Bharati Vidyapeeth

(Deemed to be University)

College of Engineering, Pune- 411043

The Structure of the Curriculum: 2014 Course

Choice Based Credit System (CBCS)

B. TECH. MECHANICAL: SEMESTER- I & II

Vision of the Bharati Vidyapeeth (Deemed to be University) College of Engineering is:

To be a World Class Institute for Social Transformation through Dynamic Education

Missions of the Bharati Vidyapeeth (Deemed to be University) College of Engineering are:

➢ *To provide quality technical education with advanced equipment, qualified faculty members, infrastructure to meet needs of profession & society.*

➢ *To provide an environment conducive to innovation, creativity, research and entrepreneurial leadership.*

➢ *To practice and promote professional ethics, transparency and accountability for social community, economic & environmental conditions.*

Goals of the Bharati Vidyapeeth (Deemed to be) University College of Engineering are:

➢ *Recruiting experienced faculty.*

➢ *Organizing faculty development programs.*

➢ *Identifying socio-economically relevant areas & emerging technologies.*

➢ *Constant review &up gradation of curricula.*

➢ *Up gradation of laboratories, library & communication facilities.*

➢ *Collaboration with industry and research & development organizations.*

➢ *Sharing of knowledge, infra-structure and resources.*

➢ *Training, extension, testing and consultancy services.*

➢ *Promoting interdisciplinary research.*

Vision of the Mechanical Engineering Department is:

To develop, high quality Mechanical Engineers through dynamic education to meet social and global challenges.

Mission Statements of the Mechanical Engineering Department are:

➢ *To provide extensive theoretical and practical knowledge to the students with well-equipped laboratories and ICT tools through motivated faculty members.*

➢ *To inculcate aptitude for research, innovation and entrepreneurial qualities in students.*

➢ *To acquaint students with ethical, social and professional responsibilities to adapt to the demands of working environment.*

Program Educational Objectives (PEOs) of the B. Tech. Mechanical are:

Graduates will be able,
- ➢ *To fulfill need of industry and society with theoretical and practical knowledge.*
- ➢ *To engage in research, innovation, lifelong learning and continued professional development.*
- ➢ *To fulfill professional ethics and social responsibilities.*

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge**: *Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*
2. **Problem analysis**: *Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*
3. **Design/development of solutions**: *Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*
4. **Conduct investigations of complex problems**: *Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*
5. **Modern tool usage**: *Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*
6. **The engineer and society**: *Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*
7. **Environment and sustainability**: *Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*
8. **Ethics**: *Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.*
9. **Individual and team work**: *Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.*
10. **Communication**: *Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.*

11. ***Project management and finance****: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.*

12. ***Life-long learning****: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.*

Statements of Programme Specific Outcomes (PSOs)

PSO1:   Apply the knowledge of thermal, design, manufacturing engineering and computational sciences to solve Mechanical Engineering problems.

PSO2:   Apply Mechanical Engineering principles for research, innovation and develop entrepreneurial skills.

PSO3:   Apply concepts of mechanical engineering to asses' societal, environmental, health and safety issues with professional ethics.

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

S.N.	Course	Teaching Scheme (Contact Hrs./ week)			Examination Scheme (Marks)							Total Credits		
					End Sem. Exam	Continuous Assessment				Total	TH	TW	Total
		L	P/D	T		Unit Test	Attendance	Assignments	TW				
C101	Engineering Mathematics – I	3	-	1	60	20	10	10	-	100	3	1	4
C102	Fundamentals of Civil Engineering	3	2	-	60	20	10	10	25	125	3	1	4
C103	Engineering Graphics *	4	2	-	60	20	10	10	25	125	4	1	5
C104	Engineering Physics	4	2	-	60	20	10	10	25	125	4	1	5
C105	Fundamentals of Electrical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
C106	Professional skill Development – I	2	-	-	50		-	-	-	50	2	-	2
C107	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		
					End Sem. Exam	Continuous Assessment					Total	TH	TW	Total
		L	P/D	T		Unit Test	Attendance	Assignments	TW					
C108	Engineering Mathematics – II	3	-	1	60	20	10	10	-	100	3	1	4
C109	Fundamentals of Mechanical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
C110	Engineering Mechanics	4	2	-	60	20	10	10	25	125	4	1	5
C111	Engineering Chemistry	4	2	-	60	20	10	10	25	125	4	1	5
C112	Mechanical Engineering Drawing*	2	4	-	60	20	10	10	25	125	2	2	4
C113	Professional skill Development-II	2	-	-	50	-	-	-	-	50	2	-	2
C114	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 - 25Total

