KSRM COLLEGE OF ENGINEERING

(Approved by AICTE and Accredited by NBA, New Delhi &Accredited by NAAC

Affiliated to JNTUA, Anantapuramu, an ISO 9001:2000 Certified Institution)

KADAPA-516003 (A.P)

CURRICULUM FOR MECHANICAL ENGINEERING STREAM

First Year (Common to all branches)

S. No	Subject code	Subject	Subject Category	L	T	P	IM	EM	CR
1.	14211001	Mathematics- I	BS	3	1	0	30	70	5
2.	14211002	Mathematics- II	BS	3	1	0	30	70	5
3	14221003	Engineering Physics	BS	2	0	0	30	70	3
4	14231004	Engineering Chemistry	BS	2	0	0	30	70	3
5	14241005	English	HU	2	0	0	30	70	3
6	14031006	Engineering Drawing	PJ	1	0	3	30	70	5
7	14051007	Problem solving & Programming in C	PN	3	0	0	30	70	5
8	14991008	Engineering Workshop	PJ	0	0	3	50	50	4
9	14051009	Programming in C lab	PN	0	0	3	50	50	4
10	14991010	Engineering sciences Lab	BS	0	0	3	50	50	4
11	14241011	English Language and Communication skills Lab	HU	0	0	3	50	50	4
		Total		16	2	15	410	690	45

Second Year-First semester

S. No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14112101	Engineering Mechanics	PN	3	1	0	30	70	3
2.	14112102	Mechanics of Solids	PN	3	1	0	30	70	3
3	14992103	Electrical Engineering & Electronics Engineering	PN	3	1	0	30	70	3
4	14032104	Material Science and Engineering	PJ	3	1	0	30	70	3
5	14032105	Thermodynamics	PJ	3	1	0	30	70	3
6	14032106	Machine Drawing	PJ	1	0	4	30	70	3
7	14992107	Material Science Lab & Mechanics of Solids Lab	PJ	0	0	3	50	50	2
8	14992108	Electrical & Electronics Engineering Lab	PN	0	0	3	50	50	2
9	14252109	Human Values and Professional Ethics (Audit Course)	HU	2	0	0	30		0
		Total		18	5	10	280	520	22

Second Year-Second semester

S. No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14212201	Probability and Statistics	BS	3	1	0	30	70	3
2.	14012202	Environmental Studies	HU	3	1	0	30	70	3
3	14112203	Mechanics of Fluids	PN	3	1	0	30	70	3
4	14032204	Kinematics of Machinery	PJ	3	1	0	30	70	3
5	14032205	Thermal Engineering – I	PJ	3	1	0	30	70	3
6	14032206	Manufacturing Technology	PJ	3	1	0	30	70	3
7	14112207	Fluid Mechanics and Hydraulic Machines Lab	PN	0	0	3	50	50	2
8	14032208	Manufacturing Technology Lab	PJ	0	0	3	50	50	2
		Total		18	06	06	280	520	22

Third Year-First semester

S.No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14033101	Industrial Management	HU	3	1	0	30	70	3
2.	14033102	Thermal Engineering II	PJ	3	1	0	30	70	3
3	14033103	Dynamics of Machinery- I	PJ	3	1	0	30	70	3
4	14033104	Machine tools	PJ	3	1	0	30	70	3
5	14033105	Design of Machine Elements-I	PJ	3	1	0	30	70	3
6	14033106	Heat Transfer	PJ	3	1	0	30	70	3
7	14243107	Advanced English Communication Skills Lab	HU	0	0	3	50	50	2
8	14033108	Thermal Engineering Lab	PJ	0	0	3	50	50	2
		Total		18	06	06	280	520	22

Third Year-Second semester

S.No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14253201	Managerial Economics and Financial Analysis	HU	3	1	0	30	70	3
2.	14033202	Operations Research	PJ	3	1	0	30	70	3
3	14033203	Dynamics of Machinery-II	PJ	3	1	0	30	70	3
4	14033204	Refrigeration and Air-Conditioning	PJ	3	1	0	30	70	3
5	14033205	Design of Machine Elements-II	PJ	3	1	0	30	70	3
6 Elective 1	14033206	Automobile Engineering	PJ	3	1	0	30	70	3
	14033207	IC Engines							
	14033208	Entrepreneurship							
7	14033209	Metrology & MachineTools Lab	PJ	0	0	3	50	50	2
8	14033210	Heat Transfer and Dynamics Lab	PJ	0	0	3	50	50	2
		Total		21	07	06	280	520	22

Fourth Year-First semester

S.No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14034101	CAD/CAM	PJ	3	1	0	30	70	3
2.	14034102	Metrology	PJ	3	1	0	30	70	3
3	14034103	Finite Element Methods	PJ	3	1	0	30	70	3
4	14034104	Instrumentation and Control Systems	PJ	3	1	0	30	70	3
5 Elective II	14034105	Production & Operations Management	PJ	3	1	0	30	70	3
	14034106	Computational Fluid Dynamics							
	14034107	Mechatronics							
6 Elective III	14034108	Modern Manufacturing Methods	PJ	3	1	0	30	70	3
	14034109	Tool Design							
	14034110	Power Plant Engineering							
7	14034111	Instrumentation and Control Systems Lab	PJ	0	0	3	50	50	2
8	14034112	CAD/CAM Lab	PJ	0	0	3	50	50	2
		Total		18	06	06	280	520	22

Fourth Year –Second Semester

S.No	Subject code	Subject	Subject Category	L	T	P	IM	EM	Credits
1.	14034201	Automation & Robotics	PJ	3	1	0	30	70	3
2.	14034202	Renewable energy sources	PJ	3	1	0	30	70	3
3	14034203	Gas Turbines and Jet Propulsion	PJ	3	1	0	30	70	3
4 Elective IV	14034204	Geometric Modeling	PJ	3	1	0	30	70	3
	14034205	Composite Materials							
	14034206	Professional Ethics & Intellectual Property Rights							
5	14034207	Seminar	PJ				100		3
6	14034208	Project Work	PJ				50	50	10
		Total		12	04	00	270	330	25

Term-wise Summary of Marks and Credits

Term	IM	EM	CR
First Year	410	690	45
Second Year-First semester	280	520	22
Second Year-Second semester	280	520	22
Third Year-First semester	280	520	22
Third Year-Second semester	280	520	22
Fourth Year-First semester	280	520	22
Fourth Year –Second Semester	270	330	25
	2080	3620	
Total	5700		180

Composition of Curriculum

Subject Category	TS	TC	%C
Basic Sciences	6	23	12.8
Humanities and Social Sciences	6	19	10.6
Basic Engineering and Design	5	21	11.7
Professional Major	41	111	61.7
Professional Minor	4	6	3.3
Total	62	180	100.0

Legend:TS-Total Subjects(including Audit Subjects);TC-Total Credits;
%C-Percentage Credits

Electives-Mechanical Engineering

S.No	Subject code	Subject	Subject Category	L	T	P	IM	EM
1	14033206	Automobile Engineering	PJ	3	1	0	30	70
2	14033207	IC Engines	PJ	3	1	0	30	70
3	14033208	Entrepreneurship	PJ	3	1	0	30	70
4	14034105	Production & Operations Management	PJ	3	1	0	30	70
5	14034106	Computational Fluid Dynamics	PJ	3	1	0	30	70
6	14034107	Mechatronics	PJ	3	1	0	30	70
7	14034108	Modern Manufacturing Methods	PJ	3	1	0	30	70
8	14034109	Tool Design	PJ	3	1	0	30	70
9	14034110	Power Plant Engineering						
10	14034204	Geometric Modeling	PJ	3	1	0	30	70
11	14034205	Composite Materials	PJ	3	1	0	30	70
12	14034206	Professional Ethics &Intellectual Property Rights	PJ	3	1	0	30	70

II B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14112101) ENGINEERING MECHANICS

COURSE OBJECTIVE:

To develop the ability, in the engineering student, to understand, formulate, and solve a given problem in a logical manner and to apply it to solve a few basic problems in engineering mechanics. like Static equilibrium of particles and rigid bodies, Analysis of trusses and friction, Properties of surfaces and volumes, Dynamic equilibrium of particles, Dynamic equilibrium of rigid bodies.

UNIT I

BASIC CONCEPTS - System of forces– Moment of forces and its Application– Couples and Resultant of Force System

EQUILIBRIUM OF SYSTEM OF FORCES: Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT II

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, Tension Coefficient method and methods of sections for vertical loads, horizontal loads and inclined loads.

FRICTION: Types of friction– laws of Friction–Limiting friction–Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Centre of Gravity of Composite figures.(Simple problems only).

UNIT IV

AREA MOMENT OF INERTIA - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses.(Simple problems only)

UNIT V

DYNAMICS : Analysis as particles and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work – Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

TEXT BOOKS:

1. Engineering Mechanics, Shames & Rao – Pearson Education.
2. Engineering Mechanics, Fedrinand L.Singer – B.S. Publishers.
3. Engineering Mechanics, Bhavikatti and Rajasekharappa

REFERENCES:

1. Engineering Mechanics-Statics and dynamics, A.Nelson, Tata McGraw-Hill Company
2. Mechanics of Materials by Timoshenko & Gere, CBS
3. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
4. Mechanics of Materials - Dr. B. C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publication
5. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

II B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14112102) MECHANICS OF SOLIDS

COURSE OBJECTIVE:

The objective of the subject is to learn the fundamentals concepts of stress, strain and deformation of solids with applications to bars and beams. The students shall understand the theory of elasticity including strain/displacement and hooks law relationship. To accesses stresses and deformation through the mathematical models of beams for bending and bars for twisting or combination of both. The knowledge of this subject will help in the design & theory of machines courses

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses &strains– Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic modulli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis –Determination bending stresses –section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES : Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

TORSION OF CIRCULAR SHAFTS- Theory of pure torsion- Derivation of torsion equations; $T/J=q/r=N\theta/l$ – Assumptions made in the theory of pure torsion- torsional moment of resistance- polar section modulus.

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – V

THIN CYLINDERS : Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains –changes in diameter, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

Thick cylinders–lame's equation – cylinders subjected to inside & outside pressures –compound cylinders.

