Chaitanya Bharathi Institute of Technology (Autonomous)
Department of Mechanical Engineering
SCHEME OF INSTRUCTION & EXAMINATION

B.E. II-Year (Production Engineering)

I-Semester

THEORY										
S.No	Syllabus Ref.No	SUBJECT	Scheme of Instruction Per week				Scheme of Examination			Credits
			L	T	D	Lab	Duration in Hrs	Maximum Marks		
								University exam	Sessional	
1	MT 211	Fourier Analysis & Partial Differential Equations	4	-	-	-	3	75	25	3
2	ME 211	Material Science & Metallurgy	4	-	-	-	3	75	25	3
3	ME 212	Machine Drawing	-	-	6	-	6	75	25	4
4	ME 213	Mechanics of Materials	4	-	-	-	3	75	25	3
5	CE 112	Environmental Studies	3	1	-		3	75	25	3
6	MB 214	Managerial Economics & Accountancy	4	-	-	-	3	75	25	3
PRACTICALS										
1	ME 214	Material Science & Metallurgy Lab	-	-	-	3	3	50	25	2
2	ME 215	Computer Drafting Lab	-	-	-	3	-	-	25	1
3	ME 216	Mechanics of Materials Lab	-	-	-	3	3	50	25	2
		TOTAL	19	1	6	9	-	550	225	24

Service Course [B.E]

			Branch	Scheme of Instruction Per week				Scheme of Examination			Credits
				L	T	D	Lab	Duration in Hrs	Maximum Marks		
									University exam	Sessional	
1	ME 217	Elements of Mech. ENGG.	ECE	4	-	-	-	3	75	25	3
2	ME 218	Principles of Mech. Engg.	EEE	4	-	-	-	3	75	25	3

Service Course [B.Tech]

			Branch	Scheme of Instruction Per week				Scheme of Examination			Credits
				L	T	D	Lab	Duration in Hrs	Maximum Marks		
									University exam	Sessional	

1	ME 219/ EE 216	Basics of Mechanical and Electrical Engineering	Chem. Engg.	2	-	-	-	1.5	38	12	1.5
2	ME 210/ EE 218	Mechanical & Electrical Engineering Lab	Chem	-	--	- -	3	1.5	25	13	1

MT 211

FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches except Biotech)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Introduce the concepts of Fourier analysis & z-transforms in engineering applications.
2. Introduction of boundary value problems and their applications in Heat Transfer and wave propagation.

Course Outcomes:

1. Students must be able to apply mathematical concepts of Fourier series, Fourier Transforms in solving one dimensional wave equation, Heat equation and the two dimensional Laplace equations.

UNIT– I

Fourier series: Dirichlet's conditions - expansion of a given function in Fourier series. Expansion of even and odd functions in Fourier series. Change of interval, half range sine and cosine series. Complex form of Fourier series.

UNIT– II

Fourier Transforms: Fourier integral (statement only)-Fourier transform, Inverse Fourier transform, Fourier sine and cosine transform, definitions and properties.

UNIT– III

Partial differential equations:

Formation of Partial differential equations by elimination of arbitrary constants and by elimination of arbitrary functions. Partial differential equations of First Order- Lagrange's Linear equation and its solution. Partial differential equations of First order but of any degree-Standard types: I- $f(p,q) = 0$, $II - f(z,p,q) = 0$, III- $f(x,p) = f(y,q)$ and IV- $z = px + qy + f(p,q)$ General Method of solution: Two independent variables-Charpit's Method-three or more independent variables Jacobi's method.

UNIT– IV

Applications of Partial differential equations:

Solutions of Partial differential equations by the method of separation of variables- boundary value problems. One dimensional Wave equation, one dimensional Heat equation- related problems. Laplace equation.

UNIT – V

Z- Transforms: Introduction, Basic theory of Z-transforms. Z-transforms of some standard sequences, Existence of z-transform. Properties of z-transforms: Linearity, Translation, scaling properties. Initial and final value theorems. Differentiation of
Z-transforms, convolution theorem, Solution of difference equations using Z-transforms.

Text Books:

1. Kanti B Datta "Mathematical Methods of Science and Engineering (Aided with MATLAB)" CENGAGE Learning.
2. B.S.Grewal "Higher Engineering Mathematics", Khanna Publishers 42nd Edition.2013
3. M.D.Raisinghania , Text Book of ODE and PDE , S.Chand publishers 4th -2012

MATERIAL SCIENCE AND METALLURGY

Instruction	4 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Enable the student to understand structure property relations, analyze the failures of metals and their prevention
2. To broad understanding of phase diagrams,
3. Student will acquire basic knowledge in various heat treatment operations, their purpose and applications
4. Student is exposed to various methods of extractive metallurgy techniques

Course Outcomes:

1. Know the fundamental science and engineering principles relevant to material
2. Suggest appropriate physical metallurgy methods (phase diagrams)
3. The type of heat treatment operation to be given to any metal in order to improve desire mechanical properties
4. Basic ability to plan an extraction process for given ore.

UNIT–I

Imperfections in crystals, dislocation in crystals, types of dislocations, critical resolved shear stress, effect of slip and twinning on the plastic deformation, Jogs and its effect on yield phenomenon, Hall–Petch equation, Orange peel effect, cold and hot working, strain hardening and Bauchinger effect, recovery, recrystallization, grain growth and its effect on mechanical properties of metals.

Fracture: Types of fracture in metals, modes of fracture, Griffith theory of brittle fracture, crack propagation, ductile fracture, fracture under combined stress.

UNIT–II

Fatigue: S–N curve, Structure of fatigue fracture specimen. Fatigue crack propagation, effect of metallurgical variables on fatigue of metal, low cycle fatigue, cumulative fatigue and fatigue damage, experimental determination of fatigue strength (RR–Moore Test), factors to be considered for the improvement of the fatigue life.

Creep: Creep strength, creep curve, creep deformation mechanisms, creep test, differences between creep curve and stress rupture curve.

Diffusion: Fick's law of diffusion, application of diffusion theory in mechanical engineering.

UNIT–III

Structure of Alloys: Construction and interpretation of thermal equilibrium diagram of binary nonferrous alloys, study of eutectic, eutectoid, peritectic peritectoid reactions, iron–iron carbide equilibrium diagram, construction and interpretation.

Types of plain carbon steels, cast iron and their properties and characteristics.

UNIT–IV.

Heat Treatment: Annealing, normalising, hardening, tempering, construction and interpretation of T–T–T diagram, austempering and martempering, case hardening, carburizing, nitriding, carbo–nitriding, flame hardening, induction hardening & brief introduction of age hardening.