Credits Sem. II -25 Grand

Total   -50

Rules for Conducting Tests
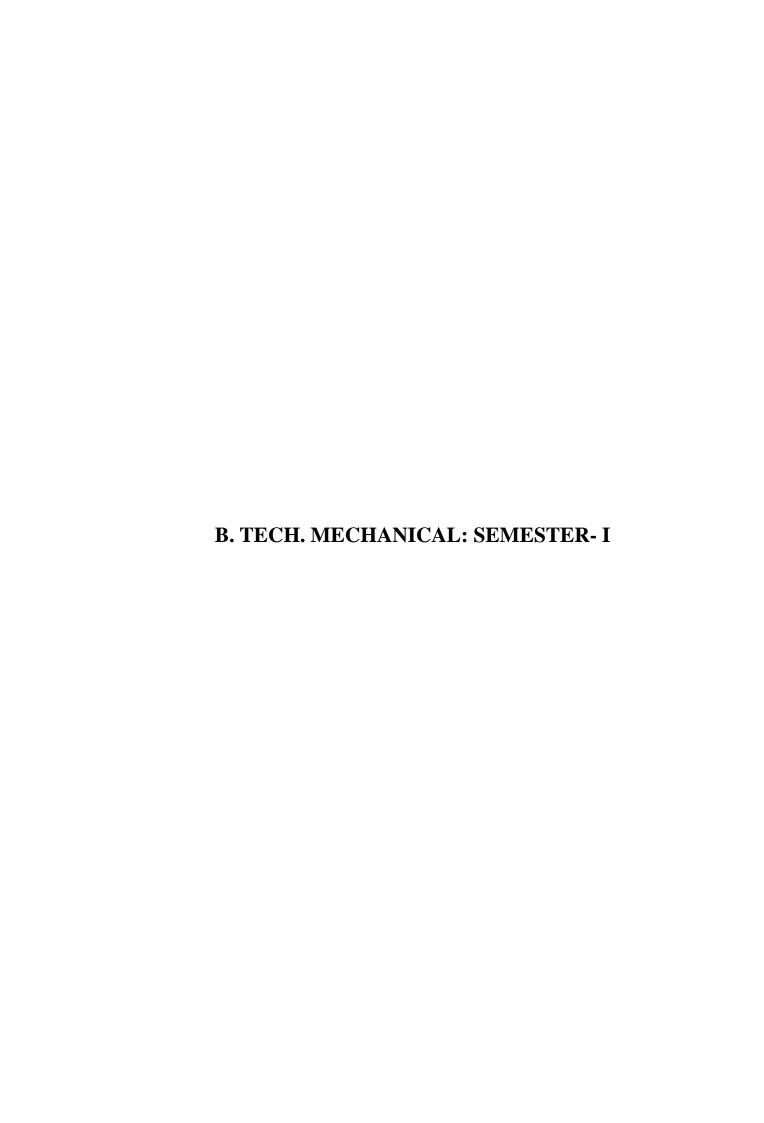
Mode of the test

- In each semester for each subject three 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) Out of the three tests conducted during the semester, the marks of only two tests in which the candidate has shown his/her best performance shall be considered, to decide the provisional marks in each subject.

  ii) Average marks obtained in two tests in which students have performed well, shall be considered as provisional marks obtained by the student in the tests.

  iii) If the candidate appears only for two tests conducted during the semester, he/ she will not be given benefit of the best performance in the tests.

  iv) If the candidate appears only for one test conducted 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 tests.

  v) 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.

  vi) 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 all three tests conducted in each semester.
- Roll nos. allotted to students shall be the examination nos. for the tests.

