ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

for

B.Tech Four Year Degree Course

(A-20 regulation II year)

in

MECHANICAL ENGINEERING

(ME)

(Applicable for the batches admitted from 2020-2021)

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution approved by UGC and affiliated to JNTUH)

(Accredited by NAAC with 'A+' Grade and Accredited by NBA of AICTE)

Yamnampet, Ghatkesar, Malkajigiri Medchal District -501 301

June, 2020

VISION

To emerge as a renowned centre in Mechanical Engineering by following the best practices in teaching, learning and research.

MISSION OF THE MECHANICAL ENGINEERING DEPARTMENT

M1	To Provide good academic environment for pursuing high quality undergraduate, Post graduate and Doctoral programs in mechanical engineering to prepare our graduates for outstanding successful professional career.
M2	To become a continuous learning center by providing service to the practicing engineers from industry , academia and professional technical societies through the Industry - Institute interaction activities.
M3	To ensure that our students be trained in interpersonal & communication skills, team work, professional ethics, IPR, practical industry training by providing campus training programs related to both placement and co-extra curricula activities.
M4	To Conduct and proliferate high quality research work to the students for their lifelong learning in developing quality solutions to society problems.

B.Tech.(Mechanical Engineering) Program Educational Objectives

PEO1	Preparation & Learning Environment: To prepare graduates with the strong fundamentals in basic science and engineering by providing an effective academic learning environment to excel in postgraduate programs and professional career.
PEO2	Core Competence: To provide graduates with a solid foundation in the core mechanical engineering fundamentals that are required to solve engineering problems and also pursue higher studies or to succeed in the industry profession.
PEO3	Breadth: To train graduates with multi-disciplinary engineering knowledge so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.
PEO4	Professionalism: To inculcate ethical attitude, communication skills, teamwork skills, life-long learning skills, and multidisciplinary approach in graduates to succeed in the professional career and society at large.

B.Tech.(Mechanical Engineering) Program Outcomes

PO1	ENGINEERING KNOWLEDGE: Graduate can apply the knowledge of the fundamentals of mathematics, science and engineering for solutions of the problems.
PO2	PROBLEM ANALYSIS: Graduate can identify, formulate and solve problems in the key areas of Design, Production and Thermal Engineering.
PO3	DESIGN / DEVELOPMENT OF SOLUTIONS: Graduate can design, analyze and conduct experiments, and interpret the data in the areas of Mechanical Engineering.
PO4	CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Graduate can conduct investigations and solve problems using research based knowledge and methods to arrive at logical conclusions.
PO5	MODERN TOOLS USAGE: Graduate can use the skills of IT tools, software and modern engineering equipment for analyzing the problems in Mechanical Engineering.
PO6	THE ENGINEER AND SOCIETY: Graduate can demonstrate the impact of engineering solutions on the society problems related to health, safety, legal, and social issues.
PO7	ENVIRONMENT AND SUSTAINABILITY: Graduate can demonstrate the impact of professional engineering solutions in environmental context and respond effectively to

	the needs of sustainable development.
PO8	PROFESSIONAL ETHICS: Graduate can implement the principles of ethics & human values in the professional responsibilities.
PO9	INDIVIDUAL AND TEAM WORK: Graduate able to work effectively as an individual , a team member and a leader in multidisciplinary settings.
PO10	COMMUNICATION: Graduate able to write critique samples (abstract, executive summary, project report), and make effective presentations among the engineering community and society at large.
PO11	PROJECT MANAGEMENT AND FINANCE: Graduate can demonstrate the knowledge of project management & finance, and handle various projects in both own discipline and multidisciplinary environments.
PO12	LIFE-LONG LEARNING: Graduate recognizes the need of self-learning skills and utilize them in lifelong learning.

B.Tech.(Mechanical Engineering) Program Specific Outcomes

PSO1	Graduate can apply the concepts of basic Mechanical Engineering courses for choosing professional career in Mechanical Engineering and allied disciplines.
PSO2	Graduate can design and analyze the technological problems and solutions specific to Thermal, Manufacturing and Product Design areas using conceptual, simulation and practical tools.
PSO3	Graduate can adapt emerging Mechanical and IT based Technologies to develop innovative solutions to varied problems, enabling graduate for lifelong learning that leads to successful career in industry / R&D / academics.

			A20- Course Structure for B. Tech.(Mech)-II Year – I semester (3rd Semester)							
Sl.No	**AICTE Category**	**Dept Course**	**Course code**	**Name of the Course**	**L**	**T**	**P/D**	**C**	**Max. Marks**	
									CIE	**SEE**
1	BS	S&H	8HC15	Complex Analysis, Probability And Statistics	2	1	0	3	30	70
2	ES	IT	8FC21	Python programming and Algorithms	2	1	0	3	30	70
3	HS&MS	S&H	8HC05	Environmental Science and Ecology	2	0	0	2	30	70
4	HS&MS	MBA	8ZC01	Economics, Accountancy and Management Science	2	0	0	2	30	70
5	PC	ME	8B306	Thermodynamics	2	1	0	3	30	70
6	PC	ME	8B307	Materials Science and Metallurgy	2	0	0	2	30	70
7	PC	ME	8B308	Machine Drawing and Computer aided Drawing Practice	1	0	2	2	30	70
8	PC	ME	8B363	Metallurgy Lab & Mechanics of Solids Lab	0	0	2	1	30	70
9	PC	ME	8B364	Fuels and Lubricants Lab	0	0	2	1	30	70
10	Proj,Sem, interns, viva	ME	8B393	Comprehensive test and Viva-voce-III (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
11	Proj,Sem, interns, viva	ME	8B387	Technical Seminar III	0	0	2	1	100	
				Total	**14**	**3**	**8**	**21**	**400**	**700**

			A20- Course Structure for B. Tech.(Mech) -II Year – II Semester(4th Semester)							
Sl.No	**AICTE Categery**	**Dept Course**	**Course code**	**Name of the Course**	**L**	**T**	**P/D**	**C**	**Max. Marks**	
									CIE	**SEE**
1	ES	EEE	8AC48	Elements of Electrical & Electronics Engineering	3	0	0	3	30	70
2	ES	CSE	8EC41	Java Programming	2	1	0	3	30	70
3	HS&MS	S&H	8HC17	Universal Human Values	2	1	0	3	30	70
4	PC	ME	8B409	Manufacturing Processes	3	0	0	3	30	70
5	PC	ME	8B410	Kinematics of Machinery	2	1	0	3	30	70
6	PC	ME	8B411	Fluid Mechanics and Hydraulic Machinery	2	0	0	2	30	70
7	HS&MS	S&H	8HC03	Soft Skills	1	0	0	1	30	70
8	ES	EEE	8AC95	Electrical & Electronics Engineering lab	0	0	2	1	30	70
9	PC	ME	8B465	Manufacturing Processes Lab	0	0	2	1	30	70
10	PC	ME	8B466	Fluid Mechanics and Hydraulic Machinery Lab	0	0	2	1	30	70
11		ME	8HC63	Soft Skills Lab	0	0	2	1	30	70
12	Proj,Sem, interns, viva	ME	8B494	Comprehensive test and Viva-voce-IV (2 Mids-Test (20M) and vivA (10M)and End Semester Test (50M) andViva(20M) = 70)	1	0	0	1	30	70
13	Proj,Sem, interns, viva	ME	8B488	Technical Seminar IV	0	0	2	1	100	
14	Proj,Sem, interns, viva	ME		Summer Industry Internship-I **(Internal Evaluation only in III Year - I Sem (2 Internal Reviews (30 M) and External Evaluation (70M))**	---	---	---	---	---	---
				Total	**16**	**3**	**10**	**24**	**460**	**840**