UNIT–V

Introduction to Extractive Metallurgy: Method of production of pig iron by blast furnace, cast iron by cupola furnace, method of production of steel by Bessemer convertor, L.D process, electric arc process, modern steel making process by electric slag refining.

Alloy Steels: Effects of alloying elements like nickel, chromium, manganese, silicon and tungsten, titanium, study about stainless steels, HSS, maraging steels, brass, bronze, muntz metal, invar, duralumin and Ti alloy (Ti–6Al–4V) their composition and properties.

Text Books:

1. V. Raghavan, *Materials Science and Engineering*, Prentice Hall of India Ltd., 4th Edn. ,2005.
2. S.H. Avner, *Introduction to Physical Metallurgy*, Tata McGraw Hill Publishers, 2nd Edn., 2005.

Suggested Reading:

1. S.P. Nayak, *Engineering Metallurgy and Material Science*, Charoter Publishing House, 6th Edn., 2005.
2. E. Dieter, *Mechanical Metallurgy*, Metric Edition, Tata McGraw Hill, 3rd Edn, 2005.
3. K.L. Kakani, *Material Science*, New Age Publications (P) Ltd,2008

MACHINE DRAWING

Instruction	6 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessionals	25 Marks
Credits	4

Course Objectives

1. Understand drawing and develop capacity to represent any object with the help of sketch .
2. To develop primary knowledge of working drawing.
3. To produce orthographic views of different machine parts.
4. To develop skill to produce assembly drawings from part drawing and vice versa

Course Outcomes

1. To apply knowledge of drawing in preparation of working drawings.
2. To draw missing views as well as to analyze and interpret drawings of machine components.
3. To use the techniques of drawing necessary for engineering practice.
4. Students will be able to apply their knowledge and skills of drawing to start and complete machine components

1. INTRODUCTION:
   Format of drawing sheet, title block, conventions of drawing lines and dimensions, First and third angles projections, convention for sectional views. Orthographic projections including sectional views of simple machine elements.

2. DRAWING OF FASENERS, JOINTS AND COUPLINGS:
   Practices of sketching work: Free hand sketches of typical machine elements for simple cases for riveted and screwed fastening, joints

3. ASSEMPBLY DRAWING:
   Preparation of assembly drawings from given details, Ability to supply additional views, the exercises will be drawings of typical machine parts viz., Connecting rod, Eccentric, Cross head, Stuffing box, Pipe vice, Screw jack, Ram's bottom safety valve, Lathe Tool Post, Tail stock, Revolving centre, Pedestal bearing (Plummer block), Swivel bearing.

Note: The test is for the ability of the student to read and interpret drawing. The drawing should include part list in standard format.

Text Books:

1. N. Siddeshwar, *Machine Drawing*, Tata McGraw Hill Publishing Co., Ltd., 5th edition, 2004.
2. N.D. Bhatt, V.M. Panchel, *Machine Drawing*, Cherotar Publishing house, Anand, New Delhi, 49th edition, 2014

Suggested Reading:

1. K.L. Narayan, P. Kanniah, K. Venkat Reddy, *Machine Drawing*, New Age International (P) Ltd., 2nd 2009.

2. K.C. John, *Text book of Machine Drawing*, PHI Learning, 2010.
3. Ajeet Singh, *Machine Drawing*, Galgotia Publications, 2010

ME 213 WITH EFFECT FROM THE ACADEMIC YEAR 2014-2015

MECHANICS OF MATERIALS

Instruction	4 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Student is exposed to the concept of various types of stresses and strains
2. Student will acquire knowledge in drawing bending and shear force diagrams for various loads
3. Student is exposed to the concept of deflections for various configurations of the beams
4. Student will acquire knowledge in estimating stresses for thin and thick cylinders

Course Outcomes:

1. Basic knowledge in mechanics of material will be useful for future courses like buckling of columns, design of bridges and dams, design of sections for rails.
2. Student will use the knowledge of mechanics of materials for finite element analysis.
3. Student will demonstrate this knowledge in estimating the deflections of beams of various configurations.
4. Student use the knowledge of mechanics of materials in design of pressure vessels.

UNIT–I

Stresses and Strains: Definitions, types of stresses and strains, elasticity and plasticity. Hooke's law, stress-strain diagrams for engineering materials, modulus of elasticity. Poisson's ratio, relationship between elastic constants, linear and volumetric strains, bars of uniform strength, temperature stresses, compound bars.

UNIT–II

Shear force and bending moment: Definition of bending moment and shear force; relationship between intensity of loading, shear force and bending moment; bending moment and shear force diagrams for cantilever, simply supported and overhanging beams; simple theory of bending, moment of resistance, modulus of section.

UNIT–III

Deflection of beams: Slope and deflections measurements of cantilever, simply supported beams with Macaulay's and double integration methods subjected to point loads and uniformly distributed loads.

Torsion: Derivation of torsion formula for circular sections, torsional stresses, angle of twist, power transmission, effect of combined bending and torsion.

UNIT–IV

Shear Stresses in beams: Distribution of shear stresses in rectangular, I- section and T-section for solid and hollow sections, compound stresses, principal stresses and strains. Mohr's circle of stress.

UNIT–V

Cylinders: Stresses in thin and thick cylinders with internal and external pressures. Hoop and longitudinal stresses in cylinders.

Columns and struts: Euler and Rankine formulae for axial load applications. Secant and Perry formulae for eccentrically loaded columns.

Text Books:

1. D.S. Prakash Rao, Strength of Materials A Practical Approach, Universities Press, Hyderabad, 1999.
2. S. Ramamrutham, Strength of Materials, Dhanpat Rai & Sons, 1993.

Reference Books:

1. S.S. Bhavakatti, Strength of Materials, Vikas Publication, 2003.
2. B.C. Punmia, Strength of Materials and Theory of Structures, Laxmi Pub., 1992
3. G.H. Ryder, Strength of Materials, Third Edition in SI units, Macmillan India Limited, Delhi, 2002.

ENVIRONMENTAL STUDIES

Instruction	3L + 1T periods per week
Duration of University Examination	3 hours
University Examinations	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To equip the students with inputs on the environment, natural resources, ecosystems and Bio-diversity.
2. To enable the students become aware of environmental pollutions, causes, effects and control measures.
3. To make the students contribute for capacity building of nation for arresting and/or managing environmental disasters.

Course Outcomes: At the end of the course, the student should have learnt

1. To define environment, identify the natural resources and ecosystems and contribute for the conservation of bio-diversity.
2. To suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment.
3. To relate the social issues and the environment and contribute for the sustainable development.
4. To follow the environmental ethics.
5. To contribute for the mitigation and management of environmental disasters.