B. TECH. MECHANICAL: SEMESTER- I

Engineering Mathematics-I
(Course No.C101)

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 Objectives:-	1. Effectively solve the system of equations 2. Use the concept of infinite series 3. Obtain maxima and minima of multivariable function
Course Outcomes:-	Students able to: 1. Understand the consistency of any type of system of equations. imaginary points using argand diagram. 2. Understand the concepts DeMoiver's theorem and Apply to find the roots of equations. 3. Understand Leibnitz's rule and Apply to find n th derivative. 4. Remember the concepts Test convergence and divergence of infinite series. 5. Understand the concepts to Compute total derivative 6. Understand the concept of Maxima and Minima and apply it to for the functions having two variable.

Course Contents

Unit 1	Matrices	(8Hrs)

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	(8Hrs)

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	(8Hrs)

Successive Differentiation, nth Derivatives of Standard Functions, Leibnitz's Theorem.

Taylor's Series and Maclaurin's Series.

Unit 4	Differential Calculus and Infinite Series	(8Hrs)

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	(8Hrs)

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	(8Hrs)
Jacobians and their applications, Chain Rule, Functional Dependence. Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.		

Assignments:

Problems and/or theory questions on following topics:

1. Linear algebra: matrices
2. Partial differentiation and indeterminate forms
3. Vector differential calculus
4. Vector integral calculus and applications
5. Partial Differentiation
6. Jacobian and Maxima And Minima

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
(Course No.C102)

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	3
	Term Work / Oral	25 Marks	1
	Total	125 Marks	4

Course Prerequisites:-	1. Concepts of Units and conversion of units 2. Basic knowledge of Chemistry Basic knowledge of physics 3. Basic knowledge of Geography, concepts of lattitude and longitude
Course Objective:-	1. To study scope and application of Civil Engineering 2. To study different surveying techniques and its classification 3. To study building planning by considering foundations, earthquake, and bye laws 4. To study infrastructure utilization and water resource management
Course Outcomes:-	Students should be able to 1. Understand different building materials and components of a building / structure. 2. Understand the principles, classification of surveying and apply actual techniques of surveying 3. Understand and apply building planning concepts for eco-friendly structures and intelligent buildings. 4. Evaluate knowledge of different foundations and earthquake resistant design 5. Understand methods of irrigation and water supply systems. 6. Understand different methods of transportation.

Course Contents

Unit 1	Civil Engineering Scope And Applications.	(6Hrs)

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	(6Hrs)

Objectives, Principles and Classification of Surveying; Linear, angular, Vertical and area Measurements and related instruments.

Unit 3	Building Planning And Bye Laws	(6Hrs)

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	(6Hrs)

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	(6Hrs)

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	(6Hrs)

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.

List of Assignments

Numerical and/or theory questions on following topics:
1. Resultant and equilibrium of forces
2. Civil Engineering Scope And Applications.
3. Surveying
4. Building Planning And Bye Laws
5. Foundations and Earthquakes
6. Irrigation And Water Supply & Infrastructure

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
(Course No.C103)

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

Course Prerequisites:-	Fundamentals of Mathematics
Course Objective:-	1. To highlight the importance of graphics in engineering 2. To develop skills in reading and interpretation of engineering drawing 3. To develop the graphical skills for communication of concepts & idea through technical drawings
Course Outcomes:-	Students able to: 1. **Understand** different types of lines, curves and dimension technique with practical application. 2. **Understand** the concept of Orthographic projections and **apply** it to draw detail views by using 1st angle projection method. 3. **Understand** the concept of isometric projection and **apply** it to construct 3D view of a component. 4. **Understand** the concept of projections of Point and Line and **apply** to draw its projection by using 1st angle projection method and to locate its traces. 5. **Understand** the concept of projections of different types of planes **apply** to draw its projection by using 1st angle projection method. 6. **Understand** the concept of projections of different types of solids and its sections **apply** to draw its projection by using 1st angle projection method.

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.

Assignments: Minimum five problems on each unit in A3 size Drawing Book

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
(Course No.C104)

Designation of Course	Engineering Physics		
Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory:- 03 Hours/ Week	End Semester Examination	60 Marks	
	Unit Test	20 Marks	4
	Assignments	10 Marks	
	Internal Evaluation	10 Marks	
	Term Work / Oral	25 Marks	1
	Total	125 Marks	5

Course Prerequisites:-	Basics knowledge of Higher secondary physics.
Course Objectives	To provide the knowledge of 1. Modern physics, nuclear physics, solid state physics and super-conductor 2. Fundamental concepts of thermodynamic and nano technology 3. Fundamental concepts of wave optics and lasers 4. Fundamental concepts of acoustics and quantum mechanics
Course Outcomes:-	Students should be able to 1. Understand fundamental concepts of modern physics, nuclear physics and analyze practical problems. 2. Understand the concepts of solid state physics, superconducters and analyze practical problems on solid state physics. 3. Understand the concepts of thermodynamic, nano technology and analyze problems on thermodynamics. 4. Understand the concepts of interference and diffraction of light; analyze practical problems. 5. Understand the concept of light polarization, lasers and its application. 6. Understand the concepts of quantum mechanics, architecural acoustics and analyze practical problems.

Course Contents

Unit 1	Modern Physics and Nuclear Physics	(8Hrs)
	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	(8Hrs)
	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	(8Hrs)

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	(8Hrs)

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	(8Hrs)

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	(8Hrs)

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.

List of Assignments

Numerical and/or theory questions on following topics:

1. Physics and Nuclear Physics
2. Solid State Physics and Superconductivity
3. Thermodynamics And Nanoscience
4. Optics – I, Interference, Diffraction
5. Optics – Ii, Polarization , Lasers
6. Architectural Acoustics , Quantum Mechanics

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
(Course No:C105)

Designation of Course	Fundamentals of Electrical Engineering		
Teaching Scheme:	**Examination Scheme:**		**Credits Allotted**
Theory:- -- Hours/ Week	End Semester Examination	60 Marks	03Credits
Lectures: 4Hrs/Week	Unit Test	20 Marks	
Tutorials: 2Hr/Week	Assignments	10 Marks	01Credits
	Internal Evaluation	10 Marks	
	Term Work / Oral	25 Marks	
	Total	125Marks	--

Course Prerequisites:-	1. Students should have the basic knowledge of Higher secondary Physics 2. Students should have the basic knowledge of Higher secondary mathematics
Course Objective:-	3. To introduce the basic concepts of electrical engineering and its applications. 4. To acquire skills of basic laws, network theorms of electrical engineering and electrostatics. 5. To get acquainted with Transformer, AC Circuits, Electrical Wiring & Illumination system.
Course Outcomes:-	**Students should be able to:** 1. Understand the fundamentals of electrical engineering and their application. 2. Understand basic laws , various Network Theorems and **evaluate** electrical network problems. 3. Understand the fundamentals of Electrostatics , their circuits and **apply** it to electrical devices. 4. Understand the concept of electromagnetism and **apply** it to single phase Transformer. 5. Understand different types of AC Circuits, their working and **apply** to electrical network problems . 6. Understand the different types of Wiring Systems and lamps.

Course Contents

Unit 1	Basic concepts	(06Hrs)
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:	(06Hrs)
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	(06Hrs)
Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction& working.		

Unit 4	Magnetic Circuit & Transformer	(06Hrs)
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	(06Hrs)
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	(06Hrs)
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.		

List of Assignments:

The students will be given total **twelve** assignments (Two assignments on each Unit respectively).

1. DC Circuit Analysis
2. Network Theorems
3. AC Circuits and Switch Gear
4. Electrical Measurement
5. Single Phase Transformer
6. Three Phase Transformer
7. 3 Phase induction motor
8. Single phase motor
9. DC Generator
10. DC Motor
11. Power transmission and distribution
12. Safety Measures

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

Professional Skills Development-I
(Course No:C106)

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 Prerequisites:-	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 7. growth.
Course Objective:-	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:-	1. Speak fluently in English without errors in tenses and hence present themselves as effective Englishcommunicators. 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 theirdaily 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, 5. personal interviews during the campus recruitment process/competitive exams. 6. 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 7. implement them in professional life.

	8. Understand the importance of team work, team motivation and effective team communication for further 9. implementation in the corporate life. They should also be able to identify concretely between team and groupdynamics.

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

Workshop Technology
(Course No:C107)

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

Course Prerequisites:-	1. Basic knowledge of materials and hand tools used in day to day life. 2. Basic knowledge of the Safety precautions.
Course Objective:-	1. To acquire skills for preparation of different carpentry and fitting models. 2. To acquaint the skills for preparation of sheet metal ,forging and joining processes. 3. To acquire skills for plastic moulding and plumbing operations.
Course Outcomes:-	Students should be able to understand, 1. Understand various operations of carpentry and fitting and apply it to create the jobs as per the given specification. 2. Understand various sheet metal operations and create the shape. 3. Understand the different joining process and apply it to specific applications. 4. Understand the different forging processes and create the job using hand forging. 5. Understand the different moulding methods and create the job by plastic moulding. 6. Understand the bending and threading operations to create pipe joints.

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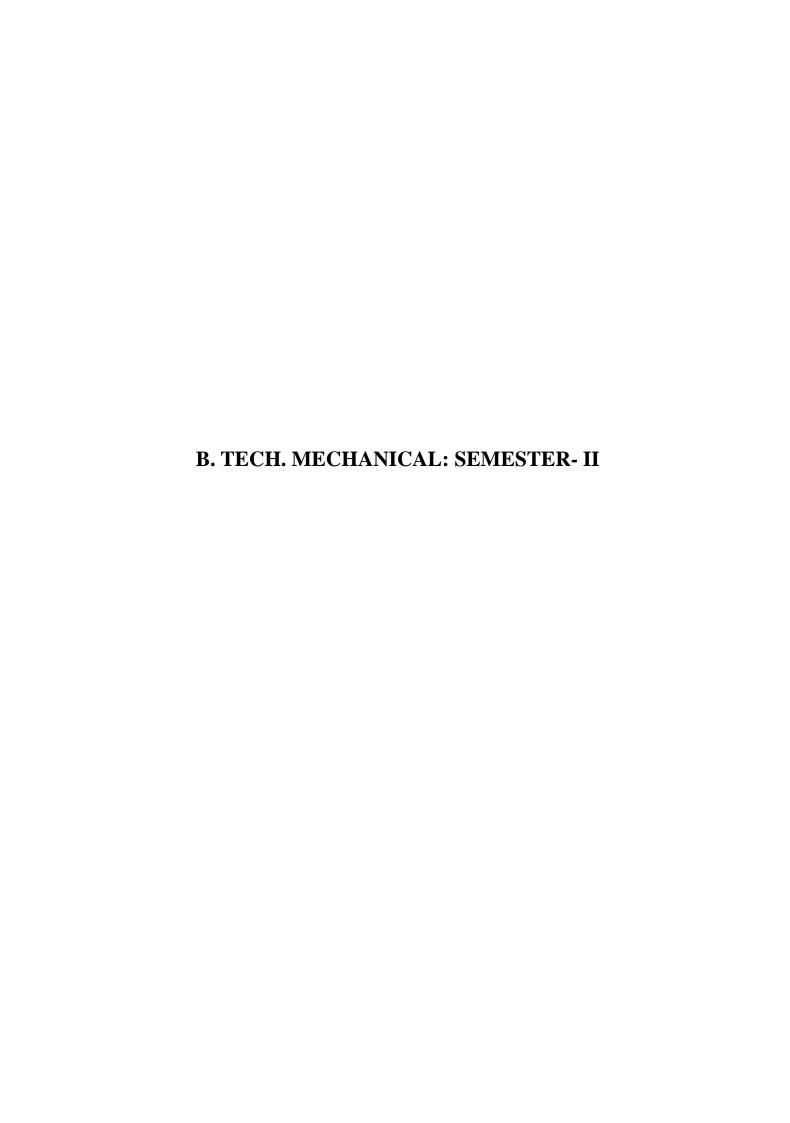
Forging -Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

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.

B. TECH. MECHANICAL: SEMESTER- II

Engineering Mathematics-II
(Course No.C108)

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

Course Prerequisites:-	Student must have basic knowledge of calculus.
Course Objective:-	To study: 1. Methods to evaluate first order, first degree differential equations and its applications in engineering problems. 2. Distinct co-ordinate systems, fourier series and curve tracing. 3. Various techniques for integral calculus and its applications in engineering problems.
Course Outcomes:-	Students should be able to, 1. Understand and evaluate first order and first degree differential equations. 2. Understand the formulation of physical systems as first order, first degree differential equation and evaluate particular solution of it. 3. Understand the Fourier series and apply it to represent periodic function. 4. Understand methods of integral calculus and curve tracing. 5. Understand co-ordinate system and apply it to solve locus problems. 6. Understand concept of multiple integral and apply it to evaluate area, volume, centre of gravity and moment of inertia.

Course Contents

Unit 1	Differential Equations (DE)	(08Hrs)
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	(08Hrs)
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	(08Hrs)
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	(08Hrs)
Differentiation Under the Integral Sign, Error functions. Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves.		

Unit 5	Solid Geometry	(08Hrs)
Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder.		

Unit 6	Multiple Integrals And Their Applications	(08Hrs)
Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.		

Assignments
1. Differential Equations (DE)
2. Applications Of Differential Equations
3. Fourier Series And Integral Calculus
4. Integral Calculus And Curve Tracing
5. Solid Geometry
6. Multiple Integrals And Their Applications

Text Books/ Reference Books

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd, 8thedition(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, 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 Mechanical Engineering
(Course No.C109)

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	20 Marks	Theory : 03
	Assignments	10 Marks	Practical : 01
	Internal Evaluation	10 Marks	
	Term Work / Oral	25 Marks	
	Total	125 Marks	4

Course Prerequisites:-	1. Students should have the basic knowledge of Higher secondary of Physics 2. Students should have the basic knowledge of Higher secondary of Chemistry
Course Objective:-	1. To introduce the basic concepts of engineering thermodynamics and its applications 2. To introduce energy sources , power producing and absorbing devices. 3. To get acquainted with mechanisms, machine components and manufacturing processes
Course Outcomes:-	Student should be Able to: 1. Understand the fundamentals of engineering thermodynamics and apply them to steady flow and non flow process. 2. Understand the basics of power producing and absorbing devices. 3. Understand fundamentals of energy sources, modes of heat transfer and apply laws of heat transfer to practical problems. 4. Understand the properties of fluids, engineering materials and evaluate the properties of fluids. 5. Understand the basics of different mechanisms and power transmission devices. 6. Understand the fundamentals of 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	(6 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.	

Assignment

1. Assignment on Thermodynamics
2. Assignment on Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines
3. Assignment on Energy Sources & Heat transfer
4. Assignment on Properties of fluids & Properties of Materials
5. Assignment on Mechanical devices
6. Assignment on Machine Tools

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
(Course No. C110)

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

Course Prerequisites:-	1. Basic Physics 2. Basic Mathematics
Course Objective:-	1. To analyze the problems related to mechanical Engineering by using the fundamental laws and principles of Engineering mechanics and proceed to design of machine elements. 2. To develop the capacity to predict the effects of forces and motions for different machine components.
Course Outcomes:-	The student should be able to 1. Understand the equilibrium conditions for different types forces and evaluate the resultant forces of a system with the help of free-body diagram. 2. Analyze the truss for different loading conditions and evaluate frictional forces for different types of machine components. 3. Understand the concept of centroid and moment of inertia and apply it for different cross section. 4. Understand the concept of rectilinear motion and apply the law of motion to solve problem related to rectilinear motion. 5. Understand the concept of curvilinear motion and apply the law of motion to solve problem related to curvilinear motion. 6. Understand the concept of different principles of kinetics apply it to solve problems related kinetics.

