ESTD: 1980

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)
(Affiliated to Andhra University, Visakhapatnam), (Recognised by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
Recognised as Scientific and Industrial Research Organisation
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R16)

II/IV B.TECH
(With effect from **2016-2017** Admitted Batch onwards)
Under Choice Based Credit System

MECHANICAL ENGINEERING

I-SEMESTER

Code No.	Course	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
B16 ENG 2101	Mathematics-IV	4	3	1	--	4	30	70	100
B16 ME 2101	Mechanics of Solids	4	3	1	--	4	30	70	100
B16 ME 2102	Thermodynamics	4	3	1	--	4	30	70	100
B16 ME 2103	Manufacturing Process	4	4	--	--	4	30	70	100
B16 ME 2104	Engineering Mechanics	4	3	1	--	4	30	70	100
B16 ME 2105	Mechanical Engineering Drawing	4	--	--	4	4	30	70	100
B16 ME 2107	Mechanical Engineering Lab	2	--	--	3	3	50	50	100
B16 CE 2108	Mechanics of Solids Lab	2	--	--	3	3	50	50	100
B16 ENG 2104	English Proficiency	2	1	1	--	2	50	50	100
B16 ME 2108	Auto CAD	1	--	--	2	2	50	--	50
	Total	**31**	**17**	**5**	**12**	**34**	**380**	**570**	**950**

II/IV B.Tech-I Sem
MECHANICAL

Code: B16 ENG 2101

MATHEMATICS – IV
(Common to CIV,ECE,EEE & ME)

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

Students learn

1. The concepts of Gradient, Divergence, Curl, Directional derivative, solenoidal and Irrotational fields
2. Green's, Stokes' and Divergence theorems
3. Classification of 2^{nd} order Partial Differential Equations as well as solution of 1-Dimensional Wave equation and 1-Dimensional Heat equation
4. the concept of Analytic function, CR equations
5. Cauchy's Integral Theorem and Integral Formula
6. Taylor and Laurent series, Residues and Residue theorem

Course Outcomes:

Students will be able to

1. Apply the concepts of Gradient, Divergence, Curl, Directional derivative, solenoidal and Irrotational fields
2. Determine scalar potential, circulation and work done
3. Evaluate integrals using Green's, Stokes' and Divergence theorems
4. Obtain the solution of 1-D wave equation and 1-D heat equation
5. Determine the zeroes and poles of functions and residues at poles
6. Evaluate certain real definite integrals that arise in applications by the use of Residue theorem

SYLLABUS

Vector Calculus-1

Definitions of Scalar and Vector point functions, Differentiation of vectors, Vector differential operator del, Del applied to scalar point function – gradient, Del applied to vector point function- divergence and curl, physical interpretation of gradient, divergence and curl(without proof), Del applied twice to a point function, Del applied to product of two functions, Irrotational and Solenoidal Fields, scalar potential

Vector Calculus-2

Integration of vectors, line integral, circulation, work done, surface integral, Flux, Green's, Stokes' and Gauss Divergence Theorems (Without proofs). Introduction to orthogonal curvilinear coordinates, cylindrical polar coordinates and spherical polar coordinates.

Applications Of Partial Differential Equations

Classification of second order partial differential equations, Method of separation of variables, One –dimensional wave equation- vibrations of a stretched string (no derivation)-, one-dimensional heat equation – Heat flow along a long horizontal bar (no derivation) (problems on heat equation involving homogeneous end conditions only), two dimensional Laplace equation in Cartesian coordinates.

Complex Variables-1

Review- Cartesian form and polar form of a complex variable, Real and imaginary parts of z^n , e^z, sin z, sinh z and log z **.**

Limit and continuity of a function of the complex variable, derivative, analytic function, properties of Analytic functions, Cauchy- Riemann equations, Harmonic functions and Orthogonal system, application of analytic function to flow problems, geometric representation of w=f(z), conformal mapping – Bilinear transformation only.

Complex Variables-2

Integration of complex functions, Cauchy's theorem, Cauchy's integral formula (statements only) . Taylor and Laurent series expansions of functions (statement of theorems only), zeros and singularities, Residue, calculation of residues, Cauchy's Residue theorem (without proof), Evaluation of real and definite integrals- integration around a unit circle

Text Book:

1. "Higher Engineering Mathematics", by Dr.B.S.Grewal, 43rd Edition, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley.
2. A text book of Engineering Mathematics, by N.P.Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics, by H.K.Dass, S.Chand Company.
4. Higher Engineering Mathematics, by B.V.Ramana, Tata Mc Graw Hill Company.
5. Higher Engineering Mathematics, by Dr. M.K.Venkatraman, The National Publishing Company.

Code: B16 ME 2101

MECHANICS OF SOLIDS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

1. To impart the knowledge on internal behavior of mechanical elements under the action of applied loads.

Course Outcomes:

1. Fundamental understanding of the concepts of stress and strain in mechanics of solids and structures and material properties.
2. Apply the fundamental concepts of principle of superposition, equilibrium, compatibility, force-deformation, and stress-strain relationships to the solid and structural mechanics problems.
3. Analyze determinate bars, beams, to determine axial forces, torques, shear forces, and bending moments.
4. Physical insight into distribution of stresses and strains in structural members by determining stress, strain, and deformation of bars, and beams, and performing stress and strain transformations.
5. Basic understanding of the method of superposition, flexibility method, and stiffness method as applied to statically determinate axial and torsional members, and beams.
6. Ability to design structural members given the dimensions, material properties such as force-displacement relationships, boundary conditions, loading, allowable stresses, and factor of safety.

SYLLABUS

Simple Stresses:
Stress, Strain, Stress- Strain curve, Lateral strain, Relationship between elastic constants, Bars of varying cross-section, Compound bars, Temperature stresses in bars.

Complex Stresses:
Stresses on an inclined plane under different uniaxial, biaxial and general case of plane stress systems, Principal planes and principal stresses, Mohr's circle, Strain energy, Impact loading.

Bending Moments and Shear Forces:
Beam - Types of loads, Types of supports, S.F. and B.M. diagrams for Cantilever, Simply supported and over hanging beams.

Deflections of Beams:
Relation between curvature, slope and deflection - simple cases in Cantilever, Simply supported and Over hanging beams.