UNIT – I

Environmental Studies Definition, Scope and importance, need for public awareness. Natural resources: Water resources, use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Effects of modern agriculture, fertilizer pesticide problems, water logging salinity. Energy resources: growing energy needs, renewable and non-renewable energy sources. Land resources; land as a resource, land degradation, soil erosion and desertification.

UNIT – II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT – III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity

UNIT – IV

Environmental Pollution: Cause, effects and control measures of air pollution, water pollution,
soil pollutions, noise pollution, thermal pollution and solid waste management. Environment protection act: Air, water, forest & wild life acts, issues involved in enforcement of environmental legislation.

UNIT – V

Social issues and the environment: Water conservation, watershed management, and environmental ethics. Climate change- global warming, acid rain, ozone layer depletion, Environmental protection act, population explosion

Disaster Management: Types of disasters, impact of disasters on environment, infrastructure and development, Basic principles of disaster mitigation, disaster management, and methodology disaster management cycle and disaster management in India

Text Books:

1. Y. Anjaneyulu, Introduction to Environmental Science, B.S. Publications, 2004
2. S.S.Dara, A Text book of Environmental Chemistry & Pollution Control, S.Chand & Comp. Ltd, 2000.

Suggested Reading:

1. De A.K. Environmental Chemistry, Wiley Eastern Ltd., 1989.
2. Odum E.P. Fundamentals of Ecology, W.B. Saunders Co., USA, 1975.
3. Rao M.N. and Datta A.K., Wastewater treatment, Oxford & IBH publishing Co., 1987.
4. Miller T.G. Jr. Environmental Science, Wordsworth Publishing Co., 1984.
5. Benny Joseph, Environmental Studies, Tata Mc. Graw Hill education Pvt. Ltd., 2000
6. Raman Siva Kumar, Introduction to Environmental Science and Engg., Tata Mc. Graw Hill education Pvt. Ltd., 2010

MB 214

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: The objective of the course is to provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

UNIT – I

Introduction to Managerial Economics: Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT – II

Demands Analysis: Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT – III

Production and Cost Analysis: Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems)

UNIT– IV

Capital Management: Capital Management, its significance, determinants and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT – V

Accountancy: Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.
(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement).

Text Books:

1. Mehta P.L., Managerial Economics – Analysis, Problems and Cases, Sulthan Chand & Son's Educational Publishers, 2011
2. Maheswari S.N Introduction to Accountanc, Vikas Publishing House, 2005
3. Panday I.M. Financial Management, Vikas Publishing House, 2009

Suggested Reading:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2001
2. M Kasi Reddy and S Saraswathi, Managerial Economics and Financial Accounting, PHI, 2007
3. J C Pappas and EF Brigham, Managerial Economics

MATERIAL SCIENCE AND METALLURGY LAB

Instruction	3 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. Students will acquire basic knowledge by understanding iron-carbide diagram and its application in engineering
2. Student is exposed to Metallographic study and analysis of various metals,
3. Student will acquire knowledge in determining the hardness of metals before and after various heat treatment operations
4. Student is exposed to T-T-T curve and its application in engineering metallurgy

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Course Outcomes:

1. Student can identify crystal structure of various metals,
2. Student can measure hardness and can correlate with microstructure
3. Student can perform a suitable heat treatment operation based on desired properties.
4. Student underlines the importance of grain size in evaluating the desired mechanical properties

List of the Experiments

1. Study of: Metallurgical Microscope, Allotropes of Iron, Iron-Iron carbide diagram, Procedure of specimen preparation.
2. Any Four experiments of the following: Metallographic study and analysis of : Steels- i) Low carbon steels, ii) Medium carbon steels, iii) Eutectoid steels, iv) High Carbon steels, v)Stainless steels, vi) Case carburized and vii) HSS, and determination of grain size using Image Analyzer.
3. Any Two experiments of the following: i) White, cast iron, ii) Gray cast iron, iii) Malleable cast iron and iv) Spheroidal cast iron and determination of grain size using Image Analyzer.
4. Any Three experiments of the following: Non-Ferrous Alloys– i) α–Brass, ii) α–β Brass, iii) Bronze, iv) Al–Si and iv) Babbitt determination of grain size using Image Analyzer.
5. Study of T–T–T curve
6. Any Three experiments of the following: Study of microstructure and measurement of hardness before and after i)) Annealing, ii) Normalizing, iii) Hardening, iv) Hardening and v)Tempering.

Text Books:

1. V. Raghavan, *Materials Science and Engineering*, Prentice Hall of India Ltd., 4th Edn. ,2005.
2. S.H. Avner, *Introduction to Physical Metallurgy*, Tata McGraw Hill Publishers, 2nd Edn., 2005.

Suggested Reading:

1. S.P. Nayak, *Engineering Metallurgy and Material Science*, Charoter Publishing House, 6th Edn., 2005.
2. E. Dieter, *Mechanical Metallurgy*, Metric Edition, Tata McGraw Hill, 3rd Edn, 2005.
3. K.L. Kakani, *Material Science*, New Age Publications (P) Ltd,2008

COMPUTER DRAFTING LAB

Instruction	3 Periods per week
Sessionals	25 Marks
Credits	1

Course Objectives:

1. Student will acquire knowledge in solid modeling by exposing to Solidworks.
2. Student will acquire knowledge in graphic communication
3. Student is exposed to design methodologies
4. Student will acquire knowledge in concept of layers

Course Outcomes:

1. Graphics and design competencies are reinforced through lab exercises.
2. Student can apply these techniques for 2 D modeling.
3. From the concept of layers, students will develop an ability to think three dimensions and interpret data from blue prints and sketches.
4. Student is exposed to various types of drawing projections, which includes orthographic projections with the knowledge of graphic communication

1. INTRODUCTION TO SOLIDWORKS DRG EDITOR

XY Coordinate system, Angular measurement, Setting of Units, Absolute, Relative and Polar Coordinates

Draw tool bar options line, Circle, Rectangle, Ellipse, Spline and Arc

Modify tool bar options- Trim, Extend, Offset, Fillet, Chamfer, Mirror, Break, Array, Polar, Rectangular, Move, Copy, Stretch, Rotate

ESNAP, SNAP, Grid, Ortho

Dimension Tool bar- aligned, angular, linear and annotations

2. EXERCISES FOR PRACTICE include – Square, headed spanner, circular, rectangular, pocketing block, concentric square, circle inscribed in a square and rectangle, cover, housing, Geneva wheel. Layer and object properties; construction line, object line, hidden line, centre line, hatching, dimensioning, leader

3. PRACTICE EXERCISE

Shaft support

4. ADDITIONAL EXERCISES are also provided during class work

Text Book:

1. *Solidworks Drawing –Training Manual (Solidworks 2012).*

MECHANICS OF MATERIALS LABORATORY

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Student will acquire basic knowledge in testing properties of engineering materials.
2. Student is exposed to concept of determining various types of hardness.
3. Student will acquire basic knowledge in determining modulus of rigidity of engineering materials
4. Student is exposed to the concept of deflection and fatigue test

Course Outcomes;

1. The properties of materials determined by the tests in laboratory will be useful for design and analysis under various load conditions.
2. Student can estimate the hardness, which is essential property of materials
3. Student can demonstrate himself in determining the Young's modulus by deflection test
4. Student can perform fatigue test, which is an essential parameters to predict failure of any material

List of Experiments

Cycle – I

1. Direct tension test on metal rods
2. Young's modulus of metal specimen by direct tension test
3. Brinnel's and Rockwell's harness tests
4. Compression test
5. Impact test

Cycle – II

1. Test on a helical spring to determine the rigidity modulus.
2. Torsion test to determine the rigidity modulus of a shaft
3. Defection test on a cantilever beam to determine the Young's modulus
4. Deflection test on a simple beam to determine the Young's modulus
5. Deflection test on fixed beam to determine the Young's modulus
6. Fatigue test.

Text Books:

1. D.S. Prakash Rao, Strength of Materials A Practical Approach, Universities Press, Hyderabad, 1999.
2. S. Ramamrutham, Strength of Materials, Dhanpat Rai & Sons, 1993.

Reference Books:

1. S.S. Bhavakatti, Strength of Materials, Vikas Publication, 2003.
2. B.C. Punmia, Strength of Materials and Theory of Structures, Laxmi Pub., 1992
3. G.H. Ryder, Strength of Materials, Third Edition in SI units, Macmillan India Limited, Delhi, 2002.

ELEMENTS OF MECHANICAL ENGINEERING

(For ECE)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the various laws of Thermodynamics & their significance
2. To understand the functioning of I.C Engines & Compressors.
3. To understand the different manufacturing process like Welding, Casting and Metal Forming Processes
4. To understand various power Transmitting devices like gears, gear train and belts.

Course Outcomes;

1. Students will demonstrate the knowledge in functioning aspects of Engines, Compressors, refrigerating and air conditioning equipment..
2. They will be able to appreciate the role of heat transfer in Transformers, Motors, Generators and cooling of Electronic components.
3. Will be able to demonstrate knowledge in production techniques related to welding, casting, metal forming Processes
4. Student can estimate the power transmitted by belts, gear and gear trains .

UNIT–I

Thermodynamics: Macroscopic & microscopic approaches, concepts of thermodynamic systems, processes, cycles and properties, quasi-static process, Zeroth law, first law of thermodynamics, application of first law to various thermodynamic processes & SFEE. Second law of thermodynamics- Kelvin–Planck & Clausius Statements., PMM1, PMM2.

I.C Engines: Working of four– stroke and two–stroke petrol and diesel engine with p–V diagrams, valve timing diagram, calculation of indicated power, brake power, specific fuel consumption, mechanical and thermal efficiencies.

Reciprocating Air Compressors: Uses of compressed air, principle of working and work done of single stage compressor– without & with clearance, multistage compressors, advantages, intercooler & aftercooler.

UNIT–II

Heat Transfer: Basic modes of heat transfer, Fourier's law of conduction, Newton's law of cooling, Stefan–Boltzmann law of radiation, one–dimensional steady state conduction heat transfer through plane walls without heat generation and with constant thermal conductivity.

Heat Exchangers: Classification and application of heat exchangers in industry, derivation of LMTD in parallel and counter flow heat exchangers and problems on LMTD.

UNIT–III

Refrigeration: Types of refrigeration systems–air refrigeration system using Bell–Coleman cycle. Simple vapor compression system, COP, T-s & p–h diagrams, types and properties of refrigerants, eco-friendly refrigerants., introduction to psychrometry, psychrometric processes, simple problems using psychrometric chart.

UNIT–IV

Basic Manufacturing Processes: Welding, brazing and soldering, brief description of process and associated principles, arc welding & gas welding.

Casting: Sand casting, die casting and principles, application.

Forming : Description of forging, extrusion, drawing & rolling.

Principles and Applications of Basic Machining Process: Turning, milling, drilling and grinding.

UNIT–V

Definition of kinematic link, pair, mechanism and machine.

Gears: Classifications of gears, nomenclature

Gear Trains: Simple, compound, inverted and epi–cyclic gear trains.

Belt Drives: Open and cross belt drives, length of belt, ratio of tensions for flat belt, condition for maximum power transmission for flat belt.

Text books:

1. R.K.Rajput, *Thermal Engineering*, Laxmi Publications (P) Ltd, 8th edition, 2011.
2. P.C.Sarma, *A Text book of Production Technology*, S. Chand & Company Ltd., 2008.
3. Thomas Bevan, *Theory of machines*, CBS Publishers, 2010.

Suggested Reading:

1. Mahesh M Rathor, *Thermal Engineering*, Tata McGraw Hill Publishers, 2013
2. R.K. Jain, Production Technology, Khanna Publishers, 2010.
3. S.S.Ratan, *Theory of machines*, Tata McGraw Hill Publishers, 2008.

PRINCIPLES OF MECHANICAL ENGINEERING

(EEE)

Instruction	4 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Students will acquire basic knowledge in thermodynamics and its applications,
2. Student will acquire basic knowledge in different modes of heat transfer and its applications in engineering
3. Student is exposed to mechanisms of power transmitting devices
4. Student will acquire knowledge in working principles of hydraulic turbines and pumps.

Course Outcomes:

1. Students can estimate the power developed by an IC engine
2. Student can understand the application and importance of refrigeration and air conditions and with this knowledge, student can estimate the rating of a air conditioner
3. Student can estimate the power transmitted by belt and gear train
4. Student can specify power developed by turbine and power required for pump.

UNIT–I

Heat Transfer: Modes of heat transfer–conduction and convection, radiation, steady state conduction–heat transfer through plane walls, cylinders, critical radius of insulation for cylinders, concept of black body radiation.

Heat Exchanger: Classification, industry applications, LMTD for parallel flow and counter flow.

Refrigeration System: COP, ton of refrigeration, air refrigeration, simple vapour compression cycle and properties of refrigerants, eco friendly refrigerants, introduction to psychometry, psychrometric processes, simple problems using psychrometric chart.

UNIT–II

IC Engines: Working of four–stroke and two–strike petrol and diesel engines with P–v diagrams, calculation of indicated power, brake power, specific fuel consumption, mechanical and thermal efficiencies.