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

COMPLEX ANALYSIS, PROBABILITY AND STATISTICS

Code :8HC15

L	T	P/D	C
2	1	0	3

Pre Requisites: Engineering Mathematics-II

Course Objectives: *To make the students to understand and expected to learn*

1. *Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.*
2. *Applications of PDE.*
3. *Concepts of the probability, types of random variables and probability distributions.*
4. *Sampling distributions and their properties, concepts on estimation.*
5. *Concepts on testing the hypothesis concerning to large samples.*
6. *Different kinds of tests related to small samples and tests concerned to small size samples and goodness of fit and independence of attributes using chi-square distribution.*

Course Outcomes:

Students will able to learn

i. *Basic concepts of Complex Analysis and conformal mapping and their properties.*
ii. *Series expansion of a function using Taylor's and Laurent's series. Evaluation of definite integrals and improper integrals.*
iii. *Concepts of probability and will able to solve problems on discrete and continuous probability distributions.*
iv. *Learn basic concepts of sampling distribution and able solve problems on estimation.*
v. *Concepts of Control Charts*
vi. *Testing the hypothesis concerning to large size and small size samples also goodness of fit and independence of attributes using chi-square distribution.*

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1										3	1	
CO2	3	2	1										3	1	
CO3	2	2	1										3	1	
CO4	3	1	1										3	1	
CO5	3	2	2						1				3	1	
CO6	3	2	2						1				3	1	

Syllabus

UNIT - I: Complex Variable – Differentiation: (8 L)

Differentiation, analytic functions, Cauchy-Riemann equations, harmonic functions, finding harmonic conjugate. Finding Analytic Functions.

UNIT - II: Complex Variable – Integration: (12 L)

Cauchy - Integral theorem (without proof), Cauchy Integral formula (without proof), singularities, zeros of analytic functions, Taylor's series, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

UNIT-III: Random Variables and Probability Distributions: (12L)

Conditional probability, Multiplication theorem, Baye's theorem (without Proof). Random variables – Discrete and Continuous, Probability Mass and Density Functions, Expectation and Variance. Probability Distributions: Binomial, Poisson and Normal Distributions.

(PTO)

UNIT-IV: Sampling Distributions and Estimation: (8L)

Populations and Samples, Sampling distribution of the Mean (∫ - known and Unknown), Sums and Differences, Central limit theorem.Estimation: Point Estimation and Interval Estimation concerning Means for Large Samples.

UNIT-V: Quality Control: (8L)

Control Charts –Control lines, determination of control limits, Types of control charts-Control charts for variables (mean chart, Range chart) – charts for attributes (fraction defective, no. of defectives and defects for unit)

UNIT-VI:Tests of Hypothesis for Small Samples: (10 L)

Tests of Hypothesis, Type–I and Type-II Errors, Hypothesis testing concerning one mean and two means and Test of Hypothesis concerning one Proportion and difference of proportions.Student t-test, Hypothesis testing concerning one mean and two means, F-test and $|^2$ test-Goodness of fit, Independence of Attributes.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
2. Probability and Statistics for Engineers: Miller and John E. Freund, PHI Publishers, 9th Edition

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, S.R.K. Iyengar and R.K.Jain, Narosa Publication.
2. Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, pearson Educations.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. SCHAUM'S outlines: Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan, Mc Graw Hill publishers.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

PYTHON PROGRAMMING AND ALGORITHMS

Code : 8FC21

L	T	P/D	C
2	1	0	3

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					3		1					2			
CO2					3		1					2			
CO3					3		1					2			
CO4					3		1					2			
CO5					3		1					2			
CO6					3		1					2			

UNIT I: **Introduction to Python**:

History, Features, Modes of Execution, Setting up path, working with Python Basic Syntax, Variable and Data Types, Operators. Conditional Statements (If, If- else, Nested if-else) Looping (for, While Nested loops) Control Statements (Break, Continue, Pass).

- **Functions:** Defining a function, calling a function, Types of functions, Function Arguments

UNIT II:String Manipulation:

Accessing Strings, Basic Operations, String slices

- **Lists:** Accessing list, Operations, Tuple: Accessing tuples, Operations,
- **Dictionaries:** Accessing values in dictionaries,
- **Modules:** Importing module, Math module, Random module, Packages
- **Exception Handling**:Exception, Exception Handling, Except clause, Try? Finally clause User Defined Exceptions
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UNIT III:

- **Python- OOPs concept:** Class and object, Attributes, Inheritance, Overloading Overriding, Data hiding.
- **Regular expressions:** Match function, Search function, Matching VS Searching, Modifiers Patterns.

UNIT IV:

Case Study with NumPy/PlotPy/SciPy/GUI Programming, Introduction, Tkinter programming, Tkinter widgets

UNIT V:

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity,

Asymptotic Notation- Big oh notation, Omega notation, Theta notations

- **Divide and conquer:** General method, applications-Binary search, Quick sort, Merge sort
- **Applications:** Implementing Algorithms ,performance analysis and sorting techniques using Python

UNIT VI:

- **Greedy method**: General method, applications- 0/1 knapsack problem, Minimum cost spanning trees.
- **Dynamic Programming**: General method, applications-Optimal binary search trees, Travelling sales person problem, Reliability design.
- **Applications:** Implementing some Greedy method and Dynamic programming techniques using Python

Text books:

1. Think Python: How to Think Like a Computer Scientist Allen B. Downey, O'Relly publications.
2. Learning with Python by Jeffrey Elkner, Chris Meyers Allen Downey, Dreamtech Press.
3. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

ENVIRONMENTAL SCIENCE AND ECOLOGY

Code :8HC05

L	T	P/D	C
2	0	0	2

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						1	3								1
CO2						1	3								1
CO3						1	3								1
CO4						1	3								1
CO5						1	3								1
CO6						1	3								1

UNIT-I Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

UNIT-III Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants.Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste:

Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

UNIT-V Sustainable development and Green Technology: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism (CDM).

UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Course Outcomes

After completion of the course, the student will be able to:

1. Understand about ecosystem and energy flow among the organisms.
2. Know the resources available, use of them and overexploitation of the resources in the nature.
3. Learn the value, use and value of biodiversity.
4. Understand the causes and effect of pollution and implement measures in control of pollution.
5. Understand the sustainable development and implement green technology for sustainable development..
6. Learn and implement policy to protect the environment.