Stresses in Beams:
Theory of bending, Flexural formula, Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections, Shear stresses in beams, Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T, angle sections.

Torsional Stresses in Shafts:
Analysis of torsional stresses, Power transmitted, combined bending and torsion.

Cylinders and Spherical Shells:
Stresses and strains in thin cylinders, Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses –hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders and Thin spherical shell.

Text Books:

1. Analysis of Structures, by Vazirani and Ratwani, Vol. 1, 1993 edition.
2. Mechanics of Materials by James M. Gere , Stephen P. Timoshenko , CBS Publishers
3. Solid Mechanics, by Popov

Reference Books:

1. Strength of Materials, by Timoshenko
2. Strength of Materials -By Jindal, Umesh Publications.
3. Analysis of structures by Vazirani and Ratwani.
4. Mechanics of Structures Vol-III, by S.B.Junnarkar.
5. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman

Code: B16 ME 2102

THERMODYNAMICS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives

1. To educate students about the behavior of real gases and the significance of ideal gas theory
2. To educate the students about the properties of ideal gas and their relationship
3. To familiarize the students about the behavior of ideal gases under heating, cooling, compression and expansion processes
4. To educate the students about the working principle of combustion engines (internal and external) and their cycles such as Otto, Diesel, Atkinson, Ericson, Brayton, etc., and their comparison

Course Outcomes

1. Students realize the practical importance of ideal gas theory and the use of real gases in combustion engines such as IC Engines and Gas turbines
2. Students are able to calculate the properties of the gases such as internal energy, enthalpy and entropy.
3. Students are able to estimate the losses which occur during operation of the heat engines, and their maximum possible operating efficiencies under STP conditions.
4. Students can estimate the maximum work-output delivered by the heat engines and maximum work consumed by the reversed heat engines

SYLLABUS

Introduction:

Basic concepts; Thermodynamic systems; Micro & Macro systems; Homogeneous and heterogeneous systems; Concept of continuum; Pure substance; Thermodynamic equilibrium; State; Property; Path; Process; Reversible and irreversible cycles; Work; Heat; Point function; Path function; Heat transfer;

Perfect gas laws-

Equation of state- Universal gas constant, various non-flow processes-Properties of end states- Heat transfer and work transfer- Change in internal energy-throttling and free expansion- Flow processes- Deviations from perfect gas model-Vanderwall's equation of state- Compressibility charts- Variable specific heats.

Zeroth and First law of thermodynamics:

Concept of equality of temperatures- Joule's experiments-First law of thermodynamics-Isolated systems and steady flow systems- Specific heats at constant volume and pressure - Enthalpy- First law applied to flow systems- Systems undergoing a cycle and change of state-First law applied to steady flow processes-Limitations of first law of thermodynamics.

Second law of thermodynamics-

Kelvin Plank statement and Clasius statement and their equivalence, Corollaries- Perpetual motion machines of first kind and second kind-Reversibility and irreversibility- Cause of irreversibility- Carnot cycle- Heat engines and heat pumps- Carnot efficiency- Clasius theorem- Clasius inequality- Concept of entropy-Principles of increase of entropy- Entropy and disorder.

Air Standard Cycles

Only P-V and T-S diagrams along with air standard efficiencies of Otto cycle, Diesel cycle, Dual combustion cycle, Comparison of Otto-Diesel and Dual cycles based on same compression ratio- same maximum pressure and same maximum temperature.

General Relations, Availability and Unavailability

Helmholtz function and Gibbs function, Maxwell's equations- Tds relations, relation between specific heats, Available energy, unavailable energy, Available and unavailable forms of energy for a flow and non-flow process.

Gases and Vapour Mixtures –

Daltons law and Gibbs-Dalton law, Volumetric Analysis of gas mixtures, Apparent molecular weight and gas constant, specific heats of gas mixture, Adaibatic mixing of perfect gases, Gas and vapour mixtures.

Text Books:

1. Engineering Thermodynamics, by P.K. Nag, Tata McGraw-Hill Publications Company.
2. Thermal Engineering by R.K Rajput, Laxmi publications.
3. Applied Thermodynamics-I by R. Yadav, Central Book House.

References Books:

1. Engineering Thermodynamics by Rathakrishnan, Prentice - Hall India.
2. Engineering Thermodynamics by Y.V.C. Rao.
3. Engineering Thermodynamics by K. Ramakrishna, Anuradha agencies.
4. Engineering Thermodynamics Work and Heat Transfer, by G.F.C Rogers and Y.R. Mayhew, ELBS publication.

Code: B16 ME 2103

MANUFACTURING PROCESS

Theory	**: 4 Periods**	**Sessionals**	**: 30**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 70**
		Credits	**: 4**

Course Objectives:

1. To provide an understanding and appreciation of the different manufacturing and fabrication methods to the students.
2. To expose the students to various applications of the manufacturing process in the real life articles/products.

Course Outcomes:

1. Student will be able to recognize various manufacturing materials, manufacturing process and types of productions.
2. Student will be able to identify various casting processes, metal forming process and welding process.
3. Student will be able to design of gating system, patterns and cores for various casting processes.
4. Student will be able to apply knowledge of casting process for manufacturing of products.
5. Student will be able to apply knowledge of rolling, forging, extrusion for manufacturing of products.
6. Student will be able to apply knowledge of welding, brazing and soldering for joining of metals.

SYLLABUS

Manufacturing concepts:
Product cycle, Job, batch and mass production, Primary and secondary manufacturing processes.

Metal Casting Process:
Principle of metal casting, Pattern: Materials, Allowances and Types, Core boxes, Moulding sands: ingredients, properties, preparation, types, Moulding tools, Sand testing, Sand moulding, Machine moulding, Core making, Melting and pouring-Classification of furnaces, Cupola furnace, pouring laddels; Element of gating system.

Special Casting Techniques:
Permanent mould casting, Pressure die casting, Centrifugal casting, Shell mold casting, Investment casting and CO_2 process, casting defects.

Metal Forming:
Hot & Cold working, Rolling, Extrusion, metal spinning, Drawing, Piercing.

Sheet Metal Forming:
Concept of spring back, Materials, tools, operations, embossing, coining, stretch forming, Progressive and Compound Dies.