Reciprocating air compressors: Uses of compressed air, principle of working and work done of single stage compressor–without and with clearance, multistage compressors, advantages, intercoolers and aftercooler.

Generation of Steam: Classification of boilers, Fire tube boilers–Locomotive boilers, Cochran boiler, Water tube boiler–Babcock & Wilcox boiler.

Gas Turbines: Classification, performance of simple gas turbine cycle (Joule cycle).

UNIT–III

Gears: Classification, Gear trains, types–single compound, Inverted & epi cyclic gear trains, belt& rope drives, open and cross belt, length of belt, ratio of tensions for flat belts, condition for maximum power.

UNIT–V

Fluid Dynamics: Introduction to Bernoulli's equation, applications–venturi meter, orifice meter, flow through pipes– Hagen's formula, friction loss in pipes, Darcy's formula, Reynolds number and its significance.

Hydraulic Turbines: Classification-working principle-Francis, Kaplan, Pelton Wheels, work done, power output, efficiency, specific speed, Unit quantities, Draft Tube, Performance characteristic curves.

UNIT–V

Pumps: Working principles and construction details of Centrifugal and reciprocating pumps, Effect of friction, acceleration head, work done, power required with and without air vessels, Problems faced in pumps, precaution, cavitation, primary velocity triangles of centrifugal pumps

Text Books:

3. R.K.Rajput, *Thermal Engineering,* Laxmi Publications (P) Ltd, 8th edition, 2011.
4. Thomas Bevan, *Theory of machines,* CBS Publishers, 2010.
5. P.N.Modi & S.M.Seth, *Hydraulics and Fluid Mechanics including Hydraulic machines*, Standard Book House, 18th edition, 2011.

Suggested Reading:

1. Mahesh M Rathor, *Thermal Engineering,* Tata Mc.Graw-Hill Publishers 2013
2. S.S.Rattan, *Theory of Machines*, Tata Mc.Graw-Hill Publishers 3rd Edition, 2009.

Jagdish Lal, *Hydraulics & Fluid mechanics*, Metropolitan Book Co. Pvt. Ltd., 2004

BASICS OF MECHANICAL AND ELECTRICAL ENGINEERING

(Chemical)

MECHANICAL ENGINEERING (Part A)

Instruction	2 Periods per week
Duration of Semester Examination	1.5 Hours
Semester Examination	38 Marks
Sessional	12 Marks
Credits	1.5

Course Objectives:

1. Student will acquire basic knowledge in mechanics of materials by understanding various types of stresses and strain
2. Student is exposed to the concept of shells and design of shaft
3. Student will acquire basic knowledge in understanding the working principle of fire tube boiler and water tube boiler
4. Student is exposed to the concept of power transmitted by belts

Course Outcomes:

1. Student can demonstrate the knowledge of mechanics of materials in evaluating the strength of material
2. The knowledge about design of cylinders will be useful for pressure vessels.
3. The knowledge about fire and water tube boilers will be useful for chemical industries, process industries and power generation.
4. Student can demonstrate knowledge of various power transmitting devices like belts in industries where power is to be transmitted from one shaft to the other.

UNIT–I

Stresses and Strains: Kinds of stress–strains, elasticity and plasticity, Hooks law, stress – strain diagram, modules of elasticity, Poission's ratio, linear and volumetric strain, relation between Young modulus, Bulk modulus and Rigidity modulus, bars of uniform strength. Compound bars and temperature stresses.

UNIT–II

Thin Cylindrical Shells: Stress in cylindrical shells due to internal pressures, circumferential stress, longitudinal stress, design of thin cylindrical shells, spherical Shells, change in dimension of the shell due to internal pressure, change in volume of the shell due to internal pressure. Shafts: Torsional stress and strains, strength of a solid shaft, power transmitted by shaft strength of a hollow shaft.

UNIT – III

Steam Boilers: Classification of boilers , study of boilers, Cochran boiler, Locomotive boiler, Babcock and Wilcox boiler, boiler mountings and accessories.

Internal Combustion Engines: Working principle of four stroke diesel and petrol engines.

Belts: velocity ratios, slip, length of belt, open belt and cross belt drives. ratio of tensions, centrifugal tension in belt, power transmitted by bells, initial tensions in the belt and simple problems.

Text Books:

1. S.Ramamrutham, *Strength of Materials*, Dhanpath and Sons, 10th Edition, 2005
2. S.S Rattan, *Theory of Machines*, Tata McGraw Hill Publishers, 2009
3. Mahesh M Rathor, *Thermal Engineering*, Tata McGraw Hill Publishers, 2013

Suggested Reading

1. S.S. Rattan, *Strength of Materials*, Tata McGraw Hill Education, 2011

2. Thomas Bevan, *Theory of Machines*, CBS Publishers, 2009.
3. A.S. Sarao, *Thermal Engineering*, Satya Prakasham, 5th Edition, 2005.

MECHANICAL & ELECTRICAL ENGINEERING LAB

(Chem)

Instruction	3 Periods per week Duration of Semester
Examination	1.5 Hours
Semester Examination	25 Marks
Sessionals	13 Marks
Credits	1

Course Objectives:

1. Students will acquire basic knowledge in determining the properties of materials like modulus of elasticity and modulus of rigidity
2. Student is exposed to the concept of determination of various hardness of material
3. Student can evaluate the performance of four-stroke diesel/petrol engine with varied engine parameters
4. Student can understand the working principle of fire tube and water tube boilers Course Outcomes:
5. Student can estimate the strength of materials from the knowledge of mechanics of materials.
6. Student can demonstrate knowledge in evaluating mechanical properties of material by determining the hardness of the material.
7. Student can estimate the power and thermal efficiency developed by an IC engine
8. The knowledge about fire tube boiler and water tube boiler is useful for power plants and pressure vessel industry.

List of the Experiments

Note: Minimum of FOUR experiments should be conducted in the semester selecting at least TWO from each cycle

Cycle-1:

1. Determination of Modulus of Elasticity (E) and salient point on stress – strain curve of given material by direct tension on universal Testing Machine (UTM)
2. Determination of rigidity modulus of a shaft by torsion test
3. Brinell's hardness Test of material
4. Determination of rigidity modulus of a leaf spring
5. Determination of the Compressive strength of bricks on compression testing Machine/.