TEXT BOOKS:

1. Perspectives in ***Environmental Studies***: ***Kaushik*** A. and ***Kaushik***, C.P. New Age International (P) Ltd. (2008)
2. Environmental Studies by Erach Bharucha, 2005 University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Syllabus for B. Tech. II Year I semester

Mechanical Engineering

ECONOMICS, ACCOUNTACY, AND MANAGEMENT SCIENCE (EAMS)

Code :8ZC01

L	T	P/D	C
2	0	0	2

Course Objectives:

- To understand the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular.
- To understand cost concept, Revenues and Market structure
- To understand and identify various basic concepts of Accounting, Double entry system and Book keeping.
- To understand the concepts of Capital expenditure, Revenue expenditure and Final accounts.
- To make student understand the basics of Management, its principles and various functions performed in organization.
- To make student learn about various personality traits, perception, attitudes of individuals working in organization.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									2		3				2
CO2									2		3				2
CO3									2		3				2
CO4									2		3				2
CO5									2		3				2
CO6									2		3				2

UNIT-1
INTRODUCTION TO MANAGERIAL ECONOMICS:

Definition, Nature and scope of Managerial Economics, Macro Economics consumer's Equilibrium. Theory of Demand, Demand function, Determinants, exceptions - Price Elasticity of Demand and Demand forecasting. Theory of supply, Production function and Economies of scale.

UNIT- 2
INTRODUCTION TO COST, REVENUE AND MARKET STRUCTURE:

Cost Analysis, types of costs, Revenue Analysis, Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems). Market structures: Types of competition, Features of Perfect competition, Monopoly, Monopolistic Competition and oligopolistic competition.

UNIT-3

INTRODUCTIONT O FINANCIAL ACCOUNTING:

Meaning and Definition of Accounting, principles of Accounting, Double-Entry system of Accounting, Book Keeping, introduction to Journal, Ledger and its types, Introduction to Trial balance, problems and solutions of trial balance.

UNIT-4

INTRODUCTION TO FINAL ACCOUNTS:

Introduction to Final Accounts, Concepts of classifications of Revenue and Capital expenditures, Final accounts: Trading account, Profit and Loss Account, Balance sheet, Problems and solutions of Final accounts with adjustments.

UNIT-5

INTRODUCTION TO MANAGEMENT:

Management- Definitions, Fayol's principles of Management, Levels of Management, functions of management. Planning: types of planning, planning process; Organizing: Organizational Design and structure, staffing; Directing;, Controlling: Basic control process.

UNIT-6

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR: Definition, Nature and Scope, Perception – Perceptual selectivity and organization, **-,** Perceptual Distortions Attribution analysis Attribution theories, Johari Window and Transactional Analysis Personality and Attitudes, Determinants of personality Formation of Attitudes.

Essential Readings:

1. A R Aryasri: Managerial Economics, Tata Mc Graw Hill
2. A R Aryasri: Management Science, Tata Mc Graw Hill

Suggested Readings:

1. S A Siddiqui & A S Siddiqui, Managerial Economics & Financial Analysis, New Age
2. Accountancy – I Tulasian Tata Mcgraw Hill Co
3. Koontz &Weihrich: Essentials of Management, 6/e, TMH, 2005

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

THERMODYNAMICS

Code :8B306

L	T	P/D	C
3	0	0	3

Course Objective:

- To learn about work and heat interactions, and balance of energy between system and its surroundings
- To learn about application of I law to various energy conversion devices
- To evaluate the changes in properties of substances in various processes
- To understand the difference between high grade and low grade energies and II law limitations on energy conversion
- To Learn the application of steam tables and Mollier charts for pure substances(steam)
- To understand the processes and efficiencies of basic power cycles

Course Outcomes: After completing this course

- The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
- Students can evaluate changes in thermodynamic properties of substances
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low grade energies.
- The students will be able to use property table and Mollier charts to evaluate properties of steam at different states.
- The students will be able to analyze and evaluate the performance of basic thermodynamics cycles

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3		1					1				2	1	
CO2	2	3		1					1				2	1	
CO3	2	3		1					1				2	1	
CO4	2	3		1					1				2	1	1
CO5	2	3		1					1				3		
CO6	2	3		1					1				3		1

Unit I: INTRODUCTION AND ZEROTH LAW

Contents: Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.

Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; thermometric properties of various thermometers

Applications: These concepts will be useful in analyzing thermodynamics systems and construction of thermometers

Unit II: GAS LAWS & FIRST LAW FOR NON FLOW PROCESS

Definition of heat, specific heat, examples of heat/work interaction in systems- control mass-First Law for Cyclic & Non-cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy.

Fundamentals- Working Fluid & behaviour: Perfect gas laws – Ideal gas-Equation of state, specific and universal gas constants-specific heat relations.

Application of First law for ideal gas undergoing during different processes; calculation of displacement Work; heat transfer; internal energy

Applications: These concepts will be applied in analysis of closed systems- piston cylinder cases.

Unit III: FIRST LAW FOR FLOW PROCESS & SECOND LAW

First Law for Flow Processes - Derivation of general energy equation for a control volume; definition of Enthalpy; Steady state steady flow processes including throttling; Examples of steady flow devices; Application of I law applications for steady flow devices.

Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.

Applications: Theses concepts will be employed in different applications like turbines, compressors, nozzles etc.

Unit IV: ENTROPY, AVAILABILTY, IRRIVERSIBILY

Clausius inequality; Definition of entropy S ; Demonstration that entropy S is a property; Evaluation of entropy for solids, liquids, ideal gases undergoing various processes; Principle of increase of entropy.(4)

Calculation of change in entropy during mixing process; Ideal Gas Mixtures- governing laws: evaluation of equivalent properties.

Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume

Applications: (i) The above concepts are employed in calculating the efficiency and losses of different processes.

Unit V: PROPERTIES OF PURE SUBSTANCES

Pure substances-definition, Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

Determination of entropy from steam tables; Definition of Isentropic efficiency for compressors, turbines and nozzles

Applications: The above concepts are employed in the steam power plants.

Unit VI: BASIC THERMODYNAMIC CYCLES

Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cyclep; Basic vapor compression cycle and comparison with Carnot cycle.

Applications: The basics of these cycles will be useful for the actual design of external combustion engines

Text Books:

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.

2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India

3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.

4. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

MATERIALS SCIENCE AND METALLURGY

Code :8B307

L	T	P/D	C
2	0	0	2

COURSE OBJECTIVES:

- To offer a comprehensive in-depth knowledge in key core course 'Materials Engineering' with a broad range of topics including crystal structures, plastic deformation, failure analysis, alloy formation principles and rules, interpretation of equilibrium phase diagrams of ferrous and non-ferrous alloys, heat treatments, case-hardening, composite materials, nanomaterials, smart materials, plain carbon steels, special steels, superalloys, mechanical properties and NDT.
- To equip the mechanical engineer with knowledge and skills required to work in manufacturing industries, materials testing, quality control, and R& D labs.