TEXT BOOKS :

1. Strength of materials by R.K Bansal, Lakshmi publishers, 5th edition 2012
1. Strength of materials by Bhavikatti, Lakshmi publications.
2. Solid Mechanics, by Popov

REFERENCES :

1. Strength of Materials -By Ramamrutham, Dhanpat rai Publications.
2. Strength of Materials- By R.K. RAJAPUT, S.Chand and company,5th edition 2012
3. Strength of Materials by Dr. sadhu singh, Khanna publishers, 10th edition 2013
4. Strength of Materials by S.Timshenko
5. Strength of Materials by S.S Rattan, McGraw-Hill companies, 2nd 2011

II B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14992103) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING

PART-A-ELECTRICAL ENGINEERING

COURSE OBJECTIVE:

To provide comprehensive idea about circuit analysis, working and to understand the basic concepts of magnetic circuits and AC & DC circuits.

To understand working principle, construction, applications of DC & AC machines and measuring instruments.

To gain knowledge about the fundamentals of wiring and earthing principles of machines and common measuring instruments.

PART – A -Electrical Engineering

UNIT – I

Electrical Circuits: Basic definitions, Types of elements, Ohm' Law, Resistive Networks, Kirchhoff's Laws., Inductive networks, capacitive networks, Series, Parallel Circuits and Star – delta and delta – star transformations

UNIT – II

DC Machines: Construction, Principle of operation of DC Generator – emf equation – types – DC motor types – torque equation – losses and efficiency, testing of D.C. Motors: Swinburne's test. Three point starter.

Transformers: Construction, Principle of operation of single phase transformers – emf equation – losses, efficiency and regulation.

UNIT III

AC MACHINES: Construction, Principle of operation of alternators – regulation by synchronous impedance method – Construction and Principle of operation of induction motor – slip – torque characteristics – applications.

Text Books:

1. Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan, 5th Edition, SCITECH Publications, 2007.
2. Fundamentals of Electrical Engineering and Technology by William D Stanley, John R. Hackworth, Richard L Jones, Thomson Learning
3. Principles of Electrical and Electronics Engineering by V.K. Mehta, S. Chand & Co.

References:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kotari and Nagarath, TMH Publications, 2nd Edition.

PART-B
ELECTRONICS ENGINEERING

COURSE OBJECTIVE:
To provide comprehensive idea about working principle, operation and characteristics of electronic devices, transducers, digital electronics and communication systems
To gain knowledge about the Fundamentals of electronic components, devices, transducers, principles of digital electronics and principles of various communication systems

UNIT-IV
DIODE AND ITS CHARACTERISTICS:
PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers (Simple Problems)
TRANSISTORS
PNP and NPN Junction Transistor, Transistor as an Amplifier, Single Stage CE Amplifier, Frequency Response of CE Amplifier, Concepts of Feedback Amplifier, Necessary conditions for Oscillators, SCR Characteristics and Applications

UNIT-V
ELECTONIC INSTRUMENTATION: Electronic multi meter and digital voltmeter, integrating volt meter, Successive approximation DVM, Principles of CRT (Cathode Ray Tube), Deflection Sensitivity, Electrostatic and Magnetic Deflection, Applications of CRO-Voltage, Current and Frequency Measurements.
Text books:
1. Electronic devices and circuits – R.L.Boylestad and Louis Nashelsky, 9th Edition, 2006, PEI/PHI.Industrial Electronics by G.K.Mittal-PHI.
2. Modern Electronic Instrumentation and Measurement Techniques-Albert D.Helfrick, WillamD.Cooper.

Reference Books:
1. Millman's Electronic Devices and Circuits-J.Millman and C.C.Halkias, Satyabratajit, 2nd Edition, 1998, TMH.
2. Electronic Devices and Circuits-K.Lal Kishore, 2nd Edition, 2005, BSP.

Question Paper Pattern: 5 questions to be answered out of 8 questions Each question should not have more than 3 bits.

II B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14032104) MATERIAL SCIENCE AND ENGINEERING

COURSE OBJECTIVE:

To gain and understanding of the relationship between the structure, properties, processing, testing, heat treatment and applications of metallic , non-metallic, ceramic and composite materials so as to identify and select suitable materials for various engineering applications.

UNIT I

STRUCTURE OF METALS: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

CONSTITUTION OF ALLOYS: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT II

EQUILIBRIUM OF DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coringmiscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe3C

UNIT III

CAST IRONS AND STEELS: Structure and properties of White Cast iron, Malleable Cast iron, greycast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

NON-FERROUS METALS AND ALLOYS: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT IV

HEAT TREATMENT OF ALLOYS: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface – hardening methods, Age hardening treatment, Cryogenic treatment of alloys. Heat treatment of plastics

UNIT V

CERAMIC MATERIALS: Crystalline ceramics, glasses, cermets.

COMPOSITE MATERIALS: Classification of composites, various methods of component

Manufacture of composites, particle – reinforced materials, fiber reinforced materials, polymer composites, metal ceramic mixtures, metal – matrix composites and Carbon – Carbon composites.

Text Books:

1. Introduction to Physical Metallurgy, Sidney H. Avner, US, 2nd Edition, 2007 Tata McGraw-Hill, Noida, 1985.
2. Essential of Materials Science and Engineering, Donald R.Askeland, USA, 3rd Edition,Cengage Publisher,2013.
3. Material science, V. Raghavan, PHI ,5th edition

Reference Books:

1. Material Science and Metallurgy, U.C. Jindal, Pearson educations, 2011,
2. Elements of Materials Science and Engineering, Lawrance H. Van Vlack, Pearson educations, 6th Edition,2002.
3. Material Science and Metallurgy, kodgire V.D, 12th Edition, Everest Publishing House, 2002.
4. Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford University Press, 1994, 2nd Edition 2013
5. Mechanics of Composite Materials, R. M. Jones, McGraw Hill Company, New York, 1975.
6. Science of Engineering Materials, Agarwal, TMH.
7. Materials Science and Engineering, William D. Callister, 8th Edition,2010
8. Elements of Material science, V. Rahghavan, PHI, 5th Edition
9. Engineering Materials and Their Applications – R. A Flinn and P K Trojan, Jaico Books
10. Engineering materials and metallurgy, R.K.Rajput, S.Chand, 1st Editon,2008

II B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14032105) THERMODYNAMICS

COURSE OBJECTIVE:

This course provides the basic knowledge about thermodynamic laws and relations, and their application to various processes. Understand the thermodynamic laws and their applications, Know the concept of entropy and availability, Know about the properties of steam and the use of steam tables and Mollier chart and Know about thermodynamic relations

UNIT I

BASIC CONCEPTS: Macroscopic and Microscopic Approaches, Thermodynamic System, State, Property, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium, Quasi-static Process, Zeroth Law of Thermodynamics,

WORK & HEAT TRANSFER: Work transfer, types of work transfers, Point and Path Functions, Heat transfer, Comparison of Work and Heat transfers.

UNIT II

FIRST LAW OF THERMODYNAMICS: First Law applied to a process and a cycle, Energy - aproperty, Forms and transformation of Energy, Internal Energy and Enthalpy, PMM I.

FLOW SYSTEMS: Control Volume, Steady Flow Process, Mass balance and Energy Balance, Applications of Steady Flow Processes.

UNIT III

Second Law of Thermodynamics: Heat Engine, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, Carnot cycle and Carnot's Theorem, Thermodynamic Temperature Scale, Efficiency of Heat Engine, PMM II Entropy: Clausius' Theorem, Entropy as a property, T-s Plot, Clausius Inequality, Principle of Entropy Increase and its applications. Available Energy, Quality of Energy, definitions of Dead state, Availability

UNIT IV

Pure Substances: P-v, P-T, T-s diagrams of Pure Substances, Mollier Diagram, Dryness Fraction, Use of Steam Tables for Thermodynamic Properties Thermodynamic Relations: Maxwell's equations, TDS equations, Joule-Kelvin Effect, Clausiusclapeyron equation.

UNIT V

Properties of Gases and Gas Mixtures: Ideal Gas, Equation of State, Avogadro's Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton's Law of Partial Pressure, Specific Heats, Internal Energy and Enthalpy of Gas Mixtures Gas Power Cycles: Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles, Second Law Analysis of Gas Power Cycles

Text Books:

1. Engineering Thermodynamics, P.K Nag, TMH Publishers, New Delhi, 5th Edition, 2013.

Reference Books:

1. Engineering Thermodynamics by P. Chattopadhyam, Oxford, 1st Revised, 2011.
2. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons (ASIA) Pte Ltd, 7th Edition, 2009.
3. Thermodynamics – An Engineering Approach – YunusCengel& Boles, TMH,7th Edition 2011.
4. Thermodynamics – J.P.Holman, McGrawHill, 2nd Edition company New York 1975.
5. An introduction to Thermodynamics, YVC Rao, Universities press, 2009 Revised Edition,
6. Engineering Thermodynamics – J.B. Jones & R.E.Dugan, PHI ,1st Edition, 2009.
7. Thermodynamics an engineering approach, Yunus Cengal and Boles,TMH,7 th edition

II B.Tech. - I Sem

L	T	P	C
1	0	4	3

(14032106) MACHINE DRAWING

COURSE OBJECTIVE:

To enable the students to prepare a detailed assembly drawing for given machine Components. Understand Indian standards for machine drawing. Prepare assembly drawing of joints, couplings and machine elements.

I. Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

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

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details – common abbreviations & their liberal usage

e) Types of Drawings – working drawings for machine parts.

II. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportion

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cottered joints and knuckle joint.

c) Riveted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

III. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions

a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.

b) Other machine parts – Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves: spring loaded safety valve, feed check valve and air cock.

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

Text Books:

1. Machine Drawing- K.L. Narayana, P.Kannaiah & K.Venkata Reddy, New Age Publishers, 4th Edition, 2012

2. Machine Drawing- Dhawan, S.Chand Publications, 1st Revised Edition, 1998.

Reference Books:

1. Machine Drawing- P.S. Gill, S.K. Kataria & Sons, 17th Edition, 2012
2. Machine Drawing- Luzzader, PHI Publishers, 11th Edition.
3. Machine Drawing – Rajput, S. Chand Pub.
4. Textbook of Machine Drawing-K.C.John, 2009, PHI learning, 1st Edition.