Forging Processes:
Forgability, Forging Materials, Classification: smith, drop, press and machine forging, Forging tools, Forging Operations, High energy rate forming, Swaging.

Welding Processes:
Welding metallurgy, Weldability, Classification: Plastic welding (Forge, Resistance & Thermit welding), Fusion welding (Gas, Arc & Thermit welding), Solid state welding (Friction, Ultrasonic, Diffusion and Explosive welding), Soldering and Brazing, Weld defects, Weld inspection and testing.

Text Books:

1. Elements of Workshop Technology Vol-1: Manufacturing Processess by S.K. Hajra Choudhury, A.K. Hajra Choudhury,Nirjhar Roy, MPP, Pvt. Ltd.
2. Manufacturing Technology- Foundary, Forming and Welding by P.N. Rao, Tata McGraw- Hill Publishing Company.

Reference Books:

1. Process and Materials of Manufacture (4th Edition) by Roy A. Lindberg, Prentice-Hall of India Private Limited.
2. Manufacturing Engineering & Technology by Kalpak Jain, Addition Wesley Edition.
3. Materials and Processes in Manufacturing by De Margo, Black and Kohsen, Prentice Hall of India.
4. Principles of Metal Casting by Hein and Rosenthol, Tata Mc-Graw Hill India.

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Code: B16 ME 2104

ENGINEERING MECHANICS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

1. The course uses the Laws of Mechanics to predict forces in and motions of machines and structures.
2. The course is the key prerequisite course to sequences of courses dealing with mechanics of machines, stress analysis and design of mechanical systems.
3. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
4. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
5. Application of established engineering methods to complex engineering problem solving.
6. Application of systematic engineering synthesis and design processes.

Course Outcomes:

Upon successful completion of this course student should be able to:

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
3. Apply basic knowledge of maths and physics to solve real-world problems

SYLLABUS

Basic Concepts:
Scalar and vector quantities- Representation vectors- Free vector force, Specification of force- Effect of force on rigid body- Free body diagram. Concurrent Forces and Parallel Forces in a Plane: Principles of statics-Resolution and Composition of forces in a plane- Equilibrium of concurrent forces in a plane- Method of projections- Equilibrium of three forces in a plane Method of moments.

Centroid & Moment of Inertia - Centroid & M.I – Arial & Mass M.I – Radius of Gyration, Parallel axis– Perpendicular axis theorem – Simple Problems.

General Case of Forces in a Plane: Resultant and equilibrium of general case of parallel forces in a plane, Statically determinate plane trusses-Method of joints and Method of sections.

Friction – Coulombs laws of dry friction – Limiting friction, Problems on Wedge friction, Belt Friction-problems.

Dynamics of Particles - Rectilinear Motion – Kinematics Problems, D'Alembert's principle, Kinetics – Problems, Work & Energy – Impulse Moment, Direct Central Impact – coefficient of restitution.

Curvilinear Motion – Projectile Motion, Moment of momentum, Work & Energy in Curvilinear motion.

Dynamics of Rigid Bodies - Rigid body rotation – Kinematics - Kinetics, Problems – Work & Energy in Rigid body rotation, Plane Motion – Kinematics, Problem – Instantaneous center of rotation, work-energy principle in plane motion.

Text Book:

1. Engineering Mechanics by S.Timoshenko and D.HYoung McGraw-Hill.

Reference Books:

1. Engineering Mechanics, Vol.1 & 2 by J.L. Meriems and L.G. Kraige.
2. Engineering Mechanics by Singer.
3. Engineering Mechanics by K.L. Kumar, Tata Mc-Graw Hill.
4. Engineering mechanics by Bhavikatti. New age international.

Code: B16 ME 2105

MECHANICAL ENGINEERING DRAWING

Theory/Practice	**: 4 Periods**	**Sessionals**	**: 30**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 70**
		Credits	**: 4**

Course Objectives

1. To provide an understanding and draw the assembly and production drawing of various engine components and machine tool components to the students.
2. To expose the students to draw various screw fastenings (Screw, Riveted, welded etc.), Bearings, couplings, key, dimensional and geometrical tolerances etc.

Course Outcomes

Students will be able to

1. Know drawing of Screw threads and Screw Fastenings using standard Empirical formulae.
2. Draw Riveted joints, Keys, Cotter-joint, Draw Couplings (Shaft couplings: Box and split muff couplings, Flanged, Flexible, Universal and Oldham couplings).
3. Draw the dimensional and geometrical tolerances and surface roughness symbols.
4. Draw Assembly and production drawings of various engine components and machine tool components.

SYLLABUS

Screw threads, Screw Fastenings, keys, and Riveted joints using standard Empirical formulae.

Cotter-joints, Shaft couplings: Box and split muff couplings, Flanged, Flexible, Universal and Oldham couplings,

Assembly drawing of various engine components and machine tool components (Simple eccentric, swivel bearing, plumber block, Screw Jack, Stuffing Box).

Conventional representations, Limits, Fits and Tolerances, Geometrical Tolerances, Indication of surface roughness, Production Drawings.

Text Books:

1. Machine Drawing, by N.D.Bhatt, Charotal Publishing House.g
2. Production Drawing by K.L Narayan, P. Kannaiah and K. Venkata Reddy, New Age.
3. Engineering Drawing, by A.C.Parkinson, Wheeler Publishing.

Reference Book:

1. Machine Drawing by K.L Narayan, P. Kannaiah and K. Venkata Reddy, New Age.

Code: B16 ME 2107

MECHANICAL ENGINEERING LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. To understand the principle and functioning of various mechanical devices such as boilers, engines etc.
2. Ability to understand the working of two stroke and four stroke engines.
3. Acquiring the knowledge of operation of a reciprocating compressor and to assess the pressure gauge performance.
4. The way of determination of flash and fire points of oil samples and carbon residue and their importance is acquired.
5. The procedure for determination of calorific values of the fuels and viscosities of oil samples can be understood.
6. Practically the procedure for moment of inertia of fly wheel, connecting rod and modulus of rigidity is acquired.

Course Outcomes:

1. Students are now aware of the use of drawing valve timing diagrams of an engine and method to evaluate the volumetric efficiency of air compressor.
2. They are also aware of method of calibrating pressure gauge, the importance of flash and fire points and calorific values of fuels.
3. The importance and application by calculating viscosities of oil samples are understood.
4. The use of moment of inertia and modulus of rigidity is understood.
5. They are also now able to identify the parts of boiler and engines etc.