COUSE OUTCOMES:

After studying this course, the students will be able to:

- identify crystal structures for various materials including metals and alloys and understand the impact of defects in such structures at atomic scale.
- understand fracture modes in failure of the industrial components during their service and failure under fatigue conditions.
- acquire the knowledge of finding number and amounts of phases, by using Lever Rule, draw and analyze the phase diagram for different binary alloys; concept of nucleation, growth of crystals and application of some cast and wrought non-ferrous metals/alloys used in industry.
- acquire the knowledge of industrially important Fe-Fe_3C phase diagram, various cast irons, steels and their applications in industry
- acquire the knowledge of different industrial heat treatment processes for steels; Surface hardening processes, how mechanical properties could be altered by implementing various heat treatment processes.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1										1		
CO2	2	3	1										1		
CO3	2	3	1										1		
CO4	2	3	1										1		
CO5	2	3	1										1	2	
CO6	2	3	1										1		3

Unit – I

Mechanical Behavior and NDT:

Crystal Structure: Unit cells, Metallic crystal structures, examples of metals with BCC, FCC and HCP crystal structures, ceramics crystal structure. **Imperfection in solids:** Point, line, interfacial and volume defects; slip systems, dislocation strengthening mechanisms, Frank Read Source of dislocation; Dislocation pile-up; Strain hardening, Intermediate annealing; Concept of single and polycrystals;Effect on grain size on ductility of metal, critically resolved shear stress. **NDT:**

Introduction to non-destructive testing: (i) Visual examination, (ii) X-ray radiography and (iii) Dye penetrant test.

Unit – II

Failure, Fatigue, Creep

Failure: Ductile and brittle failures, Ductile to brittle transition, Fracture mechanics: Introduction to Stress intensity factor approach and Griffith criterion. **Fatigue failure: fatigue-stress patterns,** Low cycle fatigue, High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress on fatigue life, Modified Goodman diagram; To solve few problems on Fatigue, Thermally induced fatigue, Fracture with fatigue,Temperature induced failures, Creep: Definition, creep curve and mechanism of creep; Case studies in failures.

Unit – III.

Alloys, Phase diagrams, NF Alloys:

Alloys: Alloys, substitutional solid solution, Hume Rothery's rules for solid solution and interstitial solid solutions- **Phase diagrams:** Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. **Binary phase diagrams:** Ni-Cu, Cu-Zn, Cu-Sn, Al-Cu, and Al-Si. "**Nonferrous Alloys:**Properties and applications of copper, brass, bronze, Al alloys, NIMONIC-105 alloy, and Titanium alloys.

Unit - IV

Fe-Fe_3C Phase diagram, Steels, Cast irons:

Fe-Fe_3C Phase diagram: Iron Iron-carbide phase diagram and description of microstructural aspects of phases (Ferrite, Austenite, Cementite, Pearlite, ledeburite, hypo and hyper eutectoid steels; hypo and hyper eutectic cast irons). **Steels:** low carbon, medium carbon, high carbon, stainless, Hadfield,high speed steels, their compositions, microstructures and applications. **Cast irons:** Types of cast irons; compositions, microstructures and applications of (Grey, white, Spheroidal graphite, Malleable) cast irons.

Unit – V

Heat treatment of steels, heat treatment of non-ferrous alloys:

Heat treatment of Steels: Annealing, normalizing and spheroidising, hardening, tempering, isothermaltransformation diagrams for Fe-C alloys and microstructure development. Continuous cooling curvesand interpretation of final microstructures and properties- austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening, **Heat treatment of non-ferrous alloys:**Aluminum alloys, Titanium alloys and Nickel basesuperalloy NIMONIC-105.

Unit – VI

Special steels, Advanced materials:

Special steels: Alloying of steel, Effect of alloying elements in steels, properties and applications of stainless steel and tool steels, maraging steels, **Properties and applicationsofAdvanced Materials:** Composites: Metal matrix composites (MMC), CMC, PMC and C-C composites, applications of composites. Principles and applications of SMART Materials (Shape memory alloys and Piezeo electric ceramics). Nanomaterials, properties and applications.

Text Book:

W. D. Callister, Jr and David G. Rethwisch, "Materials Science and Engineering-An Introduction", 9thEdition, WileyIndia.

References:

1.Physical Metallurgy principles by Reed-Hill
2. Mechanical Metallurgy / G.E. Dieter

3. V. Raghavan, “Material Science and Engineering’, Prentice Hall of India Private Limited, 1999.
4. Engineering Materials-2 an Introduction to Microstructure, Processing and Design – Micheal F Ashby &David R H Jones
5.Introduction to Physical Metallurgy / Sidney H. Avener.- Design Data book
6.Material Science and Metallurgy/Kodgire.
7.Essential of Materials science and engineering/ Donald R.Askeland/Thomson
8.Kenneth G. Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India Private Limited, 4th Indian Reprint, 2002.
9. Material Science - Vanclak
10. U. C. Jindal, “Engineering Materials and Metallurgy”, Pearson, 2011.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

MACHINE DRAWING AND COMPUTER AIDED DRAWING PRACTICE

Code :8B308

L	T	P/D	C
1	0	2	2

Course Objective:
To familiarize with the standard conventions for different materials and machine parts in working drawings. To make part drawings including sectional views for various machine elements. To prepare assembly drawings given the details of part drawings.

Course Outcomes:
After studying this course, the students will be able to:

- Understand the principles and requirements of the machine drawings.
- Understand the various symbols used in machine drawing.
- Understand the principles and requirements of various Assembly drawings.
- Drawing of different machine components
- Imagine and drawing the assembly by seeing the components given.
- Ability to understand the existing geometric modeling and develop a geometric modeling for a new component in design process

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3										1	3		
CO2		3										1	3		
CO3		3										1	3		
CO4		3										1	3		
CO5		3			2							1	3		
CO6		3			2							1	3		

UNIT-I : Machine Drawing Conventions

a) Sectional views: section planes and drawing of sections, Types of sectional views – Full sectional view, half sectional view, auxiliary sectional views, Parts not usually sectioned

b) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

UNIT-II : Drawing of simple machine parts

Selection of Views, additional views for the following machine partswith easy drawing proportions.

a) Popular forms of Screw threads like V, Metric, BSW, Buttress, Square, ACME, Worm nuts like square and hexagonal headed, Bolts like square and hexagonal headed, eye bolt, foundation bolts, stud bolts, set screws, washers

b) Keys, cotters & joints and knuckle joint.