Note: The End exam will be for 4 hrs in the following format.

All questions are to be answered
Q1 – Questions set on section I & II of the syllabus 2 out of 3 or 2 out of 4 to be answered with a weightage of 4 marks each – 08 marks
Q2– Questions set on Section II of the syllabus 2 out of 3 to be answered with a weightage of 10 marks each – 20 marks
Q3 – Drawing of assembled views of Section III items of Syllabus with a weightage of 42 marks
Note: All answers should be on the drawing sheet only. Answers on the drawing sheet only will valued

Suggestions:

Student should buy a book mentioned under Text books and study all the exercises given at the end of each chapter to equip him/her with the required ammunition.
Student should visit an automobile shop while the unit is being disassembled / assembled.
Student should go through the exercises given under assembly drawings refereeing to various books in the library to improve his assimilation capacity.

II B.Tech. - I Sem

L	T	P	C
0	0	3	2

(14992107) MATERIAL SCIENCE LAB AND MECHANICS OF SOLIDS LAB

(A) MATERIAL SCIENCE LAB:

Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
Preparation and study of the Microstructure of Mild steels, low carbon steels, high C steels.
Study of the Micro Structures of Cast Irons
Study of the Micro Structures of Non-Ferrous alloys.
Study of the Micro structures of Heat treated steels.
Hardeneability of steels by Jominy End Quench Test
To find out the hardness of various treated and untreated steels.

(B) MECHNICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on
a) Simply supported beam
b) Cantilever beam
3. Torsion test
4. Hardness test
5. Brinells hardness test
6. Rockwell hardness test
7. Test on springs
8. Compression test on cube
9. Impact test
10. Punch shear test

NOTE:
Minimum of 4 from (A) and 6 from (B) experiments need to be performed

II B.Tech. - I Sem

L	T	P	C
0	0	3	2

(14992108) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING LAB

(Common for CE & ME)

Part – A: Electrical Lab

1. Verification of KCL and KVL.
2. Swinburne's test on DC shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator)
3. Load Test on 1- ø Transformer (Determination of efficiency and regulation at given power factor)
4. Brake test on 3-Phase Induction motor (Determination of performance characteristics)
5. Speed control of D.C Shunt Motor by
   a) Armature voltage control
   b) Field flux control method
6. Brake test on D.C shunt motor.

Part – B Electronics Lab

1. Study of CRO (Measurement of voltage, frequency and phase of periodic signals)
2. V-I Characteristics of PN junction Diode.
3. Full Wave Rectifier with and without capacitive filter.
4. Input and output characteristics of Common Emitter (CE) configuration.
5. Frequency response of a single stage CE amplifier.
6. Sinusoidal signal generation using RC phase shift oscillator circuit.

(14252109) HUMAN VALUES & PROFESSIONAL ETHICS

(COMMON TO ALL BRANCHES)

Course Objective:

- This course deals with professional ethics which includes moral issues and virtues, social responsibilities of an engineer right qualities of moral Leadership

UNIT - I : ENGINEERING ETHICS

Senses of Engineering Ethics – Variety of Moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues

UNIT – II: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation – Engineers as Responsible Experimenters – Research Ethics – Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study

UNIT – III : ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case and Bhopal Case studies.

UNIT – IV : RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property (IPR) – Discrimination.

UNIT – V : GLOBAL ISSUES

Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics – Role in Technological Development – Weapons Development – Engineers as Managers – Consulting

Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Leadership – Sample Code of conduct.

TEXT BOOKS :

1. Mike martin and Roland Schinzinger. " Ethics in Engineering '', McGrow Hill, New York 2005
2. Charles E Harris. Michael S Pritchard and Michael J Rabins. " Engineering Ethics – Concepts and Cases ", Thompson Learning 2000.

REFERENCE BOOKS :

1. Charles D Fleddermann, " Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Baatright. "Ethics and the Conduct of Business", Pearson Education 2003.
3. Edmund G Seeabauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University press 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, " Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, " Computers, Ethics and Society", Oxford University Press, 2003.

II B.Tech. -II Sem

L	T	P	C
3	1	0	3

(14212201) PROBABILITY AND STATISTICS

(For ME and CSE branches only)

COURSE OBJECTIVE:

The objectives of this course are:
To revise elementary concepts and techniques encountered in M1S
To extend and formalize knowledge of the theory of probability and random variables
To introduce new techniques for carrying out probability calculations and identifying probability distributions
To motivate the use of statistical inference in practical data analysis
To study elementary concepts and techniques in statistical methodology
To provide a introduction to subsequent statistics courses

Unit I: Random variables - Discrete random variables - Continuous random variables – Probability distribution function – Discrete and continuous probability distribution – Mathematical Expectation, Variance and standard deviation of probability distribution. Binomial , Poisson and Geometric distributions - Related properties.

Unit II: Continuous distributions: Uniform – Exponential- Gamma – Normal – Log normal- Weibull distributions and related properties.

Unit III: Test of Hypothesis - Population and sample - Confidence interval of mean from normal distribution- Statistical hypothesis - null and alternative hypothesis – level of significance. Test of significance - Tests based on normal distribution –z -test for means and proportions. Small samples - t-test for one sample, two sample problem and paired t-test - F-test - Chi-square test (testing of goodness of fit and independence).

Unit IV: Correlation and regression – Correlation – Co-efficient of correlation – lines of Regression- Relation between correlation and Regression co-efficients- rank correlation – Fitting

of a straight line using the method of least squares - Multiple linear regression and its applications.

Unit V: Statistical quality control: Concept of quality of a manufactured product - defect and defectives - Causes of variation - Random and assignable causes -The principle of Shewhart control chart – Charts for attributes and variable quality characteristics - Construction and operation of p-chart, c-chart, X-bar chart and R-chart.

Text Books

1. Higher Engineering Mathematics, Dr. B.SGrewal, Khanna Publishers-42 edition.

2. Walpole and Myrs, Probability & Statistics for Engineers & Scientists, Seventh edition, Pearson Education Asia, 2002,
3. Johnson, Probability & Statistics for Engineers, Fifth edition, Prentice Hall of India.

Reference Books:

1. Probability & Statistics by E. Rukmangadachari& E. Keshava Reddy Pearson Publisher
2. Statistical Methods by S.P Guptha, S Chand Publications.

II B.Tech. - II Sem

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(14012202) ENVIRONMENTAL STUDIES

COURSE OBJECTIVE:

Develop an understanding of ecological, chemical, waste management, energy resource, environmental media (air, water, soil) and health and safety concepts.

Develop an understanding of land-based renewable resources including forests, rangeland, farmland, outdoor recreation, and wildlife.

Develop an understanding of on-site versus off-site environmental impacts and the use of risk assessment as an indicator of environmental impacts.

Understand the organizational structure of activities including adequate planning, developing schedules and budgets, integrating quality assurance and health and safety.

Unit I

Multidisciplinary nature of environmental studies: Definition, scope and importance – Need for public awareness

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems; (a) Forest resources – Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forest and tribal people; (b) Water resources – Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems; (c) Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, case studies; (d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies; (e) Energy resources –Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies; (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles

Unit II

Ecosystems: Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystems (a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit III

Biodiversity and its conservation: Introduction – Definition : genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and

local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity

Unit IV

Environmental Pollution: Definition – Cause, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g). Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution – Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides

Unit V

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns; • Environmental ethics : Issues and possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies; Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness

Human Population and the Environment: Population growth, variation among nations – Population explosion – Family Welfare Programme; Environment and human health; Human Rights; Value Education; HIV/AIDS; Women and Child Welfare; Role of Information Technology in Environment and human health, case studies; Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural; Study of common plants, insects, birds; Study of simple ecosystems-pond, river, hill slopes, etc.

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by R.Rajagopalan, Oxford University Press.
3. Environmental Studies by Benny Joseph,Mc.graHill Publications.

REFERENCES :

1. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
5. Environmental Studies by Anindita Basak – Pearson Education.

II B.Tech. - II Sem

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(14112203) MECHANICS OF FLUIDS

COURSE OBJECTIVE:

In essence, this course introduces the fundamental of fluid mechanics & Hydraulic machinery for engineers. The emphasis is on basis of fluid statics and fluid motion with application in a variety of engineering fields. This subject will introduce to study the various fluid properties and their significance in engineering problems and basic concepts of fluid flow, both kinematics and dynamics including the derivation of equation needed for the analysis of fluid flow problems. Students shall become familiar on different types of hydraulic turbines and their performances, efficiencies, velocity diagrams & Derivation of the equations , solving the problems associated with centrifugal and reciprocating pumps and their fundamentals.

UNIT I

FLUID STATICS: Dimensions and units, physical properties of fluids –mass density, specific weight, specific gravity, viscosity, surface tension, vapor pressure, compressibility, elasticity and their influence on fluid motion – atmospheric, gauge and vacuum pressure, measurement of pressure – piezometer, U-tube and differential manometers – hydro static forces on plane and curved surfaces.

UNIT II

FLUID KINEMATICS: Introduction – velocity and acceleration - Stream line, path line and streak line - stream tube - classification of flows – equation of continuity for one dimensional flow and three dimensional flow – circulation and vorticity – velocity potential and stream function –flow net.

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.

UNIT III

PIPE FLOW: Reynold's experiment – types of flow - Darcy Weisbach equation – Hagen Poiseuille equation Minor losses in pipes – pipes in series and pipes in parallel – total energy line hydraulic gradient line

MEASUREMENT OF FLOW: Velocity measurement - Pitot tube, venturi meter, and orifice meter, Flow nozzle, Turbine flow meter – flow through orifices and mouth pieces – notches and weirs

UNIT IV

Boundary Layer Theory: Boundary gap layer – definition – growth over a flat plate – boundary layer thickness – nominal, displacement, momentum and energy thickness – laminar sub layer –

Momentum integral equation of boundary layer - separation of boundary layer- methods of controlling the boundary layer

UNIT V

FORCES ON SUBMERGED BODIES: Introduction – types of drag – drag on a sphere – drag on a cylinder – drag on flat plate – drag on airfoil – effect of compressibility on drag – development of lift on circular cylinder – Magnus effect – lift on an airfoil.