LIST OF EXPERIMENTS

1. Study and valve timing diagrams for four-stroke and study & PTD of two-stroke engines.
2. Determination of volumetric efficiency of the given air compressor by (i) plate orifice method and (ii) tank capacity method.
3. Calibration of the given pressure gauge.
4. Determination of flash and fire points and b) Canradsons carbon residue test.
5. Determination of calorific value of flues (solid, liquid and gaseous) by Bomb calorimeter/Gas calorimeter.
6. Determination of the kinematic and absolute viscosity of the given sample oils.
7. Determination of inertia of the given flywheel and connecting rod.
8. Determination of modulus of rigidity of the given wire with torsion pendulum.
9. Study of boilers, various mountings and accessories.
10. Assembling of the given two-stroke petrol engine. (Instead of engine, any mechanical unit can be given for this experiment.)

Reference Books:

1. Engineering Mechanics by S.Timoshenko and D.HYoung McGraw-Hill.
2. Engineering Mechanics by Singer.
3. Internal Combustion Engines by V. Ganesan, McGraw-Hill.

Code: B16 CE 2108

MECHANICS OF SOLIDS LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Outcomes:

1. Ability to identify different types of loads and measure them.
2. Ability to measure material properties of different materials using different methods.
3. Ability to measure bulking property and fineness of sand grains.

Course Objectives:

1. To understand the different types of loading and measure the loads.
2. To understand the material properties of different materials and the ways of finding them.
3. To understand the bulking property and fineness of sand grains and the methods of finding them.

LIST OF EXPERIMENTS

1. To study the stress strain characteristics (tension and compression) of metals by using UTM.
2. To study the stress strain characteristics of metals by using Hounsefield Tensometer.
3. Determination of compression strength of wood.
4. Determination of hardness using different hardness testing machines-Brinnels, Vickers and Rockwell's.
5. Impact test by using Izod and Charpy methods.
6. Deflection test on beams using UTM.
7. Tension shear test on M.S. Rods.
8. To find stiffness and modulus of rigidity by conducting compression tests on springs.
9. Torsion tests on circular shafts.
10. Bulking of sand.
11. Punch shear test, hardness test and compression test by using Hounsefield tensometer.
12. Sieve Analysis and determination of fineness number.

Reference Books:

1. Strength of Materials, by Timoshenko
2. Strength of Materials -By Jindal, Umesh Publications.
3. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.

Code: B16 ENG 2104

ENGLISH PROFICIENCY
(Common to All Branches)

Theory	**: 1 Period**	**Sessionals**	**: 50**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 50**
Exam	**: 3 Hrs.**	**Credits**	**: 2**

AIM:

Enriching the communicative competency of the students by adopting the activity-based as well as the class-oriented instruction with a view to facilitate and enable them to enhance their language proficiency skills.

Course Objectives:

Students be able to

1. Understand the importance of professional communication.
2. Learn language skills and vocabulary in order to improve their language competency.
3. Know and perform well in real life contexts.
4. Identify and examine their self-attributes which require improvementand motivation.
5. Build their confidence and overcome their inhibitions.
6. Improve their strategies in reading skills.

Course Outcomes:

1. Students enhance their vocabulary and use it in the relevant contexts .
2. They improve speaking skills.
3. They learn and practice the skills of composition writing.
4. They enhance their reading and understanding of different texts.
5. They enrich their communication both in formal and informalcontexts.
6. They strengthen their confidence in presentation skills.

SYLLABUS

Speaking Skills
PPT
Describing event/place/thing
Picture Description
Extempore
Debate
Telephonic Skills
Analyzing Proverbs

Vocabulary
Affixes
Pairs of Words

Reading Skills
Reading Comprehension
Reading/Summarizing News Paper Artic

Writing Skills
Designing Posters
Essay writing
Resume Writing

Reference Books:

1. Interchange (4th edition) Student's books 1&2 by Jack C. Richards, CUP.
2. Fundamentals of Technical Communication by Meenakshiraman, Sangeta Sharma of OUP
3. English and Communication Skills for Students of Science and Engineering, by S.P.
4. Dhanavel, Orient Blackswan Ltd. 2009
5. Enriching Speaking and Writing Skills, Orient Blackswan Publishers
6. The Oxford Guide to Writing and Speaking by John Seely OUP

(***Note: Sessional Marks will be evaluated based on Continuous Comprehensive Evaluation of the students' Performance - 40M, Attendance – 10M and External Marks will be evaluated based on Presentation Skills – 30M, Project 20M)

Code: B16 ME 2108

Auto CAD

Lab	**: 2 Periods**	**Sessionals**	**:50**
Exam	**: 3 Hrs.**	**Credits**	**: 1**

Course Objectives:

1. Increase ability to communicate with people
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic Auto Cad skills.
5. Learn basic engineering drawing formats
6. Prepare the student for future Engineering positions

Course Outcomes

Up on completion of the course the student shall be able to gain knowledge on:

1. Auto CAD screen and various Tool bars and menus and Explain about Dimensioning and Hatching
2. Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
3. Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack
4. Rendering of 3D images

LIST OF EXERCISES

1. Study the Auto CAD screen, various toolbars and menus
2. Exercises on usage of Draw and modify tool bar.
3. Exercises on mirror, rotate, array and move commands
4. Exercises on dimension and hatching
5. Draw the 2D knuckle joint with full details & dimensioning
6. Draw the screw jack 2D drawing
7. Study the 3D solids (primitives) and solids tool bar options
8. Draw bolt and nut in 3D
9. Draw various parts of screw jack in assemble them as 3D component
10. Render the 3D images already generated and apply materials and light.