UNIT-III : Drawing of machine elements
Selection of Views, additional views for the following machine elements and parts with easy drawing proportions
Shaft coupling: Flange, Split-Muff, Flexible couplings, Claw, Oldham's and Universal Coupling
Riveted joints for plates.
UNIT-IV : Assembly Drawings of Engine parts
Stuffing box, Cross head, Eccentric, Connecting rod - Drawings of assembled views for the part drawings using conventions and easy drawing proportions
Assembly Drawings of Valves and Detailed drawings

Steam stop valve, spring loaded safety valve, feed check valve and air cock - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-V : Assembly Drawings of Machine parts

Screws jack, Tailstock, Machine Vice, Plummer block, foot step bearing - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-VI :Computer Aided 2D Drafting:

1.Introduction to Auto CAD, Setting up drawing environment, Command and System variables, Coordinate system.
2. Creating graphic primitives like Point, Line, Planes, Circle, Arc, Annotation etc.
3. Creating and editing 2D object, Layers and object Properties. Creating dimensions, Blocks and External reference.
4. Creating a layout to plot, documents, file formats.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
3. Shan Tickoo, "Auto CAD 2011: A Problem Solving Approach", Autodesk Press USA.

REFERENCES:

1. Machine Drawing – P.S.Gill.
2. 4. Machine Drawing – ND Bhat

Syllabus for B. Tech. II Year I semester

Mechanical Engineering

METALLURGY LAB & MECHANICS OF SOLIDS LAB

Code :8B363

L	T	P/D	C
0	0	2	1

METALLURGY LAB

Course objective:

To learn the sample preparation technique, etch and observe optical microstructures of ferrous and nonferrous metals/alloys.

Course Outcomes:

After studying this course, the students will be able to:

- acquire the knowledge of preparation of samples for metallurgical study.
- acquire the knowledge of preparation of sample for metallurgical study of a plain carbon steel, cast iron, alloy steel, heat treated steel and their interpretation.
- acquire the knowledge of preparation of sample for metallurgical study of nonferrous metal/alloy and interpretation

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				3		1							1		
CO2			2	3		1							1		
CO3			2	3		1							1		

List of Experiments:

1. Specimen preparation for metallographic examination and Study of Metallurgical Microscope
2. Study of microstructure of plain carbon steel
3. Study of microstructures of heat treated plain carbon steel.
4. Study of microstructures of Alloy steel
5. Study of microstructures of cast iron
6. Study of microstructure of some Non ferrous Metal or alloy (Al-Si alloy)
7. Demonstration of Jominy end quench test.

(MECHANICS OF SOLIDS LAB

Course Objective:

The objective is to learn the fundamental concepts of stresses, strains, and deformation of solids with applications structural elements.

Course Outcomes:

After studying this course, the students will be able to:

- know how to measure the hardness and impact strength of given materials
- measure the modulus of rigidity of given spring, and shaft.
- find the deflection of beams theoretically and paracticaly.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				3		1							1		
CO2			2	3		1							1		
CO3			2	3		1							1		

List of Experiments:

1. Direct Tension Test
2. Bending Test on simply supported and cantilever beams
3. Torsion Test
4. Brinell and Rockwell hardness tests (of samples obtained from Jominy End quench Test & samples of various treated and untreated steels obtained from Metallurgy Lab)
5. Test on Springs
6. Compression Test on Cube
7. Impact Test

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

FUELS AND LUBRICANTS LAB

Code :8B364

L	T	P/D	C
0	0	2	1

Course Objectives: : In this course students will learn how to measure various properties of fuels and lubricants and compare them with the standards.

Course Outcomes:

At the end of the course, students should be able

1) To find the flash and fire point of given fuel
2) To find the impurities in fuel using distillation process
3) To determine the Viscosity of fluids
4) To calculate the Calorific value of solid and gaseous fuels
5) To measure the carbon residues of the fuel after combustion
6) To test the quality of grease by conducting penetration test

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3			1			2				1		
CO2	2		3			1			2				1		
CO3	2		3			1			2				1		
CO4	2		3			1			2				1		
CO5	2		3			1			2				1		
CO6	2		3			1			2				1		

List of Experiments:

1.Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus [Co1]

2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky Martens apparatus[Co1l]

3. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer-I [Co3]

4. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer-I [Co3]

5. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer [Co3]

6. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter: [Co4]

7. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer. [Co3]

8. Determine the percentage of carbon residue of the given oil using Carbon Residue test apparatus

[Co5]

9. Conduct grease penetrate test for finding the quality of grease. [Co6]

10. Determine the distillation characteristics of Petroleum Products[Co2].

11. Determine the cloud point and pour point of the given Lubricant [Co6]

12. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter. [Co4]

Syllabus for B. Tech. II Year I semester
Mechanical Engineering

COMPREHENSIVE TEST AND VIVA-VOCE-III

Code : 8B393

L	T	P/D	C
1	0	0	1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :

1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3									2		2			2
CO2	3									2		2			2
CO3	3									2		2			2

Comprehensive Test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test : 70 marks
**Viva Voce : 30 marks
Total : 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.
End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.
End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.
The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
TECHNICAL SEMINAR III

Code : 8B387

L	T	P/D	C
0	0	2	1

Course objective:

To learn the importance of delivering seminars on technologies for demonstrating oratory and interview facing skills.

Course Outcomes:

1 Deliver lecture on emerging technologies.
2 Explain domain knowledge to resolve real time technical issues
3 Demonstrate ability to lead and explain concepts and innovative ideas.
4 Demonstrate team leading qualities.
5 Demonstrate public speaking skills.
6 Exchange new information that would not have been available otherwise.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3											2			3
CO2	3											2			3
CO3	3											2			3
CO4	3											2			3
CO5	3											2			3
CO6	3											2			3

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10

8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

1. Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING

Code:8AC48

L	T	P/D	C
2	0	0	2

Course Outcomes:

CO's: after studying this course, the student will be able to

1. Understand the fundamentals of electrical engineering and DC machines.
2. Understand the principles of AC circuits.
3. Understand the principle and operation of three phase induction motor and measuring instruments.
4. Understand the principle and operation of diode.
5. Understand the principle and operation of transistor.
6. Understand the principles of digital electronics.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1										2		
CO2	2	3	1										2		
CO3	2	3	1										1		
CO4	2	3	1										1		
CO5	2	3	1										2		
CO6	2	3	1										2		

Unit – I: Fundamentals of Electrical Engineering and DC Machines:

Ohm's Law, Kirchhoff's Laws, types of sources, passive elements. Series parallel circuits, mesh and nodal analysis. Superposition, Reciprocity theorem.

DC Machines: Principle of operation of D.C generators, types, E.M.F equation. Principle of operation of D.C motors, Types motors, Torque equation, Losses and efficiency, simple problems on D.C Generators and motors.

Unit – II: Fundamentals of AC circuits:

AC voltage wave form and basic definitions: Peak Value, R.M.S. value, Average values, Form factor and Peak factor, 'j' operator, Analysis of single phase AC circuits series and parallel (Simple circuits). Three phase circuits – Star - delta connection, Relation between line and phase voltages / currents in a 3-phase Star-Delta balanced system.

Unit – III: Induction Motors and Instruments:

Concept of Faraday's laws, 3- phase induction motor working principle, operation and construction details.

Instruments: Introduction, classification of instruments, operating principles, essential features of measuring instruments, permanent magnet moving coil (PMMC) instruments, moving iron (MI) instruments.