Text Books:

1. Hydraulics, fluid mechanics including hydraulic machines by Modi and Seth, Standard Publishers, 19th Edition,2013
2. Fluid Mechanics and Fluid Power Engineering by D. S. Kumar, Kotaria& Sons, 7th Edition, 2011

Reference Books:

1. Fluid Mechanics and hydraulic Machines by R.K. Bansal, Laxmi Publications,9th Edition,2010
2. Fluid Mechanics and Hydraulic Machines by R.K. Rajput, S.Chand,5th Edition,2013
3. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International, 1st Edition
4. Hydraulic Machines by Banga& Sharma, Khanna Publishers, 7th Edition,2007

II B.Tech. - II Sem

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(14032204) KINEMATICS OF MACHINERY

COURSE OBJECTIVE:

To understand the terms, types, and design related to mechanisms.
To understand the working principles of common mechanisms
To perform kinematic analysis on various mechanisms
To draw the cam profile
To study about types of cams and cam terminologies.
To analyze mechanism for finding its displacement, velocity, acceleration
To know kinematics of gears

UNIT – I

MECHANISMS AND MACHINES: 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. Mechanisms and machines: classification of mechanisms and machines, kinematic chain, inversion of Mechanisms: inversions of quadric cycle chain, single and double slider crank chain. Mobility of mechanisms

UNIT II

STRAIGHT LINE MOTION MECHANISMS- Exact and approximate, copiers and generated types –Peaucellier, Hart and Scott Russel – Grasshopper, Watt, Tchebicheff and Robert Mechanisms. Pantograph

STEERING MECHANISMS: Conditions for correct steering – Davis Steering gear, Ackermanns steering gear. Hooke's Joint (Universal coupling) -Single and double Hooke's joint — applications – Simple problems.

UNIT III

KINEMATICS: Velocity and Acceleration Diagrams- Velocity and acceleration – Motion of link in machine –Determination of Velocity and acceleration – Graphical method – Application of relative velocity method – Slider crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, Coriolis acceleration, and determination of Coriolis component of acceleration. Kleins construction. Analysis of slider crank mechanism for displacement, velocity and acceleration of slider using analytical method

INSTANTANEOUS CENTRE METHOD: Instantaneous centre of rotation, centrode and axode – relative motion between two bodies – Three centres in-line theorem – Locating instantaneous centres for simple mechanisms and determination of angular velocity of points and links.

UNIT IV

CAMS: Definitions of cam and follower – 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 and Drawing of cam profiles

UNIT V

GEARS: Higher pairs, friction wheels and toothed gears types, law of gearing, condition for constant velocity ratio for transmission of motion, Forms of tooth: cycloidal and involute profiles, Velocity of sliding, phenomena of interference, Methods to avoid interference, Condition for minimum number of teeth to avoid interference, Expressions for arc of contact and path of contact.

TEXT BOOKS:

1. Theory of Machines, S.S. Rattan, Tata McGraw Hill Publishers, 3rd Edition, 2013.

2. Kinematics and dynamics of machinery, R.L Norton, Tata McGraw Hill Publishers,1st Edition, 2009.

3. Theory of machines, R.S Khurmi

REFERENCE BOOKS:

1. Theory of Machines and Mechanisms, 3rd Edition, J.E. Shiegley et. al, Oxford International Student Edition.

2. Theory of Machines, Thomas Bevan, Pearson (P) 3rd Edition, 2012.

II B.Tech. - II Sem

L	T	P	C
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(14032205) THERMAL ENGINEERING – I

COURSE OBJECTIVE:

On completion of this course, the students are expected to understand the concept and working of I.C Engines, types of fuel systems, Testing and performance of different types of engines, air compressors.

UNIT I

I.C. ENGINES: Definition of Engine And Heat Engine, I.C Engine Classification – Parts of I.C.Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C.Engines SI & CI Engines, Valve and Port Timing Diagrams.

UNIT II

Fuel System: S.I. Engine: Fuel Supply Systems, carburetor types Air Filters, Mechanical and Electrical Fuel Pump – Filters– Gasoline Injection Systems.. Cooling & Lubrication Systems: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo Siphon, Water And Forced Circulation System; Lubrication Systems-Flash, Pressurized and Mist Lubrication. Ignition System: Function Of An Ignition System, Battery coil Ignition System, Magneto Coil Ignition System, Electronic Ignition System using Contact Breaker, Electronic Ignition using Contact Triggers – Spark Advance And Retard Mechanism.

UNIT III

Fuels and Combustion: S I engine :Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Type of Abnormal Combustion, Pre-Ignition and Knocking (Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives, Combustion Chambers.

C.I. Engines: Stages Of Combustion – Delay Period And Its Importance – Effect Of Engine Variables – Diesel Knock– Combustion Chambers (DI And IDI), Fuel Requirements And Fuel Rating

UNIT IV

Testing and Performance : Parameters of Performance - Measurement of Cylinder Pressure, Fuel Consumption, Air Intake, Exhaust Gas Composition, Brake Power – Determination of Frictional Losses And Indicated Power – Performance Test – Heat Balance Sheet and Chart.

UNIT V

Air Compressors: Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors, Problems Related to Reciprocating Compressors, Working principles of Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow Compressors.

Text Books:

1. Internal Combustion Engines / V. Ganesan- TMH, 4th Edition,2012

2. Thermal Engineering / Rajput / Lakshmi Publications, 9th Edition,2013

Reference Books:

1. IC Engines – Mathur& Sharma – DhanpathRai& Sons, ,2010

2. Engineering fundamentals of IC Engines – Pulkrabek, Pearson, PHI, 2nd Edition,2009

3. Thermal Engineering, Rudramoorthy – TMH, 10th Edition,2010

4. Thermodynamics & Heat Engines, B. Yadav, Central publishing house., Allahabad, 2002

5. I.C. Engines fundamentals, Heywood, McGrawHIll, 1st Edition,2011

6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand, 15th Edition,2012

II B.Tech. - II Sem

L	T	P	C
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(14032206) MANUFACTURING TECHNOLOGY

COURSE OBJECTIVE:

By this subject the students will understand how manufacturers use technology to change raw Materials into finished products. The students shall also introduce the basic concepts of casting, pattern preparation, gating system and knowledge on basic features of various welding and cutting processes. And also to study the concepts of surface treatment process, their characteristics and applications

UNIT I

CASTING: Definition, elements, Steps involved in making a casting– Types of patterns – Patterns and Pattern making — Materials used for patterns, pattern allowances and their Construction. Principles of Gating, Gating ratio and design of gating systems, Moulds: definition, mould materials, types of moulds, moulding methods, moulding machines, tests. Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys

UNIT II

SPECIAL CASTING PROCESSES: Process Mechanics, characteristics, parameters and applications of Centrifugal, Die, and Investment casting.

RISERS – Types, function and design, casting design considerations, Design of feeding systems i.e., sprue, runner, gate and riser, moulding flasks

METHODS OF MELTING: Crucible melting and cupola operation, steel making processes, Casting inspection and defects

UNIT III

A) **WELDING** : Classification of welding processes types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.

B) **CUTTING OF METALS**: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, nonferrous metals

UNIT IV

Mechanics, characteristics, process parameters, applications of Inert Gas welding, TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering &Brazing and adhesive bonding, Heat affected zones in welding; welding defects , causes and remedies ,destructive and non-destructive testing of welds

UNIT V

EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion

FORGING PROCESSES: Principles of forging – Tools and dies – Types Forging – Smith Forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

Text Books:

1. Manufacturing Technology, Vol I P.N. Rao, Tata Mc Graw Hill, 4th Edition,2013
2. Manufacturing Technology, Kalpakjain, Pearson education, 4th Edition,2002
3. Workshop Technology, Volume 1,Hajarachowdary
4. Productuction Technology,Volume I ,L.Krishna reddy

Reference Books:

1. Production Technology, K.L Narayana, I.K. International Pub, 3rd Edition,2013
2. Manufacturing Process Vol. I, H.S.Shah Pearson, 2013,
3. Principles of Metal Castings, Rosenthal, Tata McGraw Hill ,2nd Edition,2001
4. Welding Process, Parmar.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub, 1st Edition,2007
6. Workshop Technology – B.S.Raghuwanshi – Vol I.

II B.Tech. - II Sem

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(14112207) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Note: Any 10 of the above 12 experiments are to be conducted.

II B.Tech. - II Sem

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(14032208) MANUFACTURINGTECHNOLOGY LAB

1. Pattern making
2. Foundry
3. Permeability test
4. Preparation of T joint using arc welding.
5. Study of spot welding machine.
6. Weld bead geometry using arc welding.
7. Sand compression strength test.
8. Hydraulic press
9. Taper turning using lathe.
10. Knurling using lathe.
11. Threading using lathe.
12. Shaping.

Note: Any 10 of the above 12 experiments are to be conducted.

III B.Tech. - I Sem

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(14033101) INDUSTRIAL MANAGEMENT

COURCE OBJECTIVE:

To provide the basic features of Industrial Engineering like work study, material handling, production planning and control, wages and incentives etc.
In this Subject we will discuss the functions, various principles, concepts, various organizational structures. After completion of this course the students will learn
1. The technique and procedures of work study
2. To analyze to planning procedures Human effectiveness
3. To know the methods of wage payment.

UNIT I:-

Concepts of Management and Organization – Functions of Management – Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs – Systems Approach to Management.

Designing Organizational Structures: Basic concepts related to Organization, Departmentation and Decentralisation, Types of mechanistic and organic structures of organization, and their merits, demerits and suitability.

UNIT II:-

Plant location: definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach Plant Layout : definition, objectives, types of production, types of plant layout

UNIT III:-

Work study, Method study, steps involved- various types of associated charts-difference between micro-motion and memo-motion studies. Work measurement, time study, steps involved-equipment, different methods of performance rating- allowances, standard time calculation. Work Sampling, steps involved, standard time calculations, differences with time study-Applications.

UNIT IV:-

PERT & CPM : Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method - critical path calculation-crashing of simple of networks.