(Note: Total Marks will be evaluated based on Continuous Evaluation - 25 Marks, Design Contest -25 Marks)

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R16)

II/IV B.TECH
(With effect from **2016-2017** Admitted Batch onwards)
Under Choice Based Credit System

MECHANICAL ENGINEERING

II-SEMESTER

Code No.	Course	Credits	Lecture Hrs	Tutorial Hrs	Lab Hrs	Total Contact Hrs/Week	Sessional Marks	Exam Marks	Total Marks
B16 ME 2201	Advanced Strength of Materials	4	3	1	--	4	30	70	100
B16 ME 2202	Thermal Engineering	4	3	1	--	4	30	70	100
B16 ME 2203	Metal Cutting & Machine Tools	4	4	--	--	4	30	70	100
B16 ENG 2202	Engineering Economics	4	4	--	--	4	30	70	100
B16 EE 2204	Basic Electrical & Electronics Engineering	4	4	--	--	4	30	70	100
B16 ENG 2201	Environmental Studies	2	3	1	--	4	30	70	100
B16 ME 2205	Manufacturing Process Lab	2	--	--	3	3	50	50	100
B16 EE 2206	Basic Electrical & Electronics Engineering Lab	2	--	--	3	3	50	50	100
B16 ME 2206	Industry Oriented Technology Lab	1	--	--	2	2	50	--	50
	Total	**27**	**21**	**3**	**8**	**32**	**330**	**520**	**850**

II/IV B.Tech-II Sem
MECHANICAL

Code: B16 ME 2201

ADVANCED STRENGTH OF MATERIALS

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

1. To enrich the student on the concept of fixed beams with uniform Moment of inertia as well as Non uniform Moment of inertia both under stability of beam supports and under sinking & rotation of the supports.
2. To make the student capable of evaluating the deflection, slope and stress of the fixed beamwith uniform Moment of inertia as well as Non uniform Moment of inertia both under the stability of beam supports and under the sinking &rotation of the supports.
3. To make the student understand the concept of continuous beams with uniform Moment of inertia as well as Non uniform Moment of inertia both under stability of supports as well as sinking of supports

Course Outcomes:

1. Students are able to evaluate the stresses across the cross-sections of the curved beam.
2. Calculate the radial stress and circumferential stress for rotating circular disc(both hollow and solid) of uniform thickness
3. Modeling the thickness of circular rotating disc having uniform strength
4. Calculate the radial and circumferential stress for both thick and compound cylinders under different pressurized conditions
5. Evaluate the deflection and slope of simply supported beams and cantilever beams using different energy methods

SYLLABUS

Fixed Beams:
Fixing moments for a fixed beam of uniform and variable sections, Effect of sinking support, slope and deflection.

Continuous beams:
Analysis of continuous beam, Reactions at the supports, Effect of sinking of supports.

Columns and Struts:
Columns with one end free and the other fixed, Both ends fixed, One end fixed and other hinged, Limitation of Euler's formula, Column carrying eccentric load, Empirical formulae.

Bending of Curved Bars:
Stresses in bars of circular, rectangular and trapezoidal sections.

Stresses due to rotation:
Wheel rim, disc of uniform thickness, disc of uniform strength.

Thick cylinders subjected to internal and external pressure and compound cylinders.

Text Books:

1. Analysis of Structures, Vol. 1, 1993 edition, by Vazirani and Ratwani.
2. Chapter VI from Advanced Topics in Strength of Materials, by Prof. L.B.Shah and Dr.R.T.Shah.

Reference Book:

1. Strength of Materials, by Timoshenko.

Code: B16 ME 2202

THERMAL ENGINEERING

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 4**

Course Objectives:

1. To gear the student with basic principles of steam properties.
2. To prepare the student for industrial application of steam.
3. The student is taught to design the steam equipment so that R&D in industry is improved.

Course Outcomes:

1. The student gets complete knowledge of steam and its properties.
2. The student learns the complete calculation procedures for designing steam turbines, steam condensers, nozzles etc. used in thermal power plants, steam engines, water turbines and many other industrial applications.
3. The student is prepared to work in industry immediately after his course

SYLLABUS

Properties of Pure Substance:
Definition of pure substance, phase change of a pure substance, p-T (Pressure-Temperature) diagram for a pure substance, p-V-T(Pressure-Volume-Temperature) surface, phase change terminology and definitions, property Diagrams in common use, Formation of steam, Important terms relating to steam formation, Thermodynamic properties of steam and steam tables, External work done during evaporation, Internal latent heat, Internal energy of steam, Entropy of water, Entropy of evaporation, Entropy of wet steam, Entropy of superheated steam, Enthalpy-Entropy (h-s) charts for Mollier diagram, Determination of dryness fraction- Tank or bucket calorimeter, throttling calorimeter, separating and throttling calorimeter.

Vapor Power Cycles
Vapor power cycle- Rankine cycle- Reheat cycle- Regenerative cycle- Thermodynamic variables effecting efficiency and output of Rankine and Regenerative cycles- Improvements of efficiency, Binary vapor power cycle.

Steam Nozzles:

Type of nozzles- Flow through nozzles- Condition for maximum discharge- Nozzle efficiency- Super saturated flow in nozzles- Relationship between area velocity and pressure in nozzle flow- Steam injectors.

Steam Turbines:

Classification of steam turbines- Impulse turbine and reaction turbine- Compounding in turbines- Velocity diagrams in impulse and reaction turbines- Degree of reaction- Condition for maximum efficiency of reaction turbines- Effect of friction on turbines constructional features governing of turbines.

Condensers:

Classification of condenser- Jet, Evaporative and surface condensers- Vacuum and its measurement- Vacuum efficiency- Sources of air leakage in condensers- Condenser efficiency- Daltons law of partial pressures- Determination of mass of cooling water- Air pumps.

Steam Boilers –

Working principle of various boilers their accessories and mountings (Simple vertical, Cochran, Babcock & Wilcox and Lancashire Boiler), Performance of boilers (simple problems)

Text Books:

1. A Treatise on Heat Engineering by Vasandhani and Kumar.
2. Applied Thermodynamics-II by R. Yadav.
3. Thermal Engineering, by R. K. Rajput.

References Books:

1. Fundamentals of Engineering Thermodynamics by E. Radhakrishna, PHI.
2. Fluid Flow Machines, by M.S. Govinda Rao, Tata McGraw Hill publishing company Ltd.
3. Refrigeration and Air-conditioning, by C.P.Arora and Domokundwar.
4. Thermal Science and Engineering by D.S. Kumar, S.K. Kataria and Sons.
5. Refrigeration and Air-conditioning, by Ahamadul Ameen, PHI.

