Bharati Vidyapeeth Deemed University

College of Engineering, Pune- 411043

The Structure of the Curriculum: 2014 Course

Choice Based Credit System (CBCS)

B. TECH. MECHANICAL: SEMESTER- I & II

Bharati Vidyapeeth University

College of Engineering, Pune

Department of Mechanical Engineering

Vision: To provide mechanical engineers capable of dealing with global challenges

Mission: Social transformation through dynamic education

Programme Educational Objectives (PEOs):

Graduates will be able,

- To fulfill need of industry with theoretical and practical knowledge
- To engage in lifelong learning and continued professional development
- To fulfill social responsibilities

Programme Outcomes (POs):

a. To apply knowledge of mathematics, science and engineering fundamentals for solving engineering problems

b. To identify the need, plan and conduct experiments, analyze data for improving the mechanical processes

c. To design and develop mechanical systems considering social and environmental constraints.

d. To design and develop a complex mechanical system using advanced mathematical and statistical tools and techniques

e. Use of information technology (IT) tools for prediction and modeling of routine activities to enhance the work performance

f. To know social responsibilities while doing professional engineering practice.

g. To become familiar with eco-friendly, sustainable and safe work environment.

h. To take into account professional ethics while designing engineering systems.

i. Able to work efficiently as a group leader as well as an individual.

j. To communicate in written and verbal form with subordinates and supervisors

k. To apply project and finance management techniques in multidisciplinary environments.

l. To create interest for higher education and updating the knowledge.

B. TECH. MECHANICAL: SEMESTER- I (2014 Course)

S.N.	Course	Teaching Scheme (Contact Hrs./ week)			Examination Scheme (Marks)						Total Credits		
		L	P/D	T	End Sem. Exam	Continuous Assessment				Total	TH	TW	Total
						Unit Test	Attendance	Assignments	TW				
1.	Engineering Mathematics – I	3	-	1	60	20	10	10	-	100	3	1	4
2.	Fundamentals of Civil Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Graphics *	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Physics	4	2	-	60	20	10	10	25	125	4	1	5
5.	Fundamentals of Electrical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
6.	Professional skill Development – I	2	-	-	50		-	-	-	50	2	-	2
7.	Workshop Technology	-	2	-	-	-	-		50	50	-	1	1
	Total	19	10	1	350	100	50	50	150	700	19	6	25

L: Lectures, P/D: Practical/ drawing, T: Tutorial, TH: Theory, TW: Term work

* End Semester examination of duration 4 Hours.

B. TECH. (MECHANICAL) SEM.-II (2014 COURSE)

S. N	Course	Teaching Scheme (Contact Hrs./week)			Examination Scheme (Marks)						Total Credits		
		L	P/D	T	End Sem. Exam	Continuous Assessment				Total	TH	TW	Total
						Unit Test	Attendance	Assignments	TW				
1.	Engineering Mathematics – II	3	-	1	60	20	10	10	-	100	3	1	4
2.	Fundamentals of Mechanical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Mechanics	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Chemistry	4	2	-	60	20	10	10	25	125	4	1	5
5.	Mechanical Engineering Drawing*	2	4	-	60	20	10	10	25	125	2	2	4
6.	Professional skill Development-II	2	-	-	50	-	-	-	-	50	2	-	2
7.	Production Practice- I	-	2	-	-	-	-	-	50	50	-	1	1
	Total	18	12	1	350	100	50	50	150	700	18	7	25

L: Lectures, P/D: Practical/ drawing, T: Tutorial, TH: Theory, TW: Term work

* End Semester examination of duration 4 Hours.

Total Credits Sem. I - 25

Total Credits Sem. II -25

Grand Total -50

Rules for Conducting Tests

Mode of the test

- In each semester for each subject two tests shall be conducted. The schedule for the same will be declared at the commencement of academic year in the academic calendar.
- Each test shall carry 20 marks.
- University examination pattern has given weightage of 20 marks for the tests.

- To calculate these marks following procedure is followed:

  i) Average marks obtained in two tests shall be considered as provisional marks obtained by the student in the tests.

  ii) If the candidate appears only for one test during the semester, to calculate the marks obtained in the tests it will be considered that the candidate has got 0 (zero) marks in other test.

  iii) The provisional marks obtained by the candidate in class tests should reflect as proportional to theory marks. In cases of disparity of more than 15% it will be scaled down accordingly; these marks will be final marks obtained by the student. No scaling up is permitted.

  iv) If the candidate is absent for theory examination or fails in theory examination his final marks for tests of that subject will not be declared. After the candidate clears the theory, the provisional marks will be finalized as above.

- Paper pattern for tests

  i) All questions will be compulsory with weightage as following

Question 1	-	7 marks
Question 2	-	7 marks
Question 3	-	6 Marks

  ii) There will not be any sub-questions.

- For granting the term it is mandatory to appear for both tests conducted in each semester.
- Roll nos. allotted to students shall be the examination nos. for the tests.

Department of Mechanical Engineering
Syllabus: Semester I

ENGINEERING MATHEMATICS-I

Designation of Course	**Engineering Mathematics-I**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 3 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 01
Tutorial : 01 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	
	Term Work / Oral	-- Marks	
	Total	100 Marks	4

Course Prerequisites:-	Student should have Basic Knowledge of Algebra
Course Outcomes:-	1. Solve the consistency of any type of systems. 2. Find the roots of equations using DeMoiver's theorem and to locate imaginary points using argand diagram. 3. Apply Leibnitz's rule to find n th derivative. 4. Test convergence and divergence of infinite series. 5. Compute total derivative. 6. Compute maxima and minima of any function of two variables.

Course Contents

Unit 1	**Matrices**	**(8 Hrs.)**
Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors, Cayley – Hamilton Theorem. Application to problems in Engineering.		
Unit 2	**Complex Numbers And Applications**	**(8 Hrs.)**
Definition, Cartesian, Polar and Exponential Forms ,Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations., Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.		
Unit 3	**Differential Calculus and Expansion Of Functions**	**(8 Hrs.)**
Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem. Taylor's Series and Maclaurin's Series.		
Unit 4	**Differential Calculus and Infinite Series**	**(8 Hrs.)**
Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits. Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence.		
Unit 5	**Partial Differentiation And Applications**	**(8 Hrs.)**

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables. Errors and Approximations.		
Unit 6	**Jacobian and Maxima And Minima**	**(8 Hrs.)**
Jacobians and their applications, Chain Rule, Functional Dependence. Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.		

Text Books/ Reference Books

1. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune, 7th edition (1988).
2. Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).
3. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008).
4. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8thedition (1999).
5. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil, Thomson Learning, 6th edition (2007).
6. Advanced Engineering Mathematics, 2e, by M. D. Greenberg, Pearson Education, 2nd edition (2002).

Unit Tests

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

FUNDAMENTALS OF CIVIL ENGINEERING

Designation of Course	**Fundamentals of Civil Engineering**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	Theory: 03 Practical: 01
	Term Work / Oral	25 Marks	
	Total	125 Marks	4

Course Prerequisites:-	Basics of Science, measurements and Mathematics
Course Outcomes:-	1. Different building components and material 2. Classification of surveying 3. Leveling of the ground 4. Planning of building 5. Methods of irrigation and water supply 6. Different methods of transportation

Course Contents

Unit 1	**Civil Engineering Scope And Applications.**	**(6 Hrs.)**
Civil Engineering scope, importance and applications to other disciplines of Engineering; Civil Engineering construction process and role of Civil engineer; Government authorities related to Civil Engineering; Types of structures based on loading , material and configuration; Building components and their functions; Civil Engineering materials: concrete, construction steel, bricks, flooring material and tiles, paints, plywood , glass and aluminum.		
Unit 2	**Surveying**	**(6 Hrs.)**
Objectives, Principles and Classification of Surveying; Linear, angular, Vertical and area Measurements and related instruments.		
Unit 3	**Building Planning And Bye Laws**	**(6 Hrs.)**
Site selection for residential building; Principles of building planning; Building bye laws- necessity, Floor Space Index, Heights , open space requirements, set back distance , ventilation and lighting, concept of carpet and built up area, minimum areas and sizes for residential buildings ; Concept of Eco friendly structures and Intelligent buildings.		
Unit 4	**Foundations and Earthquakes**	**(6 Hrs.)**
Function of foundation, concept of bearing capacity and its estimation, types of foundation and its suitability, causes of failure of foundation. Earthquakes causes, effects and guidelines for earthquake resistant design, earthquake zones.		
Unit 5	**Irrigation And Water Supply**	**(6 Hrs.)**
Rainfall measurement and its use in design of dams; Types of dams, canals, methods of irrigation and their merits and demerits; hydropower structures ;Water supply, drinking water requirements and its quality, water and sewage treatment flow chart.		
Unit 6	**Infrastructure**	**(6 Hrs.)**
Roads- types of roads and their suitability, cross section of roads, meaning of terms ; width of roads, super elevation, camber, gradient ,sight distance, materials used for construction of roads. Railways- Types of gauges, section of		

railway track, components of railway track, advantages. Bridges: Components - Foundation, Piers, Bearings, Deck. Airways- Components -Runway, Taxiway and Hangers.

Term Work

Experiments

Any ten experiments from the following:

1. Study and use of prismatic compass and measurement of bearings.
2. Study and use of Dumpy level and reduction of levels by collimation plane method.
3. Area measurement by Digital Planimeter.
4. Drawing plan and elevation of a residential bungalow.
5. Study of features of topographical maps.
6. Assignment on collection of information on Civil Engineering materials.
7. Assignment on types of foundations.
8. Assignment problem on irrigation and hydropower structures.
9. Assignment on study of flow chart of water and sewage treatment.
10 Assignments on types of transportation systems.

Text Books/ Reference Books

1. “Surveying- Vol I” - S.K. Duggal, Tata McGraw Hill Publication.
2. “Built Environment” – Shah, Kale, Patki, , Tata McGraw Hill Publication
3. “Building Construction” – Dr. B.C. Punmia , Laxmi Publication
4. “Irrigation and water Power Engineering” - Dr. P.N. Modi, Standard Publishers, New Delhi
5. “Text book of Transportation Engineering “- Arora, Charotar Publishers.
6. Water supply and sanitary engineering-Rangawala, Charotar Publishers.
7. Basic Civil engineering”- M.S. Palanichamy- Tata McGraw Hill Publication

Unit Tests-

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

ENGINEERING GRAPHICS

Designation of Course	**Engineering Graphics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 04 Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/ Week	Unit Test	20 Marks	Theory: 04
	Assignments	10 Marks	Practical: 01
	Internal Evaluation	10 Marks	
	Term Work/ Oral	50 Marks	
	Total	150 Marks	05

Course Prerequisites:-	Basic fundamentals of Mathematics
Course Outcomes:-	Different engineering curves and dimensioning. Differentiate Ist angle and IIIrd angle projection Method in orthographic. To interpret views of the object and to draw by using Isometric projection method. Projection of Lines and its traces. Projection of different planes. Projection of solids and its sections.

Course Contents

Unit 1	**Lines and Dimensioning in Engineering Drawing and Engineering Curves**	**(08 Hrs.)**
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 Directrix-Focus method, Arcs of Circle method, Concentric circle method and Oblong method. Involute of a circle, Cycloid, Archimedean Spiral, Helix on cone, Loci of points- Slider Crank mechanisms.		
Unit 2	**Orthographic Projection**	**(08 Hrs.)**
Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.		
Unit 3	**Isometric Projections**	**(08 Hrs.)**
Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, and Sphere.		
Unit 4	**Projections of Points and Lines**	**(08 Hrs.)**
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,		
Unit 5	**Projections of planes**	**(08 Hrs.)**
Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP		
Unit 6	**Projection of Solids and Section of Solids**	**(08 Hrs.)**
Projection of prism, pyramid, cone and cylinder by rotation method. Types of section planes, projections of solids cut by different sections of prism, pyramid, cone and cylinder.		

Term work

Term work shall consist of five half-imperial size or A2 size (594 mm x 420 mm) sheets. Assignment 05 Problems on each unit in A3 size Drawing Book

Sheets

1. Types of lines, Dimensioning practice, Free hand lettering, 1nd and 3rd angle methods symbol.
2. Curves and loci of points.
3. Projections of Points and Lines and planes.
4. Orthographic Projections.
5. Isometric views.
6. Projection of Solids.

Text Books/ Reference Books

1. "Elementary Engineering Drawing", N.D. Bhatt, Charotar Publishing house, Anand India.
2. "Text Book on Engineering Drawing", K.L.Narayana & P.Kannaiah, Scitech Publications, Chennai.
3. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi.
4. "Engineering Drawing and Graphics", Venugopal K., New Age International publishers.
5. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005.
6. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005.
7. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988.

Unit Tests-

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

ENGINEERING PHYSICS

Designation of Course	**Engineering Physics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	Theory: 04 Practical: 01
	Term Work/ Oral	25 Marks	
	Total	125 Marks	5

Course Prerequisites:-	Basics knowledge of Science and fundamentals Laws
Course Outcomes:-	1. Interpret the properties of charged particles to develop modern instruments and express the mechanism of fusion and fission. 2. Interpret the basics of semiconductors and its uses to develop devices such as diode. 3. Express knowledge of nanoscience to develop new electronic devices. 4. Express the concept of transverse waves. Associate the wave nature of light and apply it to measure stress, pressure and dimension etc. 5. Analyze the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for Non Destructive Testing. 6. Define behavior of quantum particles in different types of potentials.

Course Contents

Unit 1	**Modern Physics and Nuclear Physics**	**(08 Hrs.)**

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Wavelength and resolution, Specimen limitation, Depth of field and focus, Electron microscope, Positive rays, Separation of isotopes by Bainbridge mass spectrograph. Nuclear fission, Liquid drop model of nucleus, Nuclear fission in natural uranium, Fission energy, Critical mass and size, Reproduction factor, Chain reaction and four factor formula, Nuclear fuel and power reactor, Nuclear fusion and thermonuclear reactions, Merits and demerits of nuclear energy, Particle accelerators, Cyclotron, Betatron.

Unit 2	**Solid State Physics and Superconductivity**	**(08 Hrs.)**

Band theory of solids, Free electron theory, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics. Introduction, Properties of a super conductor, Meissner's effect, Critical field, Types of superconductors, BCS theory, High temperature superconductors, Application of superconductors.

Unit 3	**Thermodynamics And Nanoscience**	**(08 Hrs.)**

Zeroth law of thermodynamics, first law of thermodynamics, determination of j by Joule's method, Applications of first law, heat engines, Carnot's cycle and Carnot's engine, second law of thermodynamics, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics. Introductions of nanoparticals, properties of nanoparticals (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticals(Physical and chemical), synthesis of

colloids, growth of nanoparticals, synthesis of nanoparticals by colloidal rout, applications.		
Unit 4	**Optics – I, Interference, Diffraction**	**(08 Hrs.)**
Interference of waves, Visibility of fringes, interference due to thin film of uniform and non-uniform thickness, Newton's rings, Engineering applications of interference (optical flatness, interference filter, non-reflecting coatings, multi-layer ARC. Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima, Rayleigh's criterion for resolution, Resolving power of grating and telescope.		
Unit 5	**Optics – Ii, Polarization , Lasers**	**(08 Hrs.)**
Introduction, Double refraction and Huygens's theory, Positive and negative crystals, Nicol prism, Dichroism, Polaroids, Elliptical and circular polarisation, Quarter and half wave plates, Production of polarised light, Analysis of polarised light, half shade polarimeter, LCD. Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Properties of lasers, Applications of lasers (Engineering/ industry, medicine, communication, Computers), Holography.		
Unit 6	**Architectural Acoustics , Quantum Mechanics**	**(08 Hrs.)**
Elementary acoustics, Limits of audibility, Reverberation and reverberation time, Sabine's formula, Intensity level, Sound intensity level, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, Sound absorption materials, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies. Electron diffraction, Davisson and Germer's experiment, Wave nature of matter, De-Broglie waves, Wavelength of matter waves, Physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box and non-rigid box.		

Term Work

Experiments

Any ten experiments from the following:

1. Determination of band gap of semi-conductor.
2. Solar cell characteristics.
3. e/m by Thomson's method.
4. Uses of CRO for measurement of phase difference and Lissajos figures.
5. Hall effect and Hall coefficient.
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode, Photo diode, LED, Ge/Si diode).
8. Plank's constant by photodiode.
9. Wavelength by diffraction grating.
10. Newton's rings.
11. Ultrasonic interferometer.
12. Sound intensity level measurement.
13. Wavelength of laser by diffraction.
14. Determination of refractive index for O-ray and E-ray.
15. Brewester's law.

Assignments

1. Recent advances in Nanotechnology
2. Nuclear radiation detectors.
3. Atomic force microscope (AFM).
4. Advanced opto-electronic devices.
5. Laser in Industry.
6. Different spectroscopic methods – a comparison (Raman, IR, UVR, etc.).

Text Books/ Reference Books

1. Physics for Engineers – Srinivasan M.R.
2. A text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar
3. Engineering Physics- K. Rajagopal
4. Electronics Principles – A.P.Molvino
5. Fundamentals of Optics – Jenkins and White
6. A Textbook of Sound – Wood
7. Engineering Physics – Sen, Gaur and Gupta

Unit Tests

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

FUNDAMENTALS OF ELECTRICAL ENGINEERING

Designation of Course	**Fundamentals of Electrical Engineering**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03
Practical:- 02 Hours/Week	Unit Test	20 Marks	Practical: 01
Tutorials: -- Hours/ Week	Assignments	10 Marks	
	Internal Evaluation	10 Marks	
	Term Work / Oral	25 Marks	
	Total	125 Marks	04

Course Prerequisites:-	Students should have knowledge of Physics and Mathematics.
Course Outcomes:-	1. Understand and apply knowledge of basic concepts of work, power, and energy for electrical, mechanical and thermal systems. 2. Understand and apply knowledge of Kirchhoff's laws and network theorems to solve electrical networks. 3. Describe construction, principle of operation, specifications and 4. Applications of capacitors and batteries. 5. Describe and apply fundamental concepts of magnetic and electromagnetic circuits for operation of single phase transformer. 6. Define basic terms of single phase and three phase ac circuits and supply systems. 7. Know and use electrical safety rules.

Course Contents

Unit 1	**Basic concepts**	**(06 Hrs.)**
Concept of EMF, Potential Difference, current, resistance, Ohms law, resistance temperature coefficient, SI units of Work, power, energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems.		
Unit 2	**Network Theorems:**	**(06 Hrs.)**
Voltage source and current sources, ideal and practical, Kirchhoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem, The venin's theorem, Max Power Transfer theorem.		
Unit 3	**Electrostatics**	**(06 Hrs.)**
Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction& working.		
	Magnetic Circuit & Transformer	**(06 Hrs.)**
Magnetic effect of electric current, cross and dot convention, right hand thumb rule, concept of flux, flux linkages, Flux Density, Magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability, B-H curve, hysteresis loop, series-parallel magnetic circuit, composite magnetic circuit, Comparison of electrical and magnetic circuit Faraday's law of electromagnetic induction, statically and dynamically induced emf, self-inductance, mutual inductance, coefficient of coupling, Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.		
Unit 5	**AC Fundamentals & AC Circuits**	**(06 Hrs.)**

AC waveform definitions , form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar & rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3-ph AC Circuits.		
Unit 6	**Electrical Wiring and Illumination system**	**(06 Hrs.)**
Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED), Study of Electricity bill.		

Term Work:

The term work shall consist of record of minimum eight exercises / experiments

1. Determination of resistance temperature coefficient.
2. Verification of Superposition Theorem.
3. Verification of The venin's Theorem.
4. Verification of Kirchhoff's Laws.
5. Verification of Maximum power transfer Theorem.
6. Time response of RC circuit.
7. Study of R-L-C series circuits for XL> XC, XL< XC & XL= XC.
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Direct loading test on Single phase transformer.
10. a)Voltage and current ratios
11. b) Efficiency and regulations
12. Study of a Residential (L.T.) Bill.

Text Books/ Reference Books

1. B. L. Theraja- "A Textbook of Electrical Technology" Volume- I, S.Chand and Company Ltd., New Delhi.
2. V. K. Mehta, - "Basic Electrical Engineering", S. Chand and Company Ltd., New Delhi.
3. I.J. Nagrath and Kothari – "Theory and problems of Basic Electrical Engineering", Prentice Hall.
4. Edward Hughes – "Electrical Technology"- Seventh Edition, Pearson Education Publication.
5. H. Cotton – "Elements of Electrical Technology", C.B.S. Publications.
6. John Omalley Shawn – "Basic circuits analysis" Mc Graw Hill Publications.
7. Vincent Del Toro – "Principles of Electrical Engineering", PHI Publications.

Unit Tests-

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

WORKSHOP TECHNOLOGY

Designation of Course	**Workshop Technology**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- -- Hours/ Week	End Semester Examination	-- Marks	Theory: 00 Practical: 01
Practical:- 2 Hours/ Week	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
	Term Work	50 Marks	
	Total	50 Marks	01

Course Prerequisites:-	Basic knowledge of hand tools used in day to day life.
Course Outcomes:-	Students should be able to understand 1. Basic Manufacturing Processes used in the industry. 2. Importance of safety.

Course Contents

Carpentry- Introduction to wood working, kinds of woods, hand tools & machines, Types joints, wood turning. Pattern making, types of patterns, contraction, draft & machining allowances

Fitting- Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping.

Sheet Metal Practice -Introduction to primary technology processes involving bending punching and drawing various sheet metal joints, development of joints.

Joining- Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies.

Forging -Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

Moulding -Principles of moulding, methods, core & core boxes, preparation of foundry sand, casting, Plastic moulding.

Plumbing- (Demonstration Common for Electrical & Non electrical Group) Types of pipe joints, threading dies, Pipe fittings.

Term Work

Term work shall consist of any three jobs, demonstrations on rest of the trades and journal consisting of six assignments one on each of the above topics.

PROFESSIONAL SKILLS DEVELOPMENT-I

Designation of Course	**Workshop Technology**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 2 Hours/ Week	End Semester Examination	50 Marks	Theory: 02 Practical: 00
Practical:- -- Hours/ Week	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
	Term Work	-- Marks	
	Total	50 Marks	02

Course Pre-requisites	
The Students should have knowledge of	
1.	Basic communication in tenses (past, present, future).
2.	Awareness of common words (adjectives used in daily verbal communication).
3.	Basic idea of sentence formation and thereby paragraph building and writing.
4.	Communication according to daily and varied contextual scenarios.
5.	Basic communication model/channel (sender, receiver and feedback), Active and passive listening skills.
6.	Basic social etiquettes and knowledge of group work and communication that will enhance their professional growth.
Course Objectives	
	The Professional Skills Development course aims to augment students overall communication and interpersonal skills by engaging them in group activities and thus aid in helping them to emerge as professionals. The English language topics for this semester focus on the development of basic fluency in English, usage of words and also introduce them to the concept and importance of interpersonal skills so as to effectively present their personalities.
Course Outcomes	
The student should be able to	
1.	Speak fluently in English without errors in tenses and hence present themselves as effective English communicators. They will be able to learn the 12 tenses and use them appropriately.
2.	Differentiate between active and passive vocabulary and be able to use the 60 words discussed in class for their daily conversation and 40 words also given as assignments.
3.	The ability to process their ideas and thoughts(verbal communication) into written communication in an effective, coherent and logical manner within a stipulated time and specific word limit of 100-150 words for paragraph writing.
4.	Present them in a certain manner by using the 50-55 phrases discussed in class appropriately for group discussions, personal interviews during the campus recruitment process/competitive exams.
5.	Enhance their communication skills by acquainting with the 2 important aspects of communication and helping them to overcome the 10 most common barriers of communication. Learn the 7 different types of listening skills; differentiate effective listening skills and understand the importance of it through 5 activities held in class and implement them in professional life.
6.	Understand the importance of team work, team motivation and effective team communication for further implementation in the corporate life. They should also be able to identify concretely between team and group dynamics.

Course Contents		
Unit I	**Essential Grammar – I**	**(4 Hrs.)**
	• Application of Tenses: Usage of past, present and future according to context. • Activities/games for tenses	
Unit II	**Vocabulary – I**	**(4 Hrs.)**
	• Vocabulary building ▪ Adjectives- physical attributes, Intellectual qualities, ▪ Words describing vacations. • Application of the vocabularies. • Activities: Story telling/ Poem building (Using those words)	
Unit III	**Written Communication - I**	**(4 Hrs.)**
	• Paragraph writing: ▪ Structure of paragraphs, ▪ Mnemonics to build Paragraph, ▪ Coherence and Unity of paragraphs.	
Unit IV	**Situational Conversation – I**	**(4 Hrs.)**
	• Application of grammar according to context. • Situation based conversation • Activities: Conversation based on context(personal and professional)	
Unit V	**Fundamental Communication Skills - I**	**(4 Hrs.)**
	• Importance of effective communication. • Types of communication. • Verbal, Non-verbal communication. • Barriers of communication. • Activities: Extempore • Listening Skills • Importance of listening skills. • Types of listening skills. • Difference between hearing and listening. • Activities: Word ball Game. Chinese Whisper	
Unit VI	**Interpersonal Skills – I**	**(4 Hrs.)**
	• Introduction to Interpersonal skills. • Group Dynamics. • Introduction to Team work. • Difference between a group and a team. • Importance of group/team in an organization. • Activities on team and group dynamics.	
Text Books		
1.**APAART**: Speak Well 1 (English language and communication)		
2.**APAART**: Speak Well 2 (Soft Skills)		
Reference Books		
1.English vocabulary in use – Alan Mc'carthy and O'dell		
2.Business Communication – Dr. Saroj Hiremath		

Department of Mechanical Engineering
Syllabus: Semester II

ENGINEERING MATHEMATICS-II

Designation of Course	**Engineering Mathematics-II**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	Theory: 03 Tutorial: 01
Tutorials: 01Hour/ Week	Unit Test	20 Marks	
	Assignments	10 Marks	
	Internal Evaluation	10 Marks	
	Term Work / Oral	-- Marks	
	Total	100 Marks	04

Course Prerequisites:-	Student must have basic knowledge of calculus.
Course Outcomes:-	1. To develop an ability to solve differential equations of first order and first degree. 2. To develop an ability to form mathematical model of rectilinear motion, electric circuit, Fourier heat conduction, Newton's law of cooling. 3. To develop an ability to transform the Cartesian co-ordinates into spherical polar and cylindrical coordinate systems. 4. To develop an ability to represent periodic function as Fourier Series. 5. To develop an ability to evaluate definite integral by DUIS rules and to trace Cartesian and polar curves. 6. To develop an ability to apply methods to find area and volume by double and triple integration.

Course Contents

Unit 1	**Differential Equations (DE)**	**(08 Hrs.)**
Definition, Order and Degree of DE, Formation of DE. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types.		
Unit 2	**Applications Of Differential Equations**	**(08 Hrs.)**
Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems.		
Unit 3	**Fourier Series And Integral Calculus**	**(08 Hrs.)**
Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis. Reduction formulae, Beta and Gamma functions.		
Unit 4	**Integral Calculus And Curve Tracing**	**(08 Hrs.)**
Differentiation Under the Integral Sign, Error functions. Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves.		

Unit 5	Solid Geometry	(08 Hrs.)
Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.		
Unit 6	**Multiple Integrals And Their Applications**	**(08 Hrs.)**
Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.		

Assignments

1. Differential Equations.
2. Application of DE.
3. Fourier's Series and Integral Calculus.
4. DUIS and Curve Tracing.
5. Solid Geometry.
6. Double and Triple integrations, area and volume.

Text Books/ Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8th edition (1999).
2. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill (2008)
3. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune, 7th edition (1988).
4. Higher Engineering Mathematics by B. S. Grewal, Khanna Publication, Delhi, 42th edition (2012).
5. Advanced Engineering Mathematics, by Peter V. O'Neil, Thomson Learning, 6th edition (2007).
6. Advanced Engineering Mathematics, by M. D. Greenberg, Pearson Education, 2nd edition (2002).

Unit Tests

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

FUNDAMENTALS OF MECHANICAL ENGINEERING

Designation of Course	**Fundamentals of Mechanical Engineering**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	
Practical:- 02 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	Theory: 03 Practical: 01
	Term Work / Oral	25 Marks	
	Total	125 Marks	4

Course Prerequisites:-	Students should have the basic knowledge of thermodynamics.
Course Outcomes:-	Able to understand- 1. The fundamentals of thermal engineering. 2. Working of power producing and absorbing devices. 3. Different energy sources and fundamental laws of heat transfer. 4. The basic properties of fluid and materials. 5. The different mechanical devices and mechanisms. 6. Machine tools and manufacturing processes.

Course Contents

Unit 1	**Thermodynamics:**	**(06 Hrs.)**
Heat, work and Internal Energy, Thermodynamic State, Process, Cycle, Thermodynamic System, First Law of Thermodynamics, Application of First Law to steady Flow and Non Flow processes, Limitations of First Law, PMM of first kind (Numerical Treatment), Second Law of Thermodynamics – Statements, Carnot Engine and Carnot Refrigerator, PMM of Second Kind (Elementary treatment only)		
Unit 2	**Introduction to I.C. Engines, turbines, refrigeration, compressors & pumps:**	**(06 Hrs.)**
Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines, Hydraulic turbines, Steam turbines, gas turbines. (Theoretical study using schematic diagrams) Vapor compression and vapor absorption system, house hold refrigerator, window air conditioner. Reciprocating and rotary compressor, Reciprocating and centrifugal pump.(Theoretical study using schematic diagrams)		
Unit 3	**Energy Sources & Heat transfer:**	**(06 Hrs.)**
Renewable and nonrenewable, solar flat plate collector, Wind, Geothermal, Wave, Tidal, Hydro power, Bio-gas, Bio-Diesel, Nuclear power. (Theoretical study using schematic diagrams) Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties, types of heat exchangers and their applications.		
Unit 4	**Properties of fluids & Properties of Materials and their Applications:**	**(06 Hrs.)**
Introduction, Units of measurements, mass density, specific weight, specific volume and relative density, viscosity, pressure, compressibility and elasticity, gas laws, vapor pressure, surface tension and capillarity, Regimes in fluid mechanics. Metals – Ferrous and Non-Ferrous, Nonmetallic materials, smart materials, Material selection criteria.		
Unit 5	**Mechanical devices & Mechanisms:**	**(06 Hrs.)**
Types of Belts and belt drives, Chain drive, Types of gears, Types of Couplings, types of friction clutch,		

Power transmission shafts, axles, keys, bush and ball bearings. Slider crank mechanism, Four bar chain mechanism, inversions of single slider crank chain mechanism, Geneva mechanism, Ratchet and Paul mechanism.		
Unit 6	**Machine Tools, Introduction to manufacturing processes and Their Applications:**	**(06 Hrs.)**
Lathe Machine – Centre Lathe, Drilling Machine – Study of Pillar drilling machine, Introduction to NC and CNC machines, Grinding machine, Power saw, Milling Machine. Casting, Sheet metal forming, Sheet metal cutting, Forging, Metal joining processes.		

Text Books/ Reference Books

1. Thermodynamics an Engineering Approach, Yunus A. Cengel and Michael A. Boles, McGraw-Hill, Inc, 2005, 6th edition.
2. Applied Thermodynamics for Engineering Technologists, T. D. Eastop and A. McConkey, 5th Edition, Prentice Hall.
3. I.C. Engines Fundamentals, J. B. Heywood, McGraw Hill, 3rd Edition, MacMillian.
4. Internal Combustion Engine, V. Ganeshan, Tata McGraw-Hill, 3rd edition.
5. Strength of Materials, H. Ryder, Macmillians, London, 1969, 3rd edition.
6. Mechanics of Materials, Johston and Beer TMH, 5th edition.
7. Mechanisms and Machine Theory, Ambekar A.G., Prentice-Hall of India**,** 2007.
8. Theory of Machines, S.S. Rattan, Tata McGraw- Hill, 2nd edition.
9. A Textbook of production engineering. P.C. Sharma, S. Chand Publication, New Delhi, 2nd edition.
10. Fluid Mechanics & Fluid Power. D.S. Kumar, Katson Publishing Engineering House, Ludhiana. 8th edition

Unit Tests

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

ENGINEERING MECHANICS

Designation of Course	**Engineering Mechanics**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 04 Hours/ Week	End Semester Examination	60 Marks	Theory: 04 Practical: 01
Practical: 02 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 10 Marks	
	Term Work / Oral	25 Marks	
	Total	125 Marks	05

Course Prerequisites:-	The Students should have knowledge of 1. Scalar and Vector 2. Newton's law of motion 3. Law of friction 4. Concept of physical quantities, their units and conversion of units 5. Concept of differentiation and integration
Course Outcomes:-	1. Calculate resultant and apply conditions of equilibrium. 2. Analyze the truss and calculate friction force. 3. Calculate centroid and moment of inertia. 4. Solve problem on rectilinear motion. 5. Solve problems on curvilinear motion. 6. Use D'alembert's principle, Work Energy principle and Impulse Momentum principle for particle.

Course Contents

Unit 1	**Resultant and Equilibrium**	**(06 Hrs.)**
Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach. Equilibrant, Conditions of Equilibrium, Equilibrium of a force system in a Plane, Force and Couple system about a point.		
Unit 2	**Truss and Friction**	**(06 Hrs.)**
Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts. Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.		
Unit 3	**Centroid and Moment of Inertia**	**(06 Hrs.)**
Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.		
Unit 4	**Kinematics of Rectilinear motion of a Particle**	**(06 Hrs.)**
Equations of motion, Constant and variable acceleration, Motion Curves, Relative motion, Dependent motion.		
Unit 5	**Kinematics of Curvilinear motion of a Particle**	**(06 Hrs.)**
Motion of a Projectile, Cartesian components, Normal and Tangential components of a curvilinear motion.		
Unit 6	**Kinetics of a Particle**	**(06 Hrs.)**
D'alembert's Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.		

Term Work:

A) The term-work shall consist of minimum five experiments from list below.

1. Determination of reactions of Simple and Compound beam.
2. Study of equilibrium of concurrent force system in a plane.
3. Determination of coefficient of friction for Flat Belt.
4. Determination of coefficient of friction for Rope.
5. Study of Curvilinear motion.
6. Determination of Coefficient of Restitution.

B) The term-work shall also consist of minimum five graphical solutions of the problems on topics.

Text Books/ Reference Books

1) "Engineering Mechanics (Statics and Dynamics)", Hibbeler R. C., McMillan Publication.
2) "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Beer F.P. and Johnston E.R., Tata McGraw Hill Publication.
3) "Engineering Mechanics", Bhavikatti S.S. and Rajashekarappa K. G., New Age International (P) Ltd.
4). "Engineering Mechanics (Statics and Dynamics)", Shames I.H., Prentice Hall of India (P) Ltd.
5) "Engineering Mechanics (Statics and Dynamics)", Singer F.L., Harper and Row Publication.
6) "Engineering Mechanics (Statics and Dynamics)", Meriam J.L. and Kraige L.G., John Wiley and Sons Publication.
7) "Engineering Mechanics (Statics and Dynamics)", Timoshenko S.P. and Young D.H., McGraw Hill Publication.
8) "Engineering Mechanics (Statics and Dynamics)",Tayal A.K., Umesh Publication.
9) "Engineering Mechanics-I and II (Statics and Dynamics)", Mokashi V.S., Tata McGraw Hill Publication.

Unit Tests-

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

ENGINEERING CHEMISTRY

Designation of Course	**Engineering Chemistry**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 4 Hours/ Week	End Semester Examination	60 Marks	
Practical - 2 Hours/ Week	Unit Test	20 Marks	Theory: 04
	Assignments	10 Marks	Practical: 01
	Internal Evaluation	10 Marks	
	Term Work/ Oral	25 Marks	
	Total	125 Marks	05

Course Prerequisites:-	The Students should have Basics knowledge of Science and fundamentals Laws.
Course Outcomes:-	At the end of the course, a student will be able to, 1. Analyze the methods involved in improving quality of water for domestic and industrial purposes. 2. Express the crystal structure through X-ray diffraction technique to examine the internal structure of crystal. 3. Demonstrate the properties and applications of fossil fuels and derived fuels. 4. Define the fundamental principles of corrosion and methods used for minimizing corrosion. 5. Interpret the basic concepts of electrochemical techniques and its applications in society. 6. Develop the skills for correct stereo chemical assignment and interpretation in complex organic molecules.

Course Content

Unit 1	**Water**	**(06 Hrs.)**
Introduction, Hardness of water, Effect of hard water on boilers and heat exchangers: a) boiler corrosion b) caustic embrittlement c) scales and sludges d) priming and foaming Water softening methods for industrial purposes :a) Zeolite process b) Phosphate conditioning Numerical based on the zeolite process		
Unit 2	**Material Chemistry**	**(06 Hrs.)**
Crystallography: Unit cell, Laws of crystallography, Weiss indices and Miller indices, Crystal defects (point and line defects), X-ray diffraction – Bragg's Law and numerical. Cement: Introduction of cement, Hydraulic/ Non-hydraulic cementing materials, classification of cement, chemistry of portland cement, chemical composition and compound constituents of portland cement, properties of cement and its applications.		
Unit 3	**Fuels**	**(06 Hrs.)**
Introduction, classification of fuels, calorific value of fuels, NCV and GCV, Determination of calorific values using Bomb calorimeter and Boys' gas calorimeter. Theoretical calculation of calorific value of a fuel, Analysis of coal a) Proximate b) Ultimate analysis of coal, Numericals based on NCV, GCV.		
Unit 4	**Corrosion And Its Prevention**	**(06 Hrs.)**
Corrosion: - Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, Electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment. Methods of prevention of corrosion- Cathodic and Anodic protection, Metallic coatings, Electroplating, Hot dipping.		

Unit 5	Electrochemistry	(06 Hrs.)
Introduction, Arrhenius Ionic theory, Kohlrausch's law of independent migration of ions Laws of electrolysis: Faradays Laws, Ostwald's dilution law, Acids and Bases, concept of pH and pOH, Buffer solutions, Solubility Product, Redox Reactions. Electrode Potential, electrochemical cell, concentration cell, reference Electrodes, Overvoltage, Conductometric Titrations, Fuel cells, Lead Acid Storage Cell and numericals based on the above articles.		
Unit 6	**Stereochemistry**	**(06 Hrs.)**
Introduction, chirality, optical activity, Enantiomers, Diastereomers, projection formula of tetrahedral carbon- Newman projection, Wedge projection, Fischer projection, Geometrical isomerism :- cis and trans isomerism, E and Z isomers Optical isomerism :- Mesoform, the number of optical isomers for chiral molecules, Conformations :- conformations of ethane, conformations of n-butane		

Term Work

Experiments

Any Ten experiments from the following:

1. Estimation of hardness of water by EDTA method.
2. Estimation of chlorine by Mohr's method.
3. Determination of percentage of Ca in given cement sample
4. Determination of coefficient of viscosity by Ostwald's viscometer
5. Study of Bomb calorimeter for determination of calorific value.
6. Determination of calorific value of gas fuel by using Boy's gas calorimeter.
7. Determination of dissolved oxygen in a water sample.
8. To determine the Molecular Weight of polymer
9. Estimation of Copper from brass sample solution by Iodometrically
10. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method
11. To standardize NaOH solution and hence find out the strength of given hydrochloric Acid solution
12. To determine Surface Tension of given liquid by Stalagmometer
13. Study of corrosion of metals in medium of different pH.
14. To set up Daniel cell
15. To determine pH of soil
16. To determine Acidity of soil

Assignments

7. Effect of hard water on boilers and heat exchangers
8. Hydraulic/ Non-hydraulic cementing materials
9. Analysis of coal a) Proximate b) ultimate analysis of coal
10. Wet corrosion-mechanism, Electroplating, Hot dipping
11. Geometrical isomerism:- cis and trans isomerism, E and Z isomers
12. Fuel cells

References / Text Books:

7. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi
8. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition (1979)
9. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988)
10. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955)
11. Engineering Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990)
12. Engineering Chemistry by Dara S. S. S Chand Publications

13. Fundamentals of Electrochemistry, V. S. Bagotsky (Ed) Wiley NY (2006)

Unit Tests-

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

MECHANICAL ENGINEERING DRAWING

Designation of Course	**Mechanical Engineering Drawing**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 02 Hours/ Week	End Semester Examination	60 Marks	
Practical - 04 Hours/ Week	Unit Test Assignments Internal Evaluation	20 Marks 10 Marks 40 Marks	Theory: 02 Practical: 02
	Term Work/ Oral	25 Marks	
	Total	125Marks	4

Course Prerequisites:-	Students should have the basic knowledge of engineering graphics.
Course Outcomes:-	1. To draw different free hand sketches in machine parts. 2. Representation of dimensions of machine components. 3. Different Auto CAD commands. 4. Orthographic projection using Auto CAD. 5. Isometric projection using Auto CAD. 6. Development of different solids using AutoCAD.

Course Contents

Unit 1	**Freehand Sketching**	**(06 Hrs.)**
Free hand sketching -- FV and TV of standard machine parts – Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints.		
Unit 2	**Dimensioning Practice**	**(06 Hrs.)**
Terms and Notations, Leader, Extension Lines, Terminations and Origin indication, Functional dimension, Non-functional dimension, Datum dimension, Redundant and auxiliary dimension, Chain dimensioning, Running dimensioning, Co-ordinate dimensioning, Symmetrical or equidistant dimensioning, Methods of dimensioning Common features: Diameters, Radii, Hole sizes, chamfers, Screw threads, Chords, Arcs, Angles, Spheres, Cylinders, Squares. Conventional Representation of Machine Components As per SP-46 (1988)		
Unit 3	**Introduction to Computer Aided Drafting**	**(06 Hrs.)**
Working Interface of AutoCAD, Drawing Limits, Creating 2-D Drawing in AutoCAD, AutoCAD commands, Editing commands in AutoCAD, Dimensioning in AutoCAD, Creating text in Auto CAD, Changing object properties Scale, Object Snap Mode, Display control in AutoCAD, Layer		
Unit 4	**Orthographic Projections [By Using AutoCAD]**	**(06 Hrs.)**
Reference planes, types of orthographic projections – First angle projections, Third angle projections, methods of obtaining orthographic views by First angle method, Sectional orthographic projections – full section, half section, offset section.		
Unit 5	**Isometric Projections [By Using AutoCAD]**	**(06 Hrs.)**
Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, and Sphere.		
Unit 6	**Development of Lateral Surfaces (DLS) of Solids. [By Using AutoCAD]**	**(06 Hrs.)**
Applications of DLS, method of development, development of lateral surface of above solids, development of lateral surface of cut solids.		

Term Work

1. Sheet (Half Imperial 4sheets)
2. Dimensioning Practices no. of sheets -2
3. Free Hand sketch no. of sheets-2
4. Four AutoCAD Printout
5. Introduction to AutoCAD commands
6. Orthographic by using AutoCAD
7. Isometric Projections by using AutoCAD
8. Development of Lateral surface by using AutoCAD

Text Books/ Reference Books

1. N.D. Bhatt, Elementary Engineering Drawing, Chartor Publishing house, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
3. P.S. Gill, Engineering drawing S.K.Kataria and sons. Delhi-110006.
4. N.D. Bhatt, Machine Drawing, Chartor Publishing house, Anand, India.
5. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New
6. Delhi.
7. Fredderock E. Giesecke, Alva Mitchell & others, Principles of Engineering Graphics,
8. Maxwell McMillan Publishing.

Unit Tests-

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

Professional Skills Development-II

Designation of Course	**Workshop Technology**		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- 2 Hours/ Week	End Semester Examination	50 Marks	Theory: 02 Practical: 00
Practical:- -- Hours/ Week	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
	Term Work	-- Marks	
	Total	50 Marks	02

Course Pre-requisites	
The Students should have knowledge of	
1.	Basic knowledge of the parts of speech in English.
2.	Vocabulary covered in the previous semester along with basic knowledge of verbs & adverbs.
3.	Basic awareness of the need of speaking skills within social circle.
4.	The elements of team dynamics done during the previous semester with proper application.
5.	Basic awareness of the concepts of feedback, criticism.
6.	The various common conflicts that may arise at varied situations.
Course Objectives	
	The Professional Skills Development course aims to augment students overall communication and interpersonal skills by engaging them in group activities and thus aid in helping them to emerge as professionals. The soft skills topics for this semester are intended to develop student's expertise on public speaking skills and to deal positively with criticism and so as to effectively present their personalities.
Course Outcomes	
The student should be able to	
1.	Speak fluently in English without errors in the sentence construction and hence present themselves as effective English communicators. They will be able to learn 20-25 common errors made in parts of speech and also use 10 modal verbs efficiently during professional communication.
2.	Differentiate between vocabulary used as adjectives, verbs and adverbs and be able to use the 60-70 words for their daily conversation.
3.	Overcome the fear of speaking and will be aware of the 3 types of public speaking necessary according to the contemporary requirements. They would be able to deliver a public speech according to the need of the audience and also be aware of positive body language to be manifested during a speech.
4.	Deal with the deeper parameters of working in teams like team motivation, multicultural team activity and team conflict resolution.
5.	Analyze themselves relating to their hobbies and strengths and hence set realistic goals in terms of personal and professional growth. They will be able to identify at least 5-7 strengths and a couple of goals to be achieved that will enable their lives to be directed appropriately.
6.	Apply 5-6 positive strategies to resolve conflicts arising during team work

Course Contents

Unit I	**Essential Grammar – II**	**(4 Hrs.)**
	• Auxiliaries • Importance of auxiliary verb in formal communication. • Group Activities	

	• Parts of Speech	
Unit II	**Vocabulary- II**	**(4 Hrs.)**
	• Vocabulary related to Adjectives • Vocabulary related to verbs and adverbs • Adjectives, verbs, Adverbial vocabulary –Usage • Application of the above taught vocabulary through activities	
Unit III	**Fundamental Communication Skills – II**	**(4 Hrs.)**
	• Public speaking skills • Effective public speaking skills • Types of public speaking • Overcoming stage fear • Do's& Don't's of public speaking • Importance of Body language in Public speaking • Importance of the audience in Public speaking • Activity – Extempore Speaking, Manuscript speech	
Unit IV	**Interpersonal skills-II**	**(4 Hrs.)**
	• Team Work • Team communication. • Factors which ensure effective & smooth team communication • Team conflict resolution-ways & methods • Case studies/activities	
Unit V	**Self-Awareness**	**(4 Hrs.)**
	• Perceptions, beliefs • Analyzing achievements, goals, hobbies • Handling criticism • Developing positive attitudes	
Unit VI	**Conflict Resolution**	**(4 Hrs.)**
	• Various conflicts that could be encountered in a work scenario. • Causes of conflicts in work scenario. • Ways and methods for conflict resolution. • Do's and Don'ts for conflict resolution.	
Text Books		
1.**APAART**: Speak Well 1 (English language and communication)		
2.**APAART**: Speak Well 2 (Soft Skills)		
Reference Books		
1.English vocabulary in use – Alan Mc'carthy and O'dell		
2.Business Communication – Dr. Saroj Hiremath		

PRODUCTION PRACTICE-I

Designation of Course			**Production Practice-I**
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- -- Hours/ Week	End Semester Examination	-- Marks	Practical: 01
Practical:- 2 Hours/ Week	Unit Test Assignments Internal Evaluation	-- Marks -- Marks -- Marks	
	Term Work	50 Marks	
	Total	50 Marks	1

Course Prerequisites:-	Basic knowledge of various machine tools.
Course Outcomes:-	Students should be able to understand 1. Understand machine tools, mechanism and accessories used in various production processes 2. Make the job of turning & tapper turning operation using lathe 3. Perform Forging and grinding of lathe tool with one knife and other end vee 4. Prepare simple solid pattern involving wood turning 5. Perform Welding using gas/arc welding process 6. Understand Sand Casting process

Course Contents

Each candidate shall be required to complete and submit the following term work:

A. Jobs:

Plain and Taper turning – one job

Forging and grinding of lathe tool with one knife and other end vee – one job

Making a simple solid pattern involving wood turning – one job

Welding (gas or arc) – one job

Sand Molding – one job

B. Journal & Demonstration:

Assignments on machine tools will be in the form of a journal based on demonstrations on machine tools. This should include sketches and relevant descriptions as given below:

1) Block Diagrams (Any Two)

a) Lathe

b) Universal milling machine

c) Radial drilling machine

d) Cylindrical grinder.

2) Mechanisms (Any Two)

a) All geared headstock of a center lathe.

b) Spindle arbor (assembly) drive of milling machine

c) Crank and slotted lever quick return drive of shaping machine.

d) Spindle assembly in a drilling machine.

3) Accessories (Any Two)

a) Taper turning attachment for a center lathe.

b) Universal dividing head.

c) Milling cutters.

Rules regarding ATKT, Continuous Assessment and award of Class

Standards for Passing

- For all courses, both in UE (University Evaluation) and IA (Internal Assessment) there are constitute separate heads-of-passing (HoP).
  - The student must obtain a minimum grade point of 5.0 (40% marks) at UE as well as at IA.

    OR
  - The student failed in IA can also pass in the course provided he/ she obtains minimum of 25% marks in IA, and GPA (Grade Point Average) for the course is at least 6.0 (50% aggregate). The GPA for the course will be calculated only if the student passes in UE.
- The student who fails at UE in a course has to reapply only at UE as a backlog candidate and clear the HoP. Similarly, a student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

- A student is allowed to carry backlog of courses prescribed for B. Tech. Sem. I, III, V, VII to B. Tech. Sem. II, IV, VI, VIII respectively.
- A student is allowed to keep term of Sem. III, if he/ she has failed in any number of courses in B. Tech. Sem. I and II.
- A student is allowed to keep term of Sem. V, if he/ she has failed in any number of courses in B. Tech. Sem. III and IV but passed in all courses in Sem. I and II.
- A student is allowed to keep term of Sem. VII, if he/ she has failed in any number of courses in B. Tech. Sem. V and VI but passed in all courses in Sem. III and IV.

Award of Class for the Degree Considering CGPA

A student who has completed the minimum credits specified for the program shall be declared to have passed in the program. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of the honors at the end of the program are as given below:

Range of the CGPA	Final Grade	Performance Descriptor	Equivalent range of marks (%)
$9.50 \leq 10.00$	O	Outstanding	$80 \leq 100$
$9.00 \leq 9.49$	A^+	Excellent	$70 \leq 79$
$8.00 \leq 8.99$	A	Very Good	$60 \leq 69$
$7.00 \leq 7.99$	B^+	Good	$55 \leq 59$
$6.00 \leq 6.99$	B	Average	$50 \leq 54$
$5.00 \leq 5.99$	C	Satisfactory	$40 \leq 49$
Below 5.00	F	Fail	Below 40