UNIT V:-

INSPECTION AND QUALITY CONTROL - types of inspections – Difference between inspection & quality control. Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. **TEXT BOOKS**:

1. Manufacturing Organization and Management, Amrine, 2/e, Pearson, 2004.

2. Industrial Engineering and Management, O.P. Khanna, DhanpatRai.

3. Industrial Management by Mrs M.M. KumthekarNanadkumarHukeri

4. Analysis and control of production systems and operations and production management, Rajagopal Kurnool, CBS publishers

5. Management science by Aryasri

REFERENCES:

1. Management, Stoner, Freeman, Gilbert, 6/e, Pearson Edu., 2005.

2. Production and Operations Management, PanneerSelvam, PHI, 2004.

3. Reliability Engineering & Quality Engineering, Dr.C. Nadhamuni Reddy and

Dr. K. Vijaya Kumar Reddy, Galgotia Publ. Pvt..Ltd.

4. Motion and Time Studies, Ralph M Barnes, John Wiley and Sons, 2004.

5. Operations Management, Chase, Jacobs, Aquilano, 10/e, TMH, 2003.

6. PERT/CPM, L.S. Srinath, East-West Press, 2000

III B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14033102) THERMAL ENGINEERING – II

COURSE OBJECTIVE:

To study vapor power cycles with reheat and regeneration
To study the working of Steam Generators and performance predictions
To study the performance of steam nozzles
Familiarize with various types of condensers
To study various types of steam Turbines and performance predictions

UNIT – I

Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration – reheating- combined- cycles.

UNIT II

Boilers : Classification based on Working principles & Pressures of operation -L.P & H.P.Boilers – Mountings and Accessories – Boiler horse power, equivalent evaporation, efficiency and heat balance – **Draught**: classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced draught.

UNIT – III

Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio. Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line –Shock at the exit.

UNIT – IV

Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency, De-Laval Turbine - its features. -Velocity compounding and pressure compounding, Combined velocity diagram for a velocity compounded impulse turbine. Governing of impulse turbine

Reaction Turbine: Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency. Governing of reaction turbine

UNIT V

Steam Condensers : Requirements of steam condensing plant, rare fraction – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its effects, air pump- cooling water requirement.

TEXT BOOKS:

1. Thermal Engineering, R.K. Rajput, 7/e, Lakshmi Publications, 2009
2. Basic and Applied Thermodynamics, P.K. Nag, TMH

REFERENCES:

1. Thermodynamics and Heat Engines, R.Yadav, Central Book Depot
2. Thermal Engineering, R.S Khurmi & JS Gupta, S.Chand.
3. Thermal Engineering-M.L.Mathur & Mehta, Jain bros.

III B.Tech. - I Sem

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(14033103) DYNAMICS OF MACHINERY -I

COURSE OBJECTIVE:

To study types of gear trains
To study Types of transmission units like belt, rope, chain etc…
To study brakes and dynamometers
To study concept of turning moment diagrams, flywheels and punching press
To study about of Governors

UNIT – I

GEAR TRAINS: Introduction –Types of gears – Simple, compound, reverted and Epicyclic gear trains. Train value – Methods of finding train value or velocity ratio – Tabular column method for Epicyclic gear trains. Torque in epicyclic gear trains, Differential gear of an automobile.

UNIT – II

BELT, ROPE AND CHAIN DRIVES : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, materials used for belts and ropes, 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.

CLUTCHES: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch

UNIT-III

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types, General description and methods of Operation

UNIT IV

TURNING MOMENT DIAGRAM AND FLY WHEELS: Turning moment diagrams for steam engine, I.C. Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of Fluctuation of speed – Fly wheels and their design.

UNIT V

GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs, Sensitiveness, isochronism, hunting, effort and power of a governor.

TEXT BOOKS :

1. Thoery of Machines, S.S Ratan, MGH
2. Theory of machines, Khurmi, S.Chand.

REFERENCES :

1. Mechanism and Machine Theory, JS Rao and RV Dukkipati, New Age Publ.
2. Dynamics of Machinery, Ballaney, Dhanpat Rai
3. Theory of Machines, Thomas Bevan, CBS Publishers
4. Theory of Machines, Jagadish Lal & J.M.Shah, Metropolitan

III B.Tech. - I Sem

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(14033104) MACHINE TOOLS

COURSE OBJECTIVE:

By this subject the students will understand the working principle of various machines such as Lathe, Capstan Lathe, Turret Lathe, often the products obtained by some manufacturing process. The surface will be rough while the products manufactured by foundry section, hence it requires machining process in order to get good appearance and dimension accuracy. For circular components Lathe can be used, for flat surfaces shaper, planner can be used, the various machines such as Drilling, Boring, Grinding, Milling, Lapping, Honing, Broaching & their applications

UNIT – I

Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects, chip breakers. Machining Parameters - cutting speed, feed, depth of cut, Tool materials Engine lathe: Principle of working, specification of lathe, types of lathes, work holders, tool holders, Box Tools, Taper turning, thread turning and attachments for Lathes, Turret and capstan lathes. collet chucks, other work holders, tool holding devices, box and tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes– tool layout and cam design.

UNIT – II

Shaping, Slotting and planing machines – their Principles of working – Principal parts– specification, classification, Operations performed. Kinematic scheme of the shaping, slotting and planing machines and machining time calculations.

UNIT – III

Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines– Jig Boring machine. Deep hole drilling machine. Kinematics scheme of the drilling andboring machines

UNIT – IV

Milling machine – Principles of working – specifications – classifications of millingmachines – Principal features of horizontal, vertical and universal milling machines –machining operations, Types and geometry of milling cutters– methods of indexing –Accessories to milling machines.

UNIT –V

Grinding machine –Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Grinding wheel: Different types of abrasives – bonds, specification and selection of a grinding wheel

Lapping, Honing and Broaching machines, comparison of grinding, lapping and honing Lapping, Honing and Broaching machines: Constructional features, speed and feed Units, machining time calculations

TEXT BOOKS :

1. Production Technology, R.K. Jain and S.C. Gupta.
2. Workshop Technology – Vol II, B.S. Raghuwanshi.

REFERENCES :

1. Machine Tools, C.Elanhezhian and M. Vijayan, Anuradha Agencies Publishers.
2. Manufacturing Technology, Kalpakzian, Pearson
3. Production Technology, H.M.T. (Hindustan Machine Tools).
4. Introduction to Manufacturing Technology, Date, Jaico Publ. House

III B.Tech. - I Sem

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(14033105) DESIGN OF MACHINE ELEMENTS – I

COURSE OBJECTIVE:

1. To study the basic design principles and apply the principles to the design of various elements encountered in Mechanical machines and structures.
2. To determine the strength of the components.
3. To determine the failure conditions and apply them to real life Problems.
4. To design simple joints, fasteners, levers and springs

UNIT – I

INTRODUCTION: General considerations of design, design process. Engineering Materials - properties

STRESSES IN MACHINE MEMBERS: Simple stresses – Combined stresses –Torsional and bending Stresses – impact stresses – stress -strain relation

UNIT – II

Theories of failure – Factor of safety – Design for strength and rigidity. Concept of stiffness in tension, bending, torsion and Combined cases

STRENGTH OF MACHINE ELEMENTS: Stress concentration –notch sensitivity –Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength –Goodman's line – Soderberg's line.

UNIT – III

RIVETED JOINTS: Types of riveted joints, design of riveted joints. Boiler shell riveting, eccentric loading.

BOLTED JOINTS – Forms of Screw threads, Stresses in Screw fasteners, Design of bolts with pre-stresses – Design of joints under eccentric loading

UNIT – IV

COTTERS JOINTS: Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints-

KEYS AND COUPLINGS: Design of Rigid couplings: Muff, Split muff and Flange couplings-

UNIT – V

SHAFTS: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code.

Text Books:

1. Design of Machine Elements, V.B.Bhandari , TMH Publishers, NewDelhi, 2nd edition, 2013
2. MachineDesign,Schaum‟sseries,TMHPublishers, NewDelhi, 1st edition, 2011
3. MachineDesign,R.K.Jain,KhannaPublishers,NewDelhi.
4. Machine Design by Groover – CBS Publications, 5th edition, 2012.

Reference Books:

1. MachineDesign,SadhuSingh,KhannaPublishers, NewDelhi
2. MachineDesign,R.S. Kurmi and J.K. Gupta ,S.ChandPublishers, NewDelhi
3. MechanicalEngineeringDesign,JosephE.Shigely,TMH Publishers,NewDelhi, 9th edition, 2011
4. DesignofMachineElements,M.F.Spotts, PHIPublishers, NewDelhi.
5. MachineDesign,PandyaandShah,CharotarPublishers,Anand, 17th edition, 2009
6. Machine Design, R.L. Norton, Tata McGrawHillPublishers, 2nd edition, 2002
7. Machine Design,Schaum series

NOTE: Design data books are permitted in the examinations.

III B.Tech. - I Sem

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(14033106) HEAT TRANSFER

COURSE OBJECTIVE:

This course provides the knowledge to understand the various modes of heat transfer like conduction, convection and radiation and also fins efficiency, heat exchangers.

UNIT I

Introduction: Modes and mechanisms of heat transfer – Basic laws of heat transfer – General applications of heat transfer

Conduction Heat transfer: Fourier law equation – General heat conduction equation in Cartesian, Cylindrical and spherical coordinates

One Dimensional steady state heat conduction: in Homogeneous slab, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Composite systems and Logarithmic mean area and geometrical mean area - Critical radius / thickness of insulation - with variable thermal conductivity - with internal heat sources or heat generation.

UNIT-II

One Dimensional Transient heat conduction: in Systems with negligible internal resistance - Significance of Biot and Fourier Numbers – Chart solution of transient conduction systems – problems on semi – infinite body,

UNIT – III

Radiation heat transfer: Introduction, physical mechanism, radiation properties, Concept a block body – Gray body plank's law- laws of black body radiation – irradiation - laws of Planck, wien, kirchoff, Lambert and Stefan Bolt man law - concept of shape factor- Emissivities – Heat exchange between tray bodies – radiation shields – Introduction to radiation net work analysis.

UNIT –IV

Convection heat transfer: Introduction of convective heat transfer, Concepts of Continuity, Momentum and Energy equation

Forced convention-

External flows: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlation for convective heat transfer for flow over – Flat plates, Cylinders and spheres.