Code: B16 ME 2203

METAL CUTTING & MACHINE TOOLS

Theory	**: 4 Periods**	**Sessionals**	**: 30**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 70**
		Credits	**: 4**

Course Objectives:

1. To give a clear understanding of the mechanism of machining to the students.
2. To describe the mechanisms of the various machine tools, types of machine tools, various operations that can be performed on them, machining time and force calculations etc to the students.

Course Outcomes:

1. Students will be able to describe the mechanisms of metal cutting.
2. Students will be able to calculate cutting forces, tool life and machining parameters.
3. Students will be able to design the single point and multi point cutting tools.
4. Students will be able to demonstrate the working of various machine tools like lathe, milling machine and grinding machine etc.
5. Students will be able to identify different micro finishing operations.
6. Students will be able to assess the advantages, limitations and applications of unconventional methods of machining.

SYLLABUS

Mechanics of Metal Cutting:
Orthogonal and oblique cutting, mechanics of chip formation, types of chips; classification, nomenclature, signature (ASA & ISO systems) of single point cutting tools, tool materials; tool wear and tool life; Cutting forces-Merchant's circle, Machinability, Cutting fluids.

Machine tools using Single point cutting tools:
Engine lathe; Capstan and turret lathe, shaper, planner, Slotter and boring-Types, Parts, Specifications, Mechanisms, Operations and machining parameters.

Machine tools using Multi point cutting tools:
Drilling machine-Types, Parts, Specifications, Mechanisms, Types of drills, Nomenclatures of twist drill, Operations and machining parameters
Milling machine-Types, Parts, Specifications, Mechanisms, Attachments, Types of Milling cutters, Nomenclature of plain milling cutter, Operations, machining parameters and Indexing methods.
Broaching machine-Types, Parts, Specifications, Types of Broaches, Nomenclature of pull broach, Operations and machining parameters

Machine tools using Abrasive wheels:
Grinding Machine- Types, Parts, Specifications, Manufacturing of grinding wheel-bonding processes, grit, grade and structure, selection of grinding wheels, mounting of grinding wheels, glazing, loading, dressing and truing of grinding wheel, Operations and machining parameters

Micro finishing Operations-Lapping, honing, super finishing, polishing and buffing

Unconventional Methods of Machining:

Process, Characteristics, Advantages, Limitations, Applications of Abrasive Jet Machining (AJM), Ultrasonic Machining (USM), Water Jet Machining (WJM), Electro Discharge Machining (EDM), Wire-cut EDM, Electron Beam Machining (EBM), Plasma Arc Machining (PAM), Laser Beam Machining (LBM), Chemical milling; Photochemical milling, Electro Chemical Machining (ECM), Electro Chemical Grinding (ECG)

Text Books:

1. Elements of Workshop Technology Vol-2: Machine Tools by S.K. Hajra Choudhury, A.K. Hajra Choudhury,Nirjhar Roy, MPP, Pvt. Ltd.
2. Metal cutting and Machine tools by P.N. Rao, Tata McGraw- Hill Publishing Company.
3. Process and Materials of Manufacture (4th Edition) by Roy A. Lindberg, Prentice-Hall of India Private Limited.

Reference Books:

1. Fundamentals of Metal Machining and Machine Tools by Geoffrey Boothroyd, International Student Edition, McGraw-Hill Book Company.
2. Metal Cutting Principles by M.C. Shaw, MIT Press, Cambridge.
3. Advanced Methods of Machining by J. A. McGeough, Chapman & Hall Publishers.
4. Metal Cutting-Theory and Practice by Amitabha Bhattacharya, Central Book Publishers.
5. Production Engineering by P.C. Sharma, S. Chand and Company.

Code: B16 ENG 2202

ENGINEERING ECONOMICS

Theory	**: 4 Periods**	**Sessionals**	**: 30**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 70**
		Credits	**: 4**

Course Objectives:

1. To understand the concept of economics and to discuss about demand analysis.
2. To know different types of economic systems and to learn factors required for production.
3. To examine different market structures and their price determination.
4. To determine and examine business cycles and to understand inflation.
5. To describe the elements of cost and to know about break-even analysis and break-even chart.
6. To explain forms of business organizations along with types of public enterprises.
7. To know how to prepare financial statement and examine the methods used for depreciation.

Course Outcomes:

1. Awareness about how resources should be allocated and utilized efficiently and types of demand.
2. Determine types of economic systems with their respective pros & cons and how factors of production will help engineers to achieve their goals.
3. Develop the capability to understand different market structures and act accordingly.
4. Understand the stages of business cycles and causes and effects of inflation.
5. Examine the nature of cost and learn how to construct a break-even chart to know no profit – no loss point.
6. Evaluate forms of business organization along with their pros and cons.
7. Construct a financial statement to know the financial position and calculation of depreciation by using different methods.

SYLLABUS

Introduction to Economics and Demand Analysis:
Definition of economics; Micro and Macro Economics. Demand-Law of Demand; Elasticity of Demand – Measurement of elasticity of demand and types of elasticity of demand.

Economic Systems and Factors of Production:
Economic Systems – Capitalism, Socialism and mixed Economy. Factors of Production – Classification of Factors of Production – Meaning and characteristics of land, labor, capital and organization.

Markets:
Perfect Competition – features and price determination under perfect competition; Imperfect Competition-Monopoly, Monopolistic Competition. Duopoly and Oligopoly (in brief).

Business Cycles (trade Cycles) and Inflation:
Business Cycles – Meaning, phases of Business Cycle, causes and consequences of Business Cycle: Inflation – types, causes and effects of Inflation.

Cost classification and Break-even Analysis:
Costs – Classification of Costs, Elements of Cost. Components of Total Cost: Methods of costing – Job Costing, process costing and unit costing. Break-even Analysis-determination of Break-even point and application of Break-even Analysis.

Forms of Business Organizations:
Sole Proprietorship, Partnership, Co-operative Society, Joint Stock Company (Private and Public Ltd) – Features, Merits and Demerits. Public enterprises and their types.

Depreciation and Financial Accounting:
Depreciation – Causes and Methods of Depreciation. Financial Accounting – Preparation of Trading Account, Profit & Loss Account and Balance Sheet of a Sole Proprietor.