UNIT IV-DIODE: Overview of Semiconductors, PN junction diode and Zener diode –Diode circuits: rectifiers (bridge type only), filters, clippers and clampers.

UNIT V- TRANSISTOR: BJT construction, operation, characteristics (CB, CE and CC configurations) and uses – JFET and MOSFET construction, operation, characteristics (CS configuration) and uses.

UNIT VI-DIGITAL ELECTRONICS : Number systems – binary codes –binary arithmetic - Boolean algebra, laws & theorems - simplification of Boolean expression using K maps - logic gates - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Text Books:

Basic Electrical Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
Basic electrical Engineering – M.S. Naidu and S. Kamakshiah – TataMcGraw-Hill, 2005 edition.
Basic Electrical & Electronics Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
Principles of Electronics - V.K.Mehta, S.Chand Publications, 2nd edition.

References:

Theory and problems of Basic electrical Engineering- D.P.Kotahari & I.J.Nagrath PHI.
Electronic Devices and Circuits, Millman & Halkias, TMH publications.

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

JAVA PROGRAMMING

Code: 8EC41

L	T	P/D	C
2	1	0	3

Course Objective:

Understand the concepts of Object oriented programming principles of Java. Write the programs and execute using OOP principles such as garbage collection, overloading methods, constructors, recursion, string handling, StringTokenizer, inheritance and its types, packages, multithreading and threads.

Course Outcomes :

1. Understand the concept of OOP with the need of constructing objects, and classes. Write programs using classes, objects, members of a class and the relationships among them needed for a specific problem.
2. Identify the purpose and usage of principles of inheritance and polymorphism. Implement concepts of polymorphism, encapsulation and methodoverloading
3. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments)
4. Students understand and implement error exception handling andmulti-threading.
5. Students learn to create GUI for the specificapplications.
6. Write programs for event-handling using various user interface components on applets.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					3		1					2		2	
CO2					3		1					2		2	
CO3					3		1					2		2	
CO4					3		1					2		1	
CO5					3		1					2		1	
CO6					3		1					2		1	

UNIT-I

History of Java, Java buzzwords, datatypes, variables, simple java program,scope and life time of variables,operators, expressions, control statements, type conversion and costing, arrays,, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, overloading methods and constructors, string handling, StringTokenizer.

UNIT-II

Inheritance –Definition, single inheritance, benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract class, Base classobject.

UNIT-III

Interfaces: definition, variables and methods in interfaces, differences between classes and interfaces, usage of implements and extends keyword, uses of interfaces.

Packages: Definition, types of packages, Creating and importing a user defined package.

Applications using interface UNIT-IV

Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating user defined exceptions.ulti-Threading: Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread.

Applications of multithreading.

UNIT-V

Advantages of GUI over CUI ,The AWT class hierarchy, Component, Frame, user interface components- labels, button, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, menu bar, graphics, layout, managers – boarder, grid, flow and card layouts.

Applications: developing calculator, developing feedback form, developing biodata.

UNIT-VI

Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters toapplets.

Applications: Developing of simple advertisements.

TEXT BOOKS

1. Java; the complete reference, 6th editon, Herbert schildt,TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, pearsoneducation.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering

UNIVERSAL HUMAN VALUES

Code: 8HC17

L	T	P/D	C
2	1	0	3

Human Values Courses: This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as "H-102 Universal Human Values 2: Understanding Harmony"is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

OBJECTIVE: The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2															
CO3															
CO4															
CO5															
CO6															

COURSE TOPICS: The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I

2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration

3. Continuous Happiness and Prosperity- A look at basic Human Aspirations

4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority

5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

10. Understanding the characteristics and activities of 'I' and harmony in 'I'

11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

12. Programs to ensureSanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding

22. Natural acceptance of human values

23. Definitiveness of Ethical Human Conduct

24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Module 6:Harmony on Professional Ethics

25. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order

b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,

c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

26. Case studies of typical holistic technologies, management models and production systems

27. Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b. At the level of society: as mutually enriching institutions and organizations

28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.

3. READINGS:

3.1 Text Book

1.Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010 3.

2 Reference Books

1.Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2.Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3.The Story of Stuff (Book).

4.The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5.Small is Beautiful - E. F Schumacher.

6.Slow is Beautiful - Cecile Andrews

7.Economy of Permanence - J C Kumarappa

8.Bharat Mein Angreji Raj - PanditSunderlal

9.Rediscovering India - by Dharampal

10.Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11.India Wins Freedom - Maulana Abdul Kalam Azad

12.Vivekananda - Romain Rolland (English)

13.Gandhi - Romain Rolland (English)

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

MANUFACTURING PROCESSES

Code: 8B409

L	T	P/D	C
3	0	0	3

Course Objectives:

1) To understand the basic casting process and calculate the pattern allowances and design the riser system needed for defect free casting and understand various types of castings and their applications
2) To understand the importance of metal forming processes and study the Rolling process
3) To gain knowledge in the working principle of Extrusion and Forging operations and learn the various ways of performing theses operations.
4) To be acquainted with the fundamentals of sheet metal operations and distinguish between various types of operations and learn about plastic processing techniques.
5) To understand the various welding processes and learn about the various types of welding operations and their applications.
6) To gain understanding of powder based manufacturing technique and manufacturing methods of plastic based products

Course Outcomes:

1) Select moulding material, pattern and calculate pattern allowances used in casting and design the gating system and Design a suitable riser for the casting and decide specific casting type for a defect free product
2) Distinguish between different forming processes and Analyze the forces and power consumed in rolling operation
3) Decide the specific forging/ extrusion process for making a part and identify the specific defects if any in the process
4) Suggest the sheet metal process for making a part and decide the processing technology for a particular type of plastic.
5) Propose the type of welding joint and specific welding process for an application and estimate the effect of process variables on arc welding
6) Choose appropriate technique for making discrete parts and opt the specific plastic processing method based on type of plastic.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1										1		
CO2	2	3	1										1	2	
CO3	2	3	1										1	2	
CO4	2	3	1										1	2	
CO5	2	3	1										1	2	
CO6	2	3	1										1	2	

UNIT – I

Metal Casting : Advantages and applications of casting processes, Casting terms, Patterns - Pattern allowances and Numerical Problems in pattern calculation, Types of patterns, Pattern Materials, Moulding materials, Elements of Gating system, Gating ratio, Solidification of pure metal and alloys, Cooling curves, Risers - Function, Riser design – Chvorinov's rule, Caine's method- Numerical Problems, Cores-uses, Special casting processes- Centrifugal casting, Die casting, and Investment casting, Casting defects

UNIT – II

Metal Forming: Advantages of forming operations,Nature of plastic deformation, hot working and cold working processes-Advantages, Disadvantages, Types of stresses applied in metal working, Bulk metal forming processes: **Rolling:** Principle, Rolled Products, mechanics of Rolling, Types of Rolling mills, Forces in rolling and power requirements - Numerical Problems

UNIT – III

Forging: basicforging operations,Forging types: Smith, Drop, Press & Machine Forging, Forging defects, Swaging

Extrusion: Extrusion principle Hot extrusion and cold extrusion - Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion

UNIT – IV

Sheet-Metal Operations: Classification, Springback in metals, shearing action, Press operations: Blanking, Piercing and other operations,Clearance and Shear in press operations, Forces and power requirement in press operations- Numerical Problems, Bending: Nomenclature, Bend allowance, bend length calculation, Types of bending dies, Numerical Problems. Spinning, Stretch forming, Embossing and Coining.

UNIT- V

Welding : Classification of welding processes, Welding terms, Gas welding: Fuel gases, Oxy-Acetylene welding, Flame types, Electric Arc welding: Electrodes, AC & DC, V-I Characteristics-Numerical Problems, Resistance Spot welding, Thermit-welding, Inert Gas welding: Shielding gases, TIG & MIG welding, Submerged arc welding, Friction welding, & Friction stir welding, Explosive welding, Welding defects – causes and remedies. Principles and Applications of Soldering, Brazing and Adhesive bonding

UNIT – VI

Powder Metallurgy- Principle, steps in PM processing, production of metallic powder, mixing and blending, compacting, sintering, Advantages & limitations of PM

Plastics processing: WorkingPrinciple and Applications of: Injection moulding, Blow moulding, Compression moulding, and Transfer moulding

TEXT BOOKS:

1. Manufacturing Technology (Foundry, Forming and Welding)Vol 1 / P.N. Rao/TMH

2. A Text book of Production Technology (Manufacturing Processes) /Dr. P C Sharma /S.Chand Publishers

REFERENCES:

1. Manufacturing Engineering and Technology/Kalpakjian S/ Pearson Education

2. Welding Engineering and Technology / RS Parmar / Khanna Publishers

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

KINEMATICS OF MACHINERY

Code:8B410

L	T	P/D	C
2	1	0	3

COURSE OBJECTIVES: The main objective of this course is intended to cover the field of engineering theory, analysis, design and practice that is generally described as mechanisms and kinematics of machines.

COURSE OUTCOMES: After completing the subject, students will be able to:

- understand the basic concepts of mechanism, types of mechanisms and inversions difference between machine mechanism and structure.
- understand velocity and acceleration diagram in order to evaluate the inertia forces in mechanism and machines.
- understand concept of steering gear mechanism, types and Hooke's joint with respect to an automobile.
- In order to understand and design complex motions possible out of comes and followers.
- understand the concept pf toothed gears and selection different types of gear trains in order obtain required velocity ratios.
- understand transmission power by various means like belts, rope and chains and their advantages and limitations.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2									2	1	
CO2		3	3	2									2	1	
CO3		3	3	2									1		
CO4		3	3	2									1		
CO5		3	3	2									2		
CO6	2	3	3	2									2	1	

UNIT – I

Mechanisms : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained. Number, type and dimensional synthesis- definitions only.

Machines : Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II

Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – III

Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint – Universial coupling – application – problems.

Straight Line Motion Mechanisms : Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT –IV

Cams: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity – Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers : Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

Toothed Gears: Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference.

Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box- Differential gear for an automobile.

UNIT – VI

Belt Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of belt drives,V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

TEXT BOOKS:

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines R.S Khurmi & J.K Gupta

REFERENCE BOOKS:

1. Theory of Machines by Thomas Bevan/ CBS
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
3. The theory of Machines /Shiegley/ Oxford.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering

Fluid Mechanics and Hydraulic Machinery

Code: 8B411

L	T	P/D	C
2	0	0	2

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

After studying this course, the students will be able to:

1. understand the fluid properties and measurement of pressure with monometers.
2. Understand the classification of fluid, Bernoulli's equation, momentum equation and their applications
3. understand Reynolds's experiment, major losses, minor losses
4. understand velocity triangle, work done calculations, elements of Hydroelectric power plant, pump storage plant.
5. Understand the classifications of turbines working principles of turbines, draft tube theory, performance of turbine.
6. Understand various types of pumps working principle of reciprocating pump, centrifugal pump, performance characteristics of centrifugal pump.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1						1				2		
CO2	2	3	1						1				2		
CO3	2	3	1						1				2		
CO4	2	3	1						1				3		
CO5	2	3	1			2			1			1	3	1	
CO6	2	3	1						1			1	3	1	

UNIT I

Fluid statics : Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers. *Applications: Foundation of basic concepts and pressure measurement devices.*

UNIT II

Fluid kinematics : Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow and three dimensional flow.

Fluid dynamics : Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Applications: The fluid dynamics concepts are employed in analyzing fluid flow problems and design of hydraulic devices.

UNIT III

Exact flow solutions in channels and ducts, Couette and Poisuielle flow, laminar flow through circular conduits and circular annuli- concept of boundary layer – measures of boundary layer thickness – Darcy Weisbach equation, friction factor,

Applications: Analysis of fluid flow through pipes and design of hydraulic pipe.

UNIT IV

Need for dimensional analysis–methods of dimension analysis–Similitude–types of similitude Dimensionless parameters–application of dimensionless parameters–Model analysis.

UNIT V

Euler's equation – theory of Rotodynamic machines – various efficiencies – velocity components at entry and exit of the rotor, velocity triangles – Centrifugal pumps, working principle, work done by the impeller, performance curves – Cavitation in pumps- Reciprocating pump–working principle.

Applications: Lifting of water in steam power plant, irrigation, and other power plants.

UNIT VI

Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines Pelton wheel, Francis turbine and Kaplan turbines, working principles – draft tube- Specific speed, unit quantities, performance curves for turbines – governing of turbines.

Applications: Turbines used in hydro-powerplants under different head conditions.

TEXT BOOKS :

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4..Hydraulic Machines Including Fluidics PB by Jagdish Lal Metropolitan Book Co. Pvt. Ltd. , 1994.

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

SOFT SKILLS

Code:8HC03

L	T	P/D	C
1	0	0	1

Course objectives:

To enable students to:

- make self-assessment.
- know the importance of certain soft skills like time management and goal setting.
- sharpen their verbal ability to handle the competitive exams.
- enhance their team skills and design thinking capabilities for effective problem solving and decision making.
- know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
- equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								3	2	1		2			3
CO2								3	2	1		2			3
CO3								3	2	1		2			3
CO4								3	2	1		2			3
CO5								3	2	1		2			3
CO6								3	2	1		2			3

UNIT:1

1. Know Yourself

1.1 ortance of knowing yourself
1.2 SWOT / SWOC Analysis

SWOT / SWOC Grid

UNIT:2

2. Organising Oneself

2.1 Developing positive outlook towards life
2.2 Time management
2.3 Goal Setting

UNIT:3

3. Verbal Aptitude

3.1 Reading Comprehension:

Strategies to comprehend difficult passages from a book; SQ3R (survey, question, read, recite, and review)

3.2 Word Analogies

3.3 Spotting Errors

3.4 Sentence Completion / Sentence

UNIT: 4

4. Skills to Excel

.1 Team work and Team Dynamics - Collaboration and Leadership

4.2 Decision Making, Design Thinking

4.3 Critical thinking and Creative

Problem Solving.