Cycle-2:

1. To evaluate the performance of four-stroke single cylinder Diesel Engine.
2. Study of Boiler – Cochran boiler, Lancashire boiler, Wilcox boiler
3. To conduct heat balance on four-Stroke single cylinder Diesel Engine.
4. Determination of the valve time diagram for a four-Stroke Vertical Diesel Engine

Text Books:

1. S.Ramamrutham, *Strength of Materials*, Dhanpath and Sons, 10th Edition, 2005
2. S.S Rattan, *Theory of Machines*, Tata McGraw Hill Publishers, 2009
3. Mahesh M Rathor, *Thermal Engineering*, Tata McGraw Hill Publishers, 2013

Suggested Reading

1. S.S. Rattan, *Strength of Materials*, Tata McGraw Hill Education, 2011
2. Thomas Bevan, *Theory of Machines*, CBS Publishers, 2009.
3. A.S. Sarao, *Thermal Engineering*, Satya Prakasham, 5th Edition, 2005.

Chaitanya Bharathi Institute of Technology (Autonomous)
Department of Mechanical Engineering

SCHEME OF INSTRUCTION & EXAMINATION

B.E. II Year (Production Engineering)

II - Semester

THEORY										
S.No	Syllabus Ref.No	Subject	Scheme of Instruction Per week				Scheme of Examination			Credits
							Duration in Hrs	Maximum Marks		
			L	T	D	Lab		University exam	Sessional	
1	MT 221	Complex Variables and Probability Statistics	4	-	-	-	3	75	25	3
2	ME 221	Kinematics of Machines	4	2	-	-	3	75	25	4
3	ME 222	Thermodynamics	4	-	-	-	3	75	25	3
4	ME 223	Fluid Dynamics	4	-	-	-	3	75	25	3
5	EE 221	Electrical Circuits and Machines	4	-	-	-	3	75	25	3
6	EC 221	Basic Electronics	4	-	-	-	3	75	25	3
PRACTICALS										
1	EE 222	Electrical Circuits & Machines Lab	-	-	-	3	3	50	25	2
2	EC 222	Basic Electronics Lab	-	-	-	3	3	50	25	2
3	EG 221	Soft Skills and Employability Enhancement	-	-	-	2	3	50	25	1
		TOTAL	24	2	0	8	-	600	225	24

Service Course

			Branch	Scheme of Instruction Per week				Scheme of Examination			Credits
				L	T	D	Lab	Duration in Hrs	Maximum Marks		
									University exam	Sessional	
1	ME 224	Mechanical Technology	CE	3	-	-	-	1.5	37	13	2
2	ME 225	Mechanical Engineering Lab	EEE	-	-	-	3	3	50	25	2
		Total		3	0	0	3	--	87	38	4

L= Lecture; T=Tutorial; D=Drawing

MT 221

COMPLEX VARIABLES AND PROBABILITY STATISTICS

(common to all branches, except ECE & Biotech)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Extension of Laplace transforms in solving the Integral equations
2. Introduction of the Concept of analyticity of complex functions and contour Integrations and conformal Mapping.
3. Introduction of Basic Probability, Probability distributions and sampling theory.

Course Outcomes:

1. Students must be able to apply the concepts learned in potential Theory, electromagnetic theory.
2. Students must realize the Probability & Statistics and its wide applications in various Branches of Engineering and science. Students must be able to analyze the Random phenomena of any Physical system.

UNIT-I

Applications of Laplace transforms to Integral equations:

Laplace transforms of special functions-Bessel function and error functions. Definitions of Integral transforms, kernel of the transform. Solution of Integral equations; Abel's integral equation, Integral equation of the convolution type and Integro-differential equations. Solutions of partial differential equations- Boundary value problems.

UNIT- II

Complex Variables:

Analytic function, Cauchy Riemann equations (Cartesian and polar forms) - construction of Analytic functions. Harmonic function, derivatives of Analytic functions.

Complex line integrals, Cauchy's Integral theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT-III

Complex Variables:

Taylor's and Laurent's expansions-zeros, types of singularities and residues. Cauchy's Residue theorem. Evaluation of real definite integrals by Cauchy's residue theorem.

Elementary transformations and conformal Mapping.

UNIT-IV

Statistics and Basic Probability

Correlation -Correlation coefficient between two variables, Rank correlation and Regression- lines, random variables, distributions-probability mass function and probability density function. Conditional distributions-Bayes' Theorem-Mathematical expectation-expected values- moments and moment generating function- Characteristic function.

UNIT-V

Probability Distributions: Binomial, Poisson, and Uniform (rectangular), Normal, exponential, Gamma and Beta distributions. Test of hypothesis using Chi-square test for goodness of fit, t-test, F-test.

Text Books:

1. Mathematical Methods of Science and Engineering (Aided with MATLAB) By KantiB.Datta CENGAGE Learning.
2. Fundamentals of Mathematical Statistics by Gupta and Kapoor
3. Higher Engineering Mathematics by B.S.Grewal.

KINEMATICS OF MACHINES

Instruction	Lectures: 4 Periods per week
	Tutorial: 2 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessionals	25 Marks
Credits	4

Course Objectives: Student will acquire acknowledge in

1. analysis of mechanisms,
2. drawing displacement diagrams for followers with various types of motions,
3. cam profile drawing for various followers,
4. estimation of transmission of power by belts and application of various gears and gear trains.

Course Outcomes:

Student will demonstrate knowledge in

1. designing a suitable mechanism depending on application
2. Drawing displacement diagrams and cam profile diagram for followers executing different types of motions and various configurations of followers,
3. Drawing velocity and acceleration diagrams for different mechanisms,
4. Selecting gear and gear train depending on application .

UNIT–I

Definition of link, element, pair, kinematic chain, mechanism and machine, Grubler's criterion, single and double slider chains, inversions of quadratic cycle chain, inversions of single and double slider crank chains. mechanism with lower pairs and straight line motion mechanism, Pantograph, Peaucerlier, Hart, Davis and Ackerman's Steering gear mechanisms.

UNIT–II

Analysis of mechanisms: Graphical methods to find velocities of mechanisms, instantaneous centre, body centre and space centre, Kennedy's theorem, graphical determination of acceleration of different mechanisms including Coriolis component of acceleration, analytical method to find the velocity and acceleration, analysis of four bar mechanism with turning pairs, Freudenstein's method for four bar linkage synthesis.

UNIT–III

Laws of Friction: Friction in screw threads, pivots, collars and clutches, friction axis of link and friction circle.

Belts and Ropes : Open and closed belt drives, length of belt drive, ratio of tensions, effect of centrifugal tension and initial tension over power transmission, condition for maximum power.

Brakes and Dynamometers: Block or shoe, band and block, internal expanding shoe brake, Prony, rope brake, belt transmission, torsion dynamometers.

UNIT–IV

Cams: Types of cams and followers, displacement diagrams for followers, uniform motion, parabolic motion, simple harmonic motion, cycloidal motion, drawing cam profile with knife–edge follower, translating roller follower and translating flat follower, cams of specified contour. Cams of specified contours, tangent cam with roller follower, circular arc (convex) cam with roller follower.

UNIT–V

Gears: Classification of gears, spur gears, nomenclature, law of gear tooth action, involute as gear tooth profile, interference of involute gears, minimum number of teeth to avoid interference, contact ratio, cycloidal tooth profile, comparision of involute and cycliodal tooth profile.

Helical Gears: Helical gear tooth relations, contact of helical gear teeth, gear trains–simple and compound, reverted and epicyclic gear trains.

Text Books:

4. Thomas Bevan, *Theory of Machines*, CBS Publishers, 2009.
5. S.S. Rattan, *Theory of Machines*, Tata McGraw Hill Publishers, 3rd Edition, 2009.

Suggested Reading:

1. J.E.Shigley, *Theory of Machines*, Tata Mc.Graw Hill Publishers, New Delhi, 3rd Edition, 2005.
2. C.S. Sharma and Kamlesh Purohit, *Theory of Mechanisms and Machines*, PHI Learning Pvt. Limited, 2006
3. Amitabh Ghosh and A.K.Mallik, *Theory of Machines*, East West Publications, 3rd Edition, 2009.

THEROMODYNAMICS

Instruction	4 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Student will acquire knowledge by understanding basic laws of thermodynamics and their applications in engineering and science
2. Student is exposed to various thermodynamics flow and non–flow processes and its applications to nozzles, diffuser, turbines and compressors
3. Student will acquire knowledge in understanding the concept of entropy and its applications
4. Student is exposed to the concept of various types of air cycles, their deviation from actual cycles and their applications.

Course Outcomes:

1. Student can apply various laws of thermodynamics for given thermodynamic process and application.
2. The knowledge and various laws used in thermodynamics are useful to thermal turbo machines
3. Student can demonstrate the knowledge of entropy in various thermodynamic applications
4. The actual performance of IC engine can be estimated by understanding the concept of air cycles. .

UNIT–I

Introduction: Thermodynamics, Macroscopic and Microscopic approaches, thermodynamic systems, properties, processes and cycles, thermodynamic equilibrium, quasi – static process, measurement of pressure, Zeroth law of thermodynamics and its significance, measurement of temperature, reference points, ideal gas equation.

UNIT–II

First Law of Thermodynamics: Concept of heat and work, first law of thermodynamics for closed system, energy- a property of the system, application of first law to various thermodynamic processes like isobaric, isochoric, isothermal, adiabatic and polytropic, definition of enthalpy, PMM1, first law applied to flow processes, application of SFEE to nozzle & diffuser, throttling device, turbine & compressor.

UNIT–III

Second Law of Thermodynamics: Limitations of first law of thermodynamics, Kelvin–Planck and Clausius statements of second law of thermodynamics, PMM2, equivalence of Kelvin-Planck and Clausius statement, reversible and irreversible processes, Carnot theorem, Clausius inequality, calculation of entropy change during various thermodynamic processes, principle of entropy increase, T–S diagrams, application of entropy principle for mixing of two fluids. Helmholtz and Gibb's functions.

UNIT–IV

Thermodynamic Properties of Fluids: Properties of pure substances, p–v diagram, p–T diagram, p–v–T surface, T–s diagram, h–s diagram, dryness fraction, use of steam tables, Maxwell relations, TdS equations, difference in heat capacities , ratio of heat capacities and energy equation.

UNIT–V

Air Standard Cycles: Air standard cycles- Otto, Diesel, Dual Combustion Cycle, and simple Rankine cycle.

Mixture of Gases: Mole fraction and mass fraction, partial pressure and Dalton's law, Amagat–Leduc law of partial volumes, relation between partial pressure, mole fraction and volume fraction; gas constant, molecular mass and specific heats of the gas mixtures, relation between volumetric and gravimetric analysis.

Text books:

6. P.K. Nag, *Engineering Thermodynamics*, Tata McGraw Hill Publishers, 4th edition, 2008.
7. D.S. Kumar, *Thermal science and Engineering*, S.K.Kataria & Sons, 4th edition, 2009.

Suggested Reading:

1. Y.A. Cengel and M.A. Boles, *Thermodynamics: An Engineering Approach*, Tata McGraw Hill Publishers, 7th edition, 2012.
2. R.K. Rajput, *Thermal Engineering*, Laxmi Publications (P) Ltd, 8th edition, 2011.
3. Mahesh M Rathor, *Thermal Engineering*, Tata McGraw Hill Publishers, 2013

FLUID DYNAMICS

Instruction	4 Periods per week
Duration of Semester Examination	3 Hours
Semester Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: Student will acquire knowledge in fundamentals of fluid kinematics, fluid statics, fluid dynamics, various instrumentation related to measurement of pressure, discharge, velocity and concepts of boundary layer

Course Outcome: Student can use the knowledge of this subject in future courses like computational fluid dynamics, turbo machines and heat transfer.

Course Objectives:

1. To understand the fundamentals of fluid properties.
2. To understand the fluid statics, kinematics, & fluid dynamics, through continuity, momentum and energy equations.
3. To develop fundamental principle of boundary layer theory, laminar & turbulent fluid flows.
4. To understand the working principles of pressure, velocity, discharge measuring devices

Course Outcome:

1. Student can use this knowledge of fluid dynamics for advanced courses like computational fluid dynamics, heat transfer, turbo machines
2. To design a pump and water pipe with the knowledge of fluid dynamics
3. To solve the problems pertains to fluid dynamics using the continuity, momentum, and energy equations.
4. To estimate drag and lift coefficients for design of aerodynamic bodies using the concept of boundary layer equations

UNIT–I

Properties of fluids: Definition of fluid and concept of continuum. Fluid properties: pressure, density, specific weight, specific volume, dynamic and kinematic viscosity. classification of fluids, ideal and real fluids.

Fluid Kinematics: General concepts of path line, stream line and stream tube. Classification of fluid flow: steady and unsteady, uniform and non-uniform, laminar and turbulent, rotational and irrotational, one, two and three dimensional flows, definition and properties of stream function and velocity potential function and use of flow nets.

UNIT–II

Fluid Statics: Total pressure, centre of pressure, total pressure on plane surface, total pressure on horizontal plate, total pressure on vertical plate, total pressure on curved surface.

Buoyancy and Floatation: Buoyancy, buoyant force, centre of buoyancy, meta centre, stability of submerged bodies.

UNIT–III

Fluid Dynamics: Energy of fluid body, potential energy and potential head, pressure energy and pressure head, kinetic energy and kinetic head, energy equation, derivation of Euler's and Bernoulli's equations and their applications, impulse momentum equation and applications.

