: 10

Name of the Course and Code	Course Code	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
Data Analysis Using Advance Excel (108)	108	2020	Skill Development
Computers Application for Business (109)	109	2020	Employability and Skill Development
Managerial Skills for Effectiveness (211)	211	2020	Skill Development
Applied Database Management Systems (101)	101	2020	Employability
Computational Statistics (104)	104	2020	Employability
Management Concepts and Applications (105)	105	2020	Employability
MOOCS Based General Course 1 (Soft Sills) (GE-1) (108)	108	2020	Skill Development
Object Oriented Software Engineering (201)	201	2020	Employability
Data structures using Python (203)	203	2020	Employability
MOOCS Based General Course 2 (GE-2) (208)	208	2020	Skill Development

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