UNIT: 5

5.Self-Management Skills

5.1 Emotional Intelligence

5.2 Stress Management

UNIT: 6

6. Interview Skills

6.1 Interview Skills: Meaning and Purpose of an Interview

6.2 Types of interviews; Interview Preparation techniques

6.3 Dress code at an interview

6.4 FAQs in HR Interview

Text Book: SOFT SKILLS – Dr. K. Alex, S. Chand publications

Suggested Readings: * SOFT SKILLS – Meenakshi Raman ; * Word Power made Easy – Norman Lewis ; * Objective English - Pearson's Publications ; * Skill Sutras- Jayashree Mohanraj * The Power of Soft Skills – Robert A. Johnson ; * Soft Skills for Everyone – Jeff Butterfield

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

Code: 8AC95

L	T	P/D	C
0	0	2	1

Understand the fundamentals of electrical engineering and DC machines.
Understand the principles of AC circuits.
Understand the principle and operation of three phase induction motor and measuring instruments.
Understand the principle and operation of diode.
Understand the principle and operation of transistor.
Understand the principles of digital electronics

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3										2		
CO2		2	3										2		
CO3		2	3										2		
CO4		2	3										2		
CO5		2	3										2		
CO6		2	3										2		

Electrical Experiments

1. Brake test on 3-phase induction motor (performancecharacteristics).
2. Speed control of DC shunt motorby
   a) ArmatureVoltageControl .
   b) Fieldfluxcontrolmethod.
3. Brake test on DC shuntmotor.
4. Swinburne's test on DC shuntmachine.
5. OCC characteristics of DC shunt generator.
6. Verification of superposition and ReciprocityTheorems.

Electronics Experiments

1. V-I Characteristics of PN –junctiondiode.
2. V-I Characteristics of Zener –junctiondiode.
3. Half wave and full waverectifier.
4. V-I Characteristics of Bipolar junctionTransistor.
5. V-I Characteristics of MOSFET.
6. Verification of logicgates

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
MANUFACTURING PROCESSES LAB

Code: 8B465

L	T	P/D	C
0	0	2	1

Course Objective:

Understand the entire procedure for preparing a component through the sand casting route
Perform sand testing to produce defect free product
Understand the procedure for doing arc, gas, and resistance welding processes.
Understand the procedure for press working operations
Understand the plastic processing techniques.

COURSE OUTCOMES:

After studying this course, the students will be able to:

1. Make a pattern preparation of sand mould and cast the part
2. Perform welding operation under different conditions and test the quality of the weld
3. Make use of plasma technique for accurately cutting metals and also perform brazing operation
4. Identify the various press working operations and various parts of hydraulic press and perform operations
5. Choose the appropriate plastic moulding method to manufacture a plastic product

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			1				2				3	1	
CO2	3	3			1				2				3	1	
CO3	3	3			1				2				3	1	
CO4	3	3			1				2				3	1	
CO5	3	3			1				2				3	1	

I. Metal Casting Lab:

1. Pattern Design and making – 1 Exercise (CO-1)

2 .Core Making-1 Exercise (CO-1)

3. Sand properties testing - -for strengths, and permeability – 2 Exercises (CO-1)

4. Melting and Pouring - 1 Exercise (CO-1)

II Welding Lab:

1. Arc welding (AC & DC)- To study the effect of polarity on weld strength and heat effected zone in Arc welding.2 Exercises (CO-2)

2. Spot Welding - 1 Exercise (CO-2)

3. TIG & MG Welding - 2 Exercises (CO-2)

4. Plasma Cutting and Brazing - 2 Exercises (CO-3)

III Mechanical Press Working: (CO-4)

1. Study of simple, compound and progressive press tool.
2. Blanking & Piercing operation- 1 Exercise

3. Bending and other operations-1 Exercise

IV Processing Of Plastics: (CO-5)

1. Injection Moulding

2. Blow Moulding

V Demonstration of Electrical Discharge Machine & Submerged Arc Welding

Syllabus for B. Tech. II Year II semester

Mechanical Engineering

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Code:8B466

L	T	P/D	C
0	0	2	1

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

After studying this course, the students will be able to:

1. compute the performance of pelton wheel under working conditions
2. compute the performance of francis turbine under working conditions
3. compute performance of reciprocating pump under working conditions
4. compute the Performance of centrifugal pump under working conditions
5. compute the Performance of multistage pump under working conditions
6. compute the coefficient of discharge of venturimeter of orifice meter under working conditions

Mapping of Course Outcomes with Program Outcomes:

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3			1							3		
CO2	2		3			1							3		
CO3	2		3			1							3		
CO4	2		3			1							3		
CO5	2		3			1							3		
CO6	2		3			1							3		

List of Experiments:

Verification of Bernoulli's Theorem

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Calibration of Rotameter
4. Calibration of Flow Nozzle
5. Determination of friction factor for a given pipe line
6. Determination of minor losses in a pipeline.
7. Determination of Co-efficient of discharge for mouth piece (cd)
8. Performance Test on Single Stage Centrifugal Pump
9. Performance Test on Multi Stage Centrifugal Pump.
10. Performance Test on Reciprocating Pump.
11. Impact of jets on Vanes
12. Performance Test on Pelton Wheel.
13. Performance Test on Francis Turbine.
14. Performance Test on Kaplan Turbine

Syllabus for B. Tech. II Year II semester
Mechanical Engineering

COMPREHENSIVE TEST AND VIVA-VOCE-IV

Code : 8B494

L	T	P/D	C
1	0	0	1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :

1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowlegde to face interviews.
3. Exhibit life long Learning skills for higher education and to persue Professional practice.

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3									2		2			2
CO2	3									2		2			2
CO3	3									2		2			2

Comprehensive Test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, IIII, IV and V semester
B.Tech III year II semester	I, II, IIII, IV, V and VI semester
B.Tech IV year I semester	I, II, IIII, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test : 70 marks

**Viva Voce : 30 marks

Total : 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.
Total marks for Comprehensive Test will be 70.

**Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.
End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.
The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
TECHNICAL SEMINAR --IV

Code : 8B488

L	T	P/D	C
0	0	2	1

Course objective

Develop an ability to understand and present the latest technological developments in computer science. Identify one of them, understand its impact on the event/method/society as a whole and present the seminar on the same which enhances oratory and interview facing skills.

Course Outcome :

1 Deliver lecture on emerging technologies.
2 Explain domain knowledge to resolve real time technical issues
3 Demonstrate ability to lead and explain concepts and innovative ideas.
4 Demonstrate team leading qualities.
5 Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice.
6 Exchange new information that would not have been available otherwise.
7 Develop debating and interview skills.

	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3											2			3
CO2	3											2			3
CO3	3											2			3
CO4	3											2			3
CO5	3											2			3
CO6	3											2			3

Technical Seminar evaluation

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05

4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9th week	15
9	End Semester Viva	30
	Total	**100 Marks**

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.