Internal flows: Division of internal flow through concepts of Hydrodynamic and thermal entry lengths – use of empirical correlations for convective heat transfer in Horizontal pipe flow, annular flow.

Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relation for convective heat transfer on plates and cylinders in horizontal and vertical orientation

UNIT – V

Heat Exchangers: Introduction, classification of heat exchangers – overall heat transfer coefficient and fouling factor concepts of LMTD, Effectiveness and NTU methods

Heat transfer through extended surfaces (or) fins:

Extended surface (fins) heat transfer – Long Fin, Fin with insulated tip and short fin.

TEXT BOOKS

1. Sachdeva.R.C, "Fundamentals of Engineering Heat and Mass Transfer", New Age International, 2009.
2. Kothandaraman.C.P, "Fundamentals of Heat and Mass Transfer", New Age International, New Delhi, 2006.
3. Heat and Mass transfer, R.K. Rajput, S.Chand & Company Ltd.,

DATA BOOKS

1. Kothandaraman.C.P, Subramanyan.S, "Heat and Mass Transfer Data Book",New age International, 7th edition, 2010.
2. Khurmi.R.S, "Steam Tables", S.Chand Publishers, 2012.

REFERENCES

1. Holman.J.P, "Heat and Mass Transfer", Tata McGraw-Hill, 2008.
2. Ozisik.M.N, "Heat Transfer", McGraw-Hill Book Co., 2003.
3. Nag.P.K, "Heat Transfer", Tata McGraw-Hill, New Delhi, 2006.
4. Frank.P, Incropera and D.P, DeWitt, "Fundamentals of Heat and Mass Transfer", John Wiley and Sons, 2001.

III B.Tech. - I Sem

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(14243107) ADVANCED ENGLISH COMMUNICATION SKILLS LAB (Common to All Branches)

1. Introduction

The Advanced English Language Skills Lab introduced at the 3rd year B.Tech level is considered essential for the student for focusing on his/her career. At this stage it is imperative for the student to start preparing for the ever growing competition in the job market. In this scenario, in order to be on par with the best, he/she needs to improve his/her Communication and soft skills

This course focuses on the practical aspects of English incorporating all the four (LRSW) skills relevant to the requirements of the prospective employers in view of globalization. The proposed course will enable the students to perform the following:

- Intensive reading to improve comprehension and communication
- Attentive listening for better understanding
- Write project/research/technical reports
- Write Resume' to attract attention
- Discuss ideas / opinions for better solutions
- Face interviews confidently
- Gather information, organize ideas, and present them effectively before an audience
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, CAT, GMAT etc.

2. Objectives:

Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's proficiency in English at all levels. The lab intends t**o** train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career

3 Syllabus

The following course content is prescribed for the Advanced Communication Skills Lab:

Reading Comprehension -- Reading for facts, guessing meanings from context, speed reading, scanning, skimming for building vocabulary(synonyms and antonyms, one word substitutes, prefixes and suffixes, idioms and phrases.)

Listening Comprehension-- Listening for understanding, so as to respond relevantly and appropriately to people of different backgrounds and dialects in various personal and professional situations

Technical Report Writing—Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis

Resume' Writing—Structure, format and style, planning, defining the career objective, projecting one's strengths, and skills, creative self marketing, cover letter

Group Discussion-- Communicating views and opinions, discussing, intervening, Providing solutions on any given topic across a cross-section of individuals,(keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.

Interview Skills—Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing

Technical Presentations (Oral)— Collection of data, planning, preparation, type, style and format ,use of props, attracting audience, voice modulation, clarity, body language, asking queries.

4. Minimum Requirements

The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc

System Requirement (Hardware Component):

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor, Speed-2.8 GHz, RAM_512 MB minimum, Hard Disk-80 GB, Headphones

Prescribed Software: Walden and K-van Solutions.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Technical writing and professional communication, Huckin and Olsen Tata Mc Graw-Hil 2009.
2. Speaking about Science, A Manual for Creating Clear Presentations by Scott Morgan and Barrett Whitener, Cambridge University press, 2006
3. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.
4. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008
5. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
6. The ACE of Soft Skills by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010
7. Cambridge English for Job-Hunting by Colm Downes, Cambridge University Press, 2008

8. Resume's and Interviews by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008

9. From Campus To Corporate by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
10. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
11. Managing Soft Skills by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010
12. Business Communication by John X Wang, CRC Press, Special Indian Edition,2008

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(14033108) THERMAL ENGINEERING LAB

1. Valve / Port Timing Diagrams of an I.C. Engines cut models.
2. Cooling water flow rate for an I.C. Engine.
3. Performance Test on 2-Stroke Petrol engine
4. V T D of R.N. engine cut model.
5. Retardation test.
6. Heat Balance of an I.C. Engine.
7. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.
8. Performance Test on 7 H.P. Kirlosker engine
9. Performance Test on Reciprocating Air – Compressor Unit
10. Study of Boilers
11. Dismantling / Assembly of Engines to identify the parts and their position in an engine.
12. Heat balance test on 10 H.P Kirlosker Engine.

Note : Any 10 of the above 12 experiments are to be conducted.

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(14253201) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common to ECE, CE, ME, EEE & CSE)

OBJECTIVES:

- To equip the budding engineering student with an understanding of concepts and tools of economic analysis.
- Provide knowledge of managerial economics through differential economics concepts, accounting concepts are necessary to analyze and solve complex problems relating financial related matters in big industries.
- An understanding of professional and ethical responsibility and ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Recognition of the need for, and an ability to engage in life-long learning and to meet contemporary issues.

UNIT – I: MANAGERIAL ECONOMICS AND DEMAND ANALYSIS

Definition, Nature and Scope of Managerial Economics- relation with other disciplines Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting.

UNIT – II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Isoquants and Isocost, MRTS, least cost combination of inputs, Cobb-Douglas production function, laws of returns, internal and external economies of scale.

Cost Analysis: Cost concepts and classification. Break-Even Analysis (BEA), determination of Break Even Point – Managerial significance and limitation of BEA

UNIT – III: INTRODUCTION TO MARKET AND PRICING POLICIES

Markets Structures: Types of competition, features of perfect competition, Monopoly, Monopolistic competition, Price- Output determination under perfect competition and monopoly – Methods of pricing – cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

UNIT – IV: BUSINESS ORGINATIONS AND CAPITAL BUDGETING

Characteristic features of business, features of Sole Proprietorship, Partnership, Joint Stock Company and Public Enterprises, Changing business environment in post- liberalization scenario

Capital: Significance, Types, Method and Sources and raising finance – Capital Budgeting Methods – Pay back Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT – V: FINANCIAL ACCOUNTING AND ANALYSIS

Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Trading, Profit and loss Account and Balance sheet with simple adjustments) – Analysis and interpretation of financial statements through Liquidity, Profitability and Capital structure Ratios.

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, sultan chand, 2009.

REFERENCES:

1. Premchand babu, Madan Mohan : Financial Accounting and Analysis, Himalaya,2009
2. Joseph G. Nellis and David parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
3. M.Sugunatha Reddy: Managerial Economics and Financial Analysis, Research India Publication, New Delhi, 2013.

III B.Tech. - II Sem

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(14033202) OPERATIONS RESEARCH

COURCE OBJECTIVE:

To enlighten the students with the various optimization techniques to understand and apply in industrial operations
To understand the concepts of linear programming techniques
To obtain knowledge in inventory control and queuing theory
To learn decision theory and game theory techniques
To learn simulation techniques
To understand various sequencing models and application of this models in process planning
To understand various replacement models in order to make optimum replacement decisions

UNIT – I
Introduction to operations Research: Development, Definition, Types of models, Operation Research models and Applications
ALLOCATION: Linear programming problem formulation, Graphical solution, Simplex method, Big-M method and Duality

UNIT – II
TRANSPORTATION PROBLEM**:** Formulation, Optimal solution, unbalanced transportation problem, Degeneracy.
Assignment problem: Formulation, Optimal solution and applications of Assignment Problem
SEQUENCING**:** Introduction, Flow Shop sequencing, n jobs through two machines, n jobs through three machines, n jobs through m machines, Two jobs through m machines, Traveling Salesman problem.

UNIT – III
REPLACEMENT**:** Introduction, Replacement of items that deteriorate with time when money value is not considered and considered, Replacement of items that fail completely and Group replacement
THEORY OF GAMES**:** Introduction, Minimax (Maximin) criterion and optimal strategy, Solution of games with saddle points, Rectangular games without saddle points, 2 x 2 games, Dominance principle, m x 2 & 2 x n games ,Graphical method.

UNIT IV
WAITING LINES**:** Single Channel: Poisson arrivals, Exponential Service times with finite queue length and non finite queue length models
Multichannel: Poisson arrivals, Exponential service times with finite queue length and non finite queue length models.

UNIT – V
INVENTORY:
Introduction, Single item deterministic models, Purchase inventory models with one price break and multiple price breaks
Stochastic models: Demand may be discrete variable or continuous variable, Instantaneous production, Instantaneous demand and continuous demand and no setup cost.

SIMULATION: Definition, Types of simulation models, Phases of simulation, Applications of simulation, Inventory and Queuing problems, Advantages and disadvantages and Simulation Languages

TEXT BOOKS:

1. Introduction to Operations Research, Taha, PHI
2. Operations Research, K.Rajagopal,PHI.

REFERENCES:

1. Operations Research, A.M. Natarajan, P.Balasubramani, A. Tamilarasi, Pearson Edu.
2. Operations Research: Methods & Problems, Maurice Saseini, Arhur Yaspan & Lawrence Friedman
3. Operations Research, R.Panneerselvam, PHI Publ.
4. Operations Research, wagner, PHI Publ.
5. Operations Research, J.K. Sharma, Mac Milan.
6. Operations Research, Wayne L. Winston, Thomson Brooks, Cole
7. Operations Research, R. Veerachari and V. Ravi Kumar, I.K. International

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(14033203) DYNAMICS OF MACHINERY -II

UNIT-I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT – II

BALANCING OF ROTATING MASSES: Balancing of rotating masses - single and multiple – single and different planes

UNIT -III

BALANCING OF RECIPROCATING MASSES: Primary, Secondary and higher balancing of reciprocating masses, Analytical and graphical methods Unbalanced forces and couples – V, multi cylinder, in -line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive force.