Text Books:

1. Managerial Economics and Financial Analysis – By A.R. Aryasri, Tata McGraw Hill Education Private Ltd., New Delhi.
2. Engineering Economics – By Tara Chand. Nem Chand & Bros. Roorke.

Reference Books:

1. Modern Economic – By K.K. Dewett, S. Chand & Co, New Delhi.
2. Principles of Economics – Vrinda Publications (P) Ltd. New Delhi.

Code: B16 EE 2204

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Theory	**: 4 Periods**	**Sessionals**	**: 30**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 70**
		Credits	**: 4**

Course Objectives

1. To learn the basic principles of electrical laws and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.
3. To understand the principle of operation and construction details of Transformers.
4. To understand the principle of operation and construction details of three phase Induction motor and Alternators.
5. To study the operation of PN junction diode, Half wave, Full wave rectifiers.
6. To study the operation OP-AMP.
7. To learn the operation of PNP and NPN Transistors and various Amplifiers.

Course Outcomes

1. Able to analyze the various Electrical networks.
2. Able to understand the basics of Magnetic Circuits.
3. Able to understand the operation of DC generators,3-Point starter and conduct the Swinburne's test.
4. Able to analyze the Performance of Transformers.
5. Able to explain the operation of three phase induction motors and alternator.
6. Able to analyze the operation of Half-wave and Full-wave rectifiers.
7. Able to explain the operation of single stage CE amplifier.

SYLLABUS

Electrical And Magnetic Circuits:

Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, series and parallel circuits and star-delta and delta-star transformations-simple problems.

Magnetic flux, MMF, Reluctance, Faradays laws, Lenz's Law, statically induced emf, dynamically induced emf, Hysteresis.

DC Machines:

Principal of operation of DC generation- EMF equation-Types-DC motor Types-Torque equation-Applications-Swinburne's Test, Speed control methods.

Transformers:

Principal of operation of Single phase Transformers- EMF equation-losses-Efficiency and Regulation.

AC Machines:

Principal of operation of three phase Induction motor-Slip-Torque characteristics-Efficiency-applications- Principal of operation of Alternators-EMF equation, regulation of alternator by synchronous impedance method.

Diodes & Rectifers: PN junction diode-Forward bias and reverse bias operation, V-I characteristics-Diode applications (Half wave, Full wave and bridge rectifier), Zener diode.

Transistors: PNP and NPN junction Transistors, Transistor as an amplifier, single stage CE amplifier, Frequency response of CE amplifier.

Text Books:

1. ELECTRICAL TECHNOLOGY by Surinder Pal Bali, Pearson Publications.
2. ELECTRONIC DEVICES AND CIRCUITS, R.L Boylestad and Louis Nashelsky,9th edition, PEI/PHI 2006.
3. Principles of Electrical Engineering, V.K mehta, Rohit Mehta, S. Chand Publications.
4. Basic Electrical Engineering by D.P.Kothari, I.J. Nagrath, McGraw Hill.
5. Basic Electrical Engineering, S.N. Singh, PHI.
6. A text book of ELECTRICAL TECHNOLOGY Volume-II, by B.L Theraja & A.K Theraja S.Chand publications.

Reference Books:

1. Basic Electrical Engineering, V.K mehta, Rohit Mehta, S. Chand Publications.
2. Fundamentals of Electrical Engineering and Electronics, Rajendra Prasad, PHI.
3. Principles of electronics Engineering, V.K mehta, Rohit Mehta, S. Chand Publications.

Code: B16 ENG 2201

ENVIRONMENTAL STUDIES
(Common to ECE,EEE & ME)

Theory	**: 3 Periods**	**Sessionals**	**: 30**
Tutorial	**: 1 Period**	**Ext. Marks**	**: 70**
Exam	**: 3 Hrs.**	**Credits**	**: 2**

Course Objectives:

Students learn

1. To develop an awareness and sensitivity to the total environment and its related problems.
2. To participate actively participation in environmental protection and improvement.
3. To develop skills for active identification and development of solutions to environmental problems
4. To evaluate environment programmes in terms of social, economic, ecological and aesthetic factors.
5. To Create a "CONCERN AND RESPECT FOR THE ENVIRONMENT"

Course Outcomes:

Students will be able to

1. Get awareness among the students about the nature and natural ecosystems.
2. Learn sustainable utilization of natural resources like water, land, minerals, air.
3. Learn resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation.
4. Safe guard against industrial accidents particularly nuclear accidents.
5. Learn Constitutional provisions for the protection of natural resources.

SYLLABUS

Global Environmental Crisis

1. Environmental Studies- Definition, Scope and importance, Need for public awareness.
2. Global Environmental Crisis

Ecosystems

1. Basic concepts: Definition, Components of Ecosystem, Structural and Functional units
2. Forest, Grassland and Desert Ecosystems
3. Aquatic Ecosystems

Biodiversity

1. Definition, genetic, species and eco-system diversity
2. Value of Bio-diversity: Consumptive value, Productive value, Social Value, Ethical value, Aesthetic value and Optional value
3. Bio-geographical classification of India
4. India as a Mega-diversity nation.

5. Hot spots of Biodiversity
6. Threats to biodiversity: Habitat loss, poaching of wild life,-man-wild life conflict
7. Endangered and Endemic species of India, Red-data book. Definitions of Threatened, Rare, Vulnerable , Endangered and Extinct species
8. Conservation of Biodiversity: In-situ and Ex-situ conservation of bio-diversity

Natural Resources: Renewable and Non-renewable resources

1. Land Resources: Land degradation, soil erosion and desertification
2. Forest Resources: Use and over exploitation, deforestation, timber extraction
3. Water resources: Use and over utilization of surface and ground water, Floods, droughts, conflict over water, water logging and salinity, dams – benefits and problems
4. Energy Resources: Renewable and non-renewable energy sources- use of alternate energy sources (Solar, wind, hydal, tidal, ocean thermal energy source, geothermal, bio-mass energy and hydrogen energy).
5. Sustainable Development, Equitable use of resources ,Limits to growth

Environmental Pollution

Definition, causes, effects and control measures of:

1. Air pollution
2. Water pollution
3. Soil pollution
4. Marine Pollution
5. Thermal pollution
6. Nuclear hazards
7. Noise pollution