Course Contents

Unit 1	**Resultant and Equilibrium**	**(06Hrs)**
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**	**(06Hrs)**
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**	**(06Hrs)**
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**	**(06Hrs)**
Equations of motion, Constant and variable acceleration, Motion Curves, Relative motion, Dependent motion.		

Unit 5	Kinematics of Curvilinear motion of a Particle	(06Hrs)
Motion of a Projectile, Cartesian components, Normal and Tangential components of a curvilinear motion.		
Unit 6	Kinetics of a Particle	(06Hrs)
D'alembert's Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.		

List of Assignments

Numerical and/or theory questions on following topics:

1. Resultant and equilibrium of forces
2. Centroid & Moment of Inertia
3. Friction
4. Trusses, frames and cables
5. Kinematics of particles
6. Kinematics of rigid body
7. Kinetics of particle
8. Structural materials and foundations

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
(Course No :C111)

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

Course Prerequisites:-	1. Types of titrations, Types of crystals, Hardness and its types. 2. Classification of fuels, Definition of calorific value, Optical Activity and chirality. 3. Definition of corrosion, Electrolysis, Primary and secondary cells.
Course Objective:-	1. To develop the interest among the students regarding chemistry and their applications in engineering. 2. To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field. 3. To understand the concepts of chemistry to lay the groundwork for subsequent studies in the field such as Mechanical Engineering.
Course Outcomes:-	tudent will be able to, 1. Understand and apply suitable water treatment techniques. 2. Understand and apply the concept of X-ray diffraction technique to study crystal structure. 3. Understand and apply the knowledge of determining the quality of fuel and quantify the oxygen required for combustion of fuel. 4. Understand different types of corrosion and suggest control measures in industries. 5. Understand and apply the concept of electrode potential and Nernst theory and relates it to electrochemical cells. 6. Understand and apply the principles of stereochemistry and study the skills for stereochemical assignment.

Course Content

Unit 1	Water	(06Hrs)
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	(06Hrs)
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	(06Hrs)
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	(06Hrs)

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	(06Hrs)

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	(06Hrs)

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

1. Water softening methods
2. Material Chemistry
3. Fuels
4. Corrosion And Its Prevention
5. Electrochemistry
6. Stereochemistry

References / Text Books :

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi
2. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition (1979)

3. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988)
4. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955)
5. Engineering Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990)
7. Engineering Chemistry by Dara S. S. S Chand Publications
8. 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
(Course No. C112)

Designation of Course	Mechanical Engineering Drawing		
Teaching Scheme:	Examination Scheme:		Credits Allotted
Theory:- 2 Hours/ Week	End Semester Examination	60Marks	
Practical - 4 Hours/ Week	Unit Test	20 Marks	Theaory:02
	Assignments	10Marks	Practical:02
	Internal Evaluation	40 Marks	
	Term Work / Oral	25 Marks	
	Total	125Marks	4

Course Prerequisites:-	Students should have the basic knowledge of 1. Fundamentals of Mathematics 2. Fundamentals of Engineering Graphics
Course Objective:-	1. Effectively communicate drawing using software like AutoCAD 2. Use of AutoCAD commands for drawing 2D and 3D. 3. Use free hand sketching for machine components.
Course Outcomes:-	Student will be able to, 1. Understand the concepts of freehand sketches and apply to draw free hand sketches of machine components. 2. Understand the concepts of dimensioning practices and apply to represent the dimensions for machine components 3. Understand commands of AutoCAD and apply appropriate commands for drawing. 4. Remember the concepts of orthographic projection and apply to draw it using AutoCAD command for drawing Orthographic projections. 5. Remember the concepts of isometric projection and apply to draw it using AutoCAD command for drawing 3D model. 6. Understand the concept of lateral development of surfaces and apply it to for development of surfaces of solids by 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.		

Assignments

Minimum **Five** Questions based on each unit in A2 size Sheets.

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, Unit-V, VI

Professional Skills Development-II
(Course No: C114)

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 Prerequisites:-	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 Objective:-	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:-	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
(Course No: C114)

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

Course Prerequisites:-	Students should have the basic knowledge of 1. Basic knowledge of Engineering Graphics 2. Basic knowledge of workshop technology
Course Objective:-	Student will be able to, 1. To acquire skills for plain and taper turning operations and its calculations 2. To acquaint the skills for preparation of grinding operations 3. To acquire skills for pattern making and sand moulding 4. To acquire skills for gas welding process 5. To demonstrate machine tools and mechanisms
Course Outcomes:-	Student will be able to, 1. Understand the plain and taper turning operations to create jobs as per given specification. 2. Understand the forging and grinding operations to create a job. 3. Create simple solid pattern using wood turning and apply it during sand moulding. 4. Understand the gas and arc welding process and apply for welding joints. 5. Understand and apply the sand moulding processes. 6. Understand the machine tools, mechanisms and accessories used in various production processes.

Course Contents

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

A. Jobs:

    a. Plain and Taper turning – one job

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

    c. Making a simple solid pattern involving wood turning – one job

    d. Welding (gas or arc) – one job

    e. 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.

    a.   Spindle arbor (assembly) drive of milling machine

    b.   Crank and slotted lever quick return drive of shaping machine.

    c.   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 A. T. K. T.

- A candidate who is granted term for B. Tech. Semester-I will be allowed to keep term for his/her B. Tech. Semester-II examination even if he/she appears and fails or does not appear at B. Tech. Semester-I examination.

- A candidate who is granted term for B. Tech. Semester - III will be allowed to keep term for his/her B. Tech. Semester-IV examination even if he/she appears and fails or does not appear at B. Tech. Semester-III examination.

- A candidate who is granted term for B. Tech. Semester-V will be allowed to keep term for his/her B. Tech. Semester-VI examination if he/she appear and fails or does not appear at B. Tech. Semester-V examination.

- A candidate who is granted term for B. Tech. Semester-VII will be allowed to keep term for his/her B. Tech. Semester-VIII examination if he/she appears and fails or does not appear at B. Tech. Semester-VII examination.

- A candidate shall be allowed to keep term for the B. Tech. Semester-III course if he/she has a backlog of not more than 3 Heads of passing out of total number of Heads of passing in theory examination at B. Tech. Semester-I & II taken together.

- A candidate shall be allowed to keep term for the B. Tech. Semester-V of respective course if he/she has no backlog of B. Tech Semester-I & II and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 heads of passing in term work and practical examination or term work and oral examination.

- A candidate shall be allowed to keep term for the B. Tech. Semester-VII course if he/she has no backlog of B. Tech. Semester-III & IV and he/she has a backlog of not more than 3 Heads of passing in theory examination and not more than 3 Heads of passing in term work and practical examination or term work and oral examination.

CONTINUOUS ASSESSMENT

- In respect of Term work at B. Tech. Semester-I & II, B. Tech. Semester-III & IV and B. Tech. Semester-V & VI, target date shall be fixed for the completion of each job, project experiment or assignment as prescribed in the syllabus and the same shall be collected on the target date and assessed immediately at an affiliated college by at least one pair of the concerned teachers for the subject and the marks shall be submitted at the end of each term to the Principal of the college.

- Termwork and performance of Practical/Oral examination shall be assessed on the basis of the depth of understanding of the principles involved, correctness of results and not on ornamental or colorful presentation.

- For B. Tech. Semester-VII & VIII, term work assessment will be done by external and internal examiners jointly during the examination schedule declared by the university. The record of continuous

assessment shall be made available to the examiners during Term work and practical and Term work and oral examinations. Examiner shall use this record for overall assessment of the performance of the student. Every practical/term work assignment shall be assessed on the scale of 25 marks and weightage of 25 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	07
2	Presentation	06
3	Understanding	12

- Marks obtained out of 25 for all assignments together will be converted on scale of marks assigned to term work of respective subject in the structure of the course.

CLASS

The class should be awarded to the student on the basis of aggregate marks obtained together in both the semesters of the respective year by him. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or more marks but less than 66%	First Class
C	Aggregate 55% or more marks but less than 60%	Higher Second Class
D	Aggregate 50% or more marks but less than 55%	Second Class
E	Aggregate 40% or more marks but less than 50%	Pass Class