UNIT – IV

VIBRATIONS: Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's method, Rayleigh's method Whirling of shafts, critical speeds,

UNIT V

TORSIONAL VIBRATIONS: Torsional vibrations, two and three rotor systems. Simple problems on forced, damped vibration, Vibration Isolation & Transmissibility

TEXT BOOKS :

1. Thoery of Machines, S.S Ratan, MGH
2. Theory of machines, Khurmi, S.Chand.

REFERENCES :

1. Mechanism and Machine Theory, JS Rao and RV Dukkipati, New Age Publ.
2. Dynamics of Machinery, Ballaney, Dhanpat Rai
3. Theory of Machines, Thomas Bevan, CBS Publishers
4. Theory of Machines, Jagadish Lal & J.M.Shah, Metropolitan.

III B.Tech. - II Sem

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(14033204) REFRIGERATION AND AIR CONDITIONING

COURCE OBJECTIVE:

On completion of this course, the students are expected to gain knowledge about refrigeration and air conditioning system, analysis and design calculations.

1. Understand Vapour compression and vapour absorption system Operation.
2. Analyze the refrigeration cycles and methods for improving Performance.
3. Familiarize the components of refrigeration systems.
4. Design air conditioning systems using cooling load calculations.
5. Know the application of refrigeration and air conditioning systems.

UNIT – I

Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. – Different refrigeration methods - Air Refrigeration: Ideal and Actual cycles,Open and Dense air systems –- problems – Refrigeration needs of Air crafts.

Refrigerants – Desirable properties – classification of refrigerants used –Nomenclature- secondary refrigerants- lubricants – Ozone Depletion – Global Warming new refrigerants.

UNIT – II

Vapour compression refrigeration – Basic cycle - working principle and essential components of the plant – COP – Representation of cycle on T-S and P-h charts –Expander vs. Throttling, effect of sub cooling and super heating – cycle analysis –Actual cycle- Influence of various parameters on system performance – Construction and Use of P-h charts – numerical Problems.

Vapour Absorption Refrigeration System – description and working of NH3 – water system and Li Br –water (Two shell & Four shell) System -Calculation of max COP.

Principle of operation of three Fluid absorption system.

UNIT III

Steam Jet Refrigeration System: Working Principle and Basic Components, Principle and operation of: (i) Thermo-electric refrigerator (ii) Vortex tube or Hilsch tube.

Testing and charging and Maintenance of refrigeration and air conditioning

Introductions to cryogenics - Applications

UNIT –IV

Introduction to Air Conditioning: Psychometric Properties & Processes –Characterization of Sensible and latent heat loads — Need for Ventilation, Consideration of Infiltrated air – Heat Load concepts: RSHF, GSHF- Problems.

UNIT V

Requirements of human comfort and concept of Effective Temperature- Comfort chart–Comfort Air Conditioning- Summer, Winter & year round air conditioning- simple problems.

TEXT BOOKS:

1. Basic Refrigeration and Air-Conditioning – Ananthanarayanan, TMH Refrigeration and Air Conditioning, 3/e, TMH, 2010
2. A Course in Refrigeration and Air conditioning, SC Arora & Domkundwar,Dhanpatrai

REFERENCES:

1. Refrigeration and Air Conditioning, Manohar Prasad, 2/e, New Age.
2. Principles of Refrigeration, Dossat, 4/e, Pearson Edu.
3. Refrigeration and Air Conditioning, P.L.Ballaney, Khanna Publ.
4. Refrigeration and Air Conditioning, R.C.Arora, PHI, 2010
5. Refrigeration and Air Conditioning, CP Arora, 3/e, TMH, 2008

Tables/Codes: Thermal Engineering Data Book containing Refrigerant and Psychrometric property Tables and charts

III B.Tech. - II Sem

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(14033205) DESIGN OF MACHINE ELEMENTS– II

COURCE OBJECTIVE:

To study the design of various mechanical transmission systems
To study the design of different types of engine parts
To study the design of different types of transmission parts
To study the design of gears
To study the design of springs

UNIT – I

BEARINGS: Types of Journal bearings – Lubrication – Bearing Modulus–bearing materials – journal bearing design – Ball and roller bearings – Static and dynamic loading of ball &roller bearings, bearing life –Failure of bearings.

UNIT –II

ENGINE PARTS: Pistons, Forces acting on piston – Construction Design and proportions of piston. Cylinder, Cylinder liners,
Connecting rod: Thrust in connecting rod – stress due to whipping action on Connecting rod ends

UNIT – III

POWER TRANSMISSIONS SYSTEMS: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.
DESIGN OF POWER SCREWS: Design of screw, Square ACME, Buttress screws- Efficiency of the screw. Design of nut, compound screw, differential screw, and ball screw possible failures

UNIT – IV

SPUR & HELICAL GEARS: Spur gears- Helical gears – Load concentration factor –Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, module and face width, Check for dynamic and wear considerations

UNIT – V

MECHANICAL SPRINGS: Stress and deflections of helical Springs-Springs for fatigue loading – Natural frequency of helical springs-Energy storage capacity- Helical Torsion springs-Leaf springs-Coaxial springs

TEXT BOOK:

1. Machine Design , V.B.Bhandari, TMH
2. Machine Design, R.S. Khurmi & J.S.Gupta, S.Chand Publ.

REFERENCES:

1. Mech. Engg. Design, JE Shingley
2. Design of Machine Elements-II, T. Krishna Rao, I.K. International
3. Machine Design, T.V. Sundaramoorthy & N.Shanmugam
4. Machine Design, Kanniah, Scitech Publishers
5. Data Books : (i) P.S.G. College of Technology (ii) Balaveer Swamy and Mahadevan

NOTE: Design data books are permitted in the examinations

III B.Tech. - II Sem

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(14033206) AUTOMOBILE ENGINEERING

B.Tech. III-II Sem (M.E)

AUTOMOBILE ENGINEERING

UNIT – I

Introduction: Components of a four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – oil filters, oil pumps – crank case ventilation.

UNIT – II

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters– carburetor – types – air filters – Gasoline injection.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle spray formation, injection timing, testing of fuel pumps.

Emissions from Automobiles – Pollution standards National and international – Pollution Control– Techniques – Multipoint fuel injection for SI Engines- Common rail diesel injection Emissions from alternative energy sources– hydrogen, Biomass, alcohols, LPG, CNG - their merits and demerits.

UNIT – III

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, Thermostat, evaporative cooling – pressure sealed cooling – antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Braking System: Mechanical brake system, Hydraulic brake system, Pneumatic and vacuum brake systems.

Unit – IV

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, Bendix drive, mechanism of Solenoid switch, Lighting systems, Horn, wiper, Fuel gauge – oil pressure gauge, Engine temperature indicator.

UNIT – V

Transmission System: Clutches- Principle- fluid fly wheel – gear box- types:

sliding mesh, constant mesh, synchromesh, epi-cyclic, over drive, torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential, rear axles.

Steering System: Steering geometry – camber, castor, king pin rake, combined angle toe-in, center point steering, steering gears – types, steering linkages.

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

TEXT BOOKS:

1. Automotive Mechanics –Vol.1&Vol.2, Kirpal Singh.
2. Automobile Engineering, William Crouse

REFERENCE BOOKS:

1. Automobile Engineering, R.K.Rajput, Lakshmi Publ.
2. Automobile Engineering, K.K. Ramalingam, scitech Publ.
3. Automotive Engines, Newton, Steeds & Garret.
4. Alternate Fuels, Thipse, Jaico Publ. House

III B.Tech. - II Sem

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(14033207) INTERNAL COMBUSTION ENGINES

(ELECTIVE –I)

COURSE OBJECTIVE:

On completion of this course, the students are expected to understand the fundamental principle, operation, performance of IC Engines, auxiliary systems, combustion of SI & CI engines, various fuels used and engine emissions.

1. Acquire the knowledge of engine components and fuel air cycles.
2. Understand the working of engine auxiliary systems.
3. Understand the combustion aspects of SI Engines
4. Understand the combustion aspects of CI Engines.
5. Know the various alternate fuels, engine emissions, measuring and control techniques

UNIT I - COMPONENTS OF IC ENGINES AND PERFORMANCE

Classification of Internal combustion Engine, Function and operation of Two stroke and Four stroke engines, Comparison of SI and CI and two stroke and four stroke engines, Effects of supercharging and supercharging Types - centrifugal, roots, vane, Types of scavenging process, Design and Performance data, Efficiency, Specific fuel consumption, IMEP determination - Simple calculations -Performance characteristics, Heat balance calculations, Fuel air cycles and their significance, Comparison of air-standard and fuel air cycles.

UNIT II - ENGINE AUXILIARY SYSTEMS

Desirable air- fuel ratios for starting, warm up, acceleration, idling and normal operation, Necessity of Carburetors and their function and types, Function and classification of injection systems, Injection pump, governor and nozzle types, Description of construction and function of Electronic injection system and MPFI systems, Energy requirement of ignition system, need, Types - Battery and Magneto ignition types, Ignition timing and engine parameters, Engine oil properties, lubrication system types - mist, wet sump and dry sump lubrication systems, Types of cooling systems - Direct and Indirect - Coolant and antifreeze solutions.

UNIT III - COMBUSTION IN SI ENGINES

Homogeneous and heterogeneous mixture, Combustion in spark ignition engines,Stages of combustion in spark ignition engines, Flame front propagation, Factors influencing flame speed, Rate of pressure rise, Phenomenon of knock in SI engines, Effect of engine variables on knock, Combustion chambers for SI engines - Smooth engine operation, High power output and thermal efficiency, Stratified charge engine.

UNIT IV - COMBUSTION IN CI ENGINES

Combustion in CI engine, Stages of combustion in CI engines, Factors affecting the delay period - compression ratio, engine speed, output, atomization and duration of injection, quality of fuel, intake temperature, intake pressure, Phenomenon of knock in CI engines, Comparison of knock in SI and CI engines, Air motion - Swirl - Squish.