Social Issues and the Environment

1. Social consequences of Development and Environmental Changes
   a. Climate change and global warming, acid rain and Ozone layer depletion
   b. Developmental projects and displacement of people, resettlement and rehabilitation issues with special reference to tribal people Water stress.
   c. Modern Techniques in Rain water harvesting
   d. Urbanization and solid waste management (wealth from waste-Vermi composting, Recycling, Production of energy etc)
   e. Green Revolution and its impact on environment
2. **Governance**
   a. Environment (protection)Act of 1986
   b. Air (Prevention and control of pollution) Act of 1981
   c. Water (Prevention and control of Pollution) Act of 1974
   d. Forest Conservation Act of 1980
   e. Wildlife Conservation Act of 1972
   f. Environmental Impact Assessment

Case Studies

   a. Chipco Movement (Sunderlal Bahuguna)
   b. Silent Valley
   c. Snake and Croc man (Romulus Whitaker)

d. Water Conservation in Ralegaon Siddhi (Maharashtra)and Alwar , Rajastan (Anna Hazare and Tarun Bharat Singh)
e. Green Belt Movement (Wangari Maathai), Timmakka & Chikkanna
f. Paradise on Earth (Curitiba-Brazil)
g. Low-cost Houses (Laurie Baker)
h. Kolleru lake

Text Books:

1. Environmental Studies (From Crisis to Cure) by R. Rajagopalan, Oxford university Press, 2008
2. Environmental Studies by Anubha Kaushik &C.P. Kauskik, New Age International (P) Ltd, New Delhi, 2006

Reference Books:

1. Environmental Sciences by G.Tyler Miller, JR,10^{th} ed, Thomson publishers, 2004

Code: B16 ME 2205

MANUFACTURING PROCESS LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. To recognize the tools, materials, machines used for making products in foundry, welding and machine shop.
2. To differentiate the different welding techniques used for different materials.
3. To realize the various moulding sands used for making moulds

Course Outcomes:

1. Student will be able to prepare moulds for a given component.
2. Student will be able to apply the knowledge of arc welding to join two metal pieces.
3. Student will be able to practice plain turning, facing, step turning, taper turning, and thread cutting operations on the lathe machine.
4. Student will be able to generate horizontal, vertical and angular surfaces on a given work piece using shaper.
5. Student will be able to generate spur gear on milling machine.
6. Student will be able to demonstrate Capstan and Turret lathe, cylindrical grinder and surface grinding machine.

LIST OF EXPERIMENTS

1. Use of basic tools and operations of the following trades

S.No.	Trade/Machine	No. of exercises
1	Moulding	3
2	Welding	3
3	Lathe Machine	3
4	Milling Machine	1
5	Shaping Machine	1

2. Moulding sand testing (Not for examination only for demonstration purpose)
3. Forging (Not for examination only for demonstration purpose)

Reference Books:

1. Elements of Workshop Technology Vol-1: Manufacturing Processess by S.K. Hajra Choudhury, A.K. HajraChoudhury,Nirjhar Roy, MPP, Pvt. Ltd.
2. Elements of Workshop Technology Vol-2: Machine Tools by S.K. Hajra Choudhury, A.K. HajraChoudhury,Nirjhar Roy, MPP, Pvt. Ltd.

Code: B16 EE 2206

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Lab	**: 3 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Ext. Marks**	**: 50**
		Credits	**: 2**

Course Objectives:

1. Information to supplement to the Electrical & Electronics Engineering courses.
2. The ability to conduct testing and experimental procedures on Circuits.

Course Outcomes:

Students will be able to

1. Apply the concepts of Theorems for a given electrical circuit.
2. Evaluate the efficiency and regulation of a single phase transformer.
3. Relate physical observations and measurements involving electrical circuitTso theoretical principles.
4. Design amplifier circuit using NPN transistor

LIST OF EXPERIMENTS

Part-A: Electrical Engineering

1. Verification of KCL and KVL
2. Verification of Ohms law (draw the V-I characteristics for a particular resistor)
3. Swinburne's test on D.C shunt Machine (predetermination of efficiency when working as motor and generator)
4. Brake test on D.C shunt motor. (determination of performance characteristics)
5. Brake test on D.C series motor. (determination of performance characteristics)
6. Brake test on three phase induction motor.(determination of performance characteristics)
7. Speed control of D.C shunt by (a) Armature voltage control (b) Field flux control Method.
8. OC and SC test on single phase Transformer (predetermination of efficiency and regulation at given power factor).

Part- B: Electronics Engineering

1. PN junction Diode Characteristics (a) Forward bias (b) Reverse bias. (cut in voltage and resistance calculations)
2. Half wave rectifier with and without filters.
3. Full wave rectifier with and without filters.
4. Transistor CE characteristics (Input and Output)
5. Characteristics CE amplifier
6. Zener diode characteristics
7. Regulation characteristics of Zener diode.

Reference Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications.
2. Electronic Devices And Circuits, R.L Boylestad and Louis Nashelsky,9th edition, PEI/PHI 2006.

Code: B16 ME 2206

INDUSTRY ORIENTED TECHNOLOGY LAB

Lab	**: 2 Periods**	**Sessionals**	**: 50**
Exam	**: 3 Hrs.**	**Credits**	**: 1**

CATIA

Course Objectives:

1. Increase ability to communicate with people
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic CATIA skills.
5. Learn basic engineering drawing formats
6. Prepare the student for future Engineering positions

Course Outcomes

Up on completion of the course the student shall be able to gain knowledge on:

1. CATIA screen and various Tool bars and menus and Explain about Dimensioning and Hatching
2. Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
3. Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack.
4. Rendering of 3D images.

LIST OF EXERCISES

1. Study the CATIA CAD screen, various toolbars and menus
2. Exercises on usage of Draw and modify tool bar.
3. Exercises on mirror, rotate, array and move commands
4. Exercises on dimension and hatching
5. Draw the 2D knuckle joint with full details & dimensioning
6. Draw the screw jack 2D drawing
7. Study the 3D solids (primitives) and solids tool bar options
8. Draw bolt and nut in 3D
9. Draw various parts of screw jack in assemble them as 3D component
10. Render the 3D images already generated and apply materials and light.

(Note: Total Marks will be evaluated based on Continuous Evaluation - 25 Marks, Record/Report-10 Marks, Exam-10 Marks and Attendance-5 Marks)