UNIT–IV

Measurement of Fluid Flows: Measurement of pressure and use of pressure measuring devices such as manometers, Bourdon's pressure gauge and transducers, measurement of velocity and use of velocity measuring devices such as pitot tube and hot wire anemometers, measurement of discharge, use of discharge measuring devices such as venture meter, orifice meter and rotometer, derivation of relevant formulae, discharge formulae for weirs and notches.

UNIT–V

Laminar and Turbulent flow through pipes: Distinction between laminar and turbulent flows, Reynold's number and its significance, upper and lower critical values of Reynold's number for flow in pipes, development of laminar and turbulent flow in circular pipes. Hagen–Poiseuille equation, frictional losses in pipes, Darcy equation, estimation of Darcy's friction factor, empirical formulae and Moody's chart.

Boundary Layer Theory: Development of laminar and turbulent boundary layers on flat plate, pressure gradient and phenomenon of separation. Fluid flow over an aerofoil, flow around a cylinder at rest, rotational flow around a cylinder, lift and drag forces and coefficients, circulation and Magnus effect.

Text Books:

1. P.N.Modi and S.M.Seth, *Hydraulic and Fluid Mechanics*, Standard Book House, 2010
2. R.K.Rajput, *Fluid Mechanics and Hydraulic Machines*, S. Chand & Company, 2010.

Suggested Reading:

1. K.L.Kumar, *Engineering Fluid Mechanics*, Eurasia Publishing House, 2005
2. V.L.Streeter, *Fluid Mechanics*, Mc.Graw Hill Co. Ltd., 2005
3. D.S.Kumar, *Fluid Mechanics*, S.K. Kataria & Sons, 2010

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

Exercise 1

Communicative Competence – The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation – Structure of presentation – Presentation tools – Body language

Creating an effective PPT

Exercise 3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4

Personality Development – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5

Corporate Culture – Grooming and etiquette, communication media etiquette

Academic ethics and integrity

Suggested Reading:

1. Madhavi Apte , “A Course in English communication”, Prentice-Hall of India, 2007
2. Leena Sen , “Communication Skills”, Prentice-Hall of India, 2005
3. Dr. Shalini Verma, “Body Language- Your Success Mantra”, S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , “Objective English”, 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, “The ACE of Soft Skills”, New Delhi: Pearson, 2010
6. Gulati and Sarvesh, “ Corporate Soft Skills”, New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, “Presentation Skills for Students”, New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, “The Habits of Highly Effective People”, New York: Free Press, 1989

PART-B

MECHANICAL TECHNOLOGY

(For Civil Engineering)

Instruction	3 Periods per week
Duration of Semester Examination	1 ½ Hrs
Semester Examination	37 Marks
Sessionals	13 Marks
Credits	2

Course Objectives:

1. Exposure and utility & specification of the earth moving equipment used in construction activity with relevant examples.
2. Exposure to the handling of conveying & hoisting cost & benefits of the equipment usage, logistics and maintenance of the equipment.
3. Understanding of the aggregate and pneumatic machinery working capability and specifications.

Course Outcome:

1. Awareness of the equipment is created, utility along with specific activity of the equipment is understood,
2. Economics, specification, application & capacity issues, are understood
3. Operation and maintenance issues are understood.

UNIT–I

General Description, operation, maintenance and selection of the following: Earth moving and excavating equipment, shovels, dragline, clamshell, cable excavator, bucket wheel excavator, tractor, bulldozer, scraper, trenchers, grader, earth compactors.

UNIT–II

Conveying Equipment: Belt conveyor, screw conveyor, bucket conveyor, apron conveyer, and aerial ropeway.

Hoisting Equipment: Hoist winch, differential and worm geared chain hoists, fork lift trucks, guyed and stiffly derricks, swing and non-swing mobile crane, whirler, crane, construction elevator, passenger lift, bucker elevators.

UNIT–III

Aggregate and concrete Production Equipment: Crusher's jaw, gyratory, hammer and roll crusher, screens–stationary, shaking and vibrating screens, concrete mixers, concrete pumps.

Pneumatic Equipment: Reciprocating air compressor, construction pneumatic jack hammer, paving breaker, rock drill, concreter vibrator.

*Text Book*s:

1. Mahesh Varma, *Construction Equipment and its Planning and Applications*, Metropolitan Books Co, Delhi, 2004.

Suggested Books:

1. R.L.Peurifoy, *Construction Planning Equipment and Methods*, McGraw Hill Publishers, 2000
2. Goodes Spence, *Building and Civil Engineering Plant*, Crossby Lock Wood, 2005

MECHANICA ENGINEERING LAB

(For EEE)

Instruction	3 Periods per week
Duration of Semester Examination	3 Hrs
Semester Examination	50 Marks
Sessionals	25 Marks
Credits	2

Coarse Objectives:

1. Student will acquire knowledge in evaluating the performance of IC engines,
2. Student is exposed to in evaluating the performance of hydraulic turbines,
3. Student will acquire knowledge in estimating overall efficiency of pumps
4. Student is exposed to the concept of heat conduction

Course Outcomes:

1. Student is exposed to carry out the investigations on IC engines with varied engine parameters,
2. Student can select and evaluate the hydraulic performance of hydraulic turbine
3. Student can select a pump based on the application and estimate the overall efficiency of the pump.
4. Student can demonstrate the knowledge in determining the thermal conductivity of insulating materials

List of the Experiments (Any Twelve of the following)

1. Performance test on multi cylinder petrol or diesel engine.
2. Measurement of discharge by venturimeter.
3. Measurement of velocity by pitot tube.
4. Measurement of discharge by orifice meter/ rotameter.
5. Determination of flash and fire point of lubricants.
6. Determination of thermal conductivity of composite wall.
7. Determination of heat transfer coefficient under natural convection phenomenon.
8. Determination of volumetric efficiency of multi stage reciprocating air compressor.
9. Study of construction details of a gear box .
10. Performance of (a) Francis (b) Kaplan (c) Pelton Wheel turbines.
11. Performance characteristics of reciprocating and centrifugal pumps.

Text Books:

6. R.K.Rajput, *Thermal Engineering,* Laxmi Publications (P) Ltd, 8th edition, 2011.
7. P.N.Modi & S.M.Seth, *Hydraulics and Fluid Mechanics including Hydraulic machines*, Standard Book House, 18th edition, 2011.

Suggested Reading:

3. Mahesh M Rathor, *Thermal Engineering*, Tata Mc.Graw-Hill Publishers 2013
4. Rajput, R.K., "*Heat and Mass Transfer*", S.Chand & Company Ltd, New Delhi, 2010
5. Jagdish Lal, *Hydraulics & Fluid mechanics*, Metropolitan Book Co. Pvt. Ltd., 2004