UNIT V - ALTERNATE FUELS AND EMISSION

Alternate Fuels -Alcohol, Methanol, Ethanol, Gaseous fuel - Hydrogen, CNG, LPG, Biodiesel - production, advantages & disadvantages. Air pollution due to IC engines, Hydrocarbon emission and their reasons, Formation of oxides of nitrogen, CO, Particulates, aldehydes, sulphur, lead and phosphorus emissions, catalytic converter, exhaust gas recirculation, Flame ionization detector, NDIR, smoke types - measuring device. Emission standards

TEXT BOOKS

1. Ganesan.V, “Internal Combustion Engines”, Tata McGraw-Hill, New Delhi,2009.
2. Ramalingam.K.K, “Internal Combustion Engines- Theory and practice”,SciTech publications India Pvt. Ltd., Chennai, 2010.

REFERENCES

1. Thipse.S.S, “Internal Combustion Engines”, Jaico Publication House., 2010.
2. Thipse.S.S, “Alternate Fuels”, Jaico Publication House., 2010.
3. Mathur.M.L and Sharma.R.P, “A course in Internal Combustion Engines”, Dhanpat Rai & Sons, New Delhi, 2010.
4. Heywood.J.B, “Internal Combustion Engine Fundamentals”, McGraw Hill International, New York, 2008.
5. Domkundwar.V.M, “A course in Internal Combustion Engines”, Dhanpat Rai & Sons, 2010.

III B.Tech. - II Sem

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3	1	0	3

(14033208) ENTREPRENEURSHIP

(ELECTIVE-I)

COURSE OBJECTIVE:

In this Subject we will study the entrepreneur role, characteristics, opportunities and importance of woman to become an entrepreneur. It also gives the clear view of how a venture needs to be established with the available resources. Financing & managing the capital & venture expansion strategies, Global aspects of the Entrepreneurship. It also gives the information on location of plants & various public issues, material handling & production management

UNIT 1 :

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur, The Entrepreneurial decision process, Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs, Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur

UNIT II :

Creating and Starting the Venture, Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process.

The Business Plan Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities

UNIT III :

Financing and Managing the new venture, Sources of capital, venture capital , angel investment, Record keeping, recruitment, motivating and leading teams, financial controls. Marketing and sales controls, E-commerce and Entrepreneurship, Internet advertising

UNIT IV :

New venture Expansion Strategies and Issues, Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits.

Choosing location and layout, Issues related to Selection of layout.

Global aspects of Entrepreneurship

UNIT V :

Production and Marketing Management Thrust of production management, Selection of production Techniques, plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing

TEXT BOOKS:

1.Entrepreneurship, Robert Hisrich, & Michael Peters, 5/e TMH.
2.Entrepreneurship, Dollinger, Pearson, 4/e, 2004.

REFERENCES:

1. Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2004.

2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.

3. Entrepreneurial Management, Robert J.Calvin, TMH, 2004.

4. The Entrepreneurial Connection, Gurmeet Naroola, TMH, 2001.

5. Indian Economy, Dutt&Sundaram S. Chand, 2005.

6. Essential of Entrepreneurship and small business management, Thomas W. Zimmerer & Norman M. Scarborough, 4/e PHI, 2005.

7. Industrial Relations & Labour Laws, Srivastava, Vikas, 2005.

8. Industrial Law, ND Kapoor, Sultan Chand & Sons, 2005

III B.Tech. - II Sem

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(14033209) METROLOGY AND MACHINE TOOLS LAB

Minimum number of five experiments from each section

Section A:

1. Measurement of lengths, heights, diameters by vernier calipers, micrometersetc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height of spur gear.
4. Alignment test on the lathe.
5. Alignment test on milling machine.
6. Study of Tool makers microscope and its application
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method.
10. Surface roughness measurement by Talysurf instrument.
11. Surface Wear Resistances Test using Electro Spark Coating Device.

Section B:

1. Demonstration of construction & operations of general purpose machines: Lathe, Drilling machine, Milling machine, Shaper, Planning machine, Slotting machine, Cylindrical Grinder, Surface grinder and Tool & cutter grinder.
2. Job on Step turning and taper turning on lathe machine
3. Job on Thread cutting and knurling on -lathe machine.
4. Job on Drilling and Tapping
5. Job on Shaping and Planning
6. Job on Slotting
7. Job on Milling Job on Cylindrical Surface Grinding
8. Job on Grinding of Tool angles.

III B.Tech. - II Sem

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(14033210) HEAT TRANSFER AND DYNAMICS LAB

Minimum number of five experiments from each section

Section A: HEAT TRANSFER STREAM

1. Thermal conductivity of insulating powder material through Concentric Sphere apparatus.
2. Thermal conductivity of insulating material through lagged pipe apparatus
3. Overall heat transfer co-efficient through Composite Slab Apparatus
4. Thermal Conductivity of metal (conductor).
5. Heat transfer in pin-fin
6. Heat transfer coefficient in forced convection.
7. Heat transfer coefficient in natural convection
8. Experiment on Parallel and counter flow heat exchanger.
9. Experiment on Stefan Boltzman Apparatus.

Section B: DYNAMICS STREAM

1. Experiment on vibration Lab unit.
2. Experiment on gyroscopic unit.
3. Experiment on Balancing unit.
4. Experiment on whirling shaft Apparatus
5. Experiment on Cam Apparatus
6. Experiment on Governor Apparatus
7. Study on Vapor compression Refrigeration system
8. Study on Air condition unit

NOTE: Heat Transfer data books are permitted in the examinations.

IV B.Tech. - I Sem

L	T	P	C
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(14034101) CAD/CAM

COURSE OBJECTIVE:

The course examines the area that is commonly referred to as CAD/CAM. The general objectives of the course are to enable the students to:

Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings,

Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program,

Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering,

Useful-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

UNIT-I

Fundamentals of CAD - The design process - Applications of computers for design benefits of CAD - Computers configuration of CAD applications - Computer peripherals for CAD - Design work station - Graphics terminal.

UNIT-II

Geometry and line generation, Computer graphics: Transformations- Points and lines transformation - Translation, rotation, Scaling, Mirror Reflection; 2D and 3D transformations with routines - Mathematical formulations - Windowing and Clipping.

UNIT-III

Curve generation - Plane curves - Space curves - Surface description and generation; modeling concepts: 2D and 3D modeling - Wire frame, Surface and Solid modeling. B-rep solid modelers and constructive solid geometry, Bezier curve and surface representations.

UNIT-IV

CAM - Definition, Divisions of CIM: Group technology - Introduction, concepts of GT, Analysis of GT, Classification and coding system, Advances of GT, Flexible manufacturing systems (FMS) - Definition, Different flexibilities Need of FMS, Components of FMS, Difference between conventional manufacturing system and FMS, Advantages of FMS.

Basic concepts of Material Handling systems like - AS/RS, conveyers, AGVS and their applications, Applications of robots in manufacturing and material handling.

UNIT V

Computer Aided Process Planning- Variant and Generative CAPP Systems.

MRP- Inputs to MRP, Benefits, Capacity Planning.

Basic concepts of Shop floor data- Types of factory data and collection systems- concepts of automatic identification methods- Bar code technology-Concepts and uses.

Text Books:

1. CAD/CAM, A Zimmers & P.Groover, PE, PHI
2. CAD/CAM-Principles and applications, P.N. Rao, TMH, 3rd edition, 2010

References:

1. Computer Graphics : Plastock Schaum Series
2. Interactive Computer Graphics: Newman & Sproul
3. Computer Graphics: Steven Hamington
4. CAD/CAM: Groover
5. Automation, Production System & CIM: M.P. Groover
6. Mathematical Elements of Computer Graphics: Rogers and Adams
7. Procedural Elements of Computer Graphics: Rogers

IV B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14034102) METROLOGY

UNIT – I

SYSTEMS OF LIMITS AND FITS: Introduction, Definitions, fits and their types –unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – International Standard system for plain and screwed work

UNIT – II

LINEAR MEASUREMENT: Length standard, line, ends & wavelength standards slip gauges – calibration of the slip gauges, Dial indicator, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – Bevel protractor – angle gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.
LIMIT GAUGES: Plug, Ring, Snap, Gap, Taper, Profile and Position gauges. Taylor's principle Design of Go and No Go gauges.

UNIT – III

OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope – collimators, optical projector – optical flats and their uses, interferometer.
FLATNESS MEASUREMENT: Measurement of flatness of surfaces – straight edges–surface plates – optical flat and auto collimator.
SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S Values – Ra , Rz values, Methods of measurement of surface finish-profilograph, Talysurf, BIS symbols for indication of surface finish.
MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses.

UNIT-IV

SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch- profile thread gauges.
MACHINE TOOL ALIGNMENT TESTS: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools. Preparation of acceptance charts.

UNIT- V

GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement: Measurement of diameter, pitch, pressure angle and tooth thickness. Coordinate Measuring Machines: Types of CMM and Applications of CMM.

SURFACE ENGINEERING: Surface treatment processes and their character tics and applications. (a) Overlay coatings (b) Diffusion coatings (c) Thermal or mechanical modification of Surfaces

TEXT BOOKS:

1. Engineering Metrology , Mahajan, Dhanpat Rai
2. Engineering Metrology, R.K. Jain, Khanna Publ.

REFERENCES:

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology , Connie Dotson ,4e, Thomson
3. Handbook of Tribology: Materials, Coatings, and Surface Treatments, Bharat Bhushan and B.K.Gupta.
4. Surface Engineering with Lasers, Dehosson J.T.
5. Surface Engineering for corrosion and wear resistance, JR Davis, Woodhead Publ.

IV B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14034103) FINITE ELEMENT METHODS

COURSE OBJECTIVE:

The students will learn the Fundamentals of finite element analysis including, discrete system analysis, steady state and transient heat transfer analysis, static and dynamic analysis of structures. The Main objective of the course is to teach the fundamentals of finite element method with emphasize on the underlying theory, assumption, and modeling issues as well as providing hands on experience using finite element software to model, analyze and design systems of mechanical engineers

UNIT-I

Introduction to Finite Element Method for solving field problems, Stress and Equilibrium, Strain - Displacement relations, Stress - strain relations, Potential Energy approach, Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin's and weighted residual methods, calculus of variations, Essential and natural boundary conditions**,** Pascal's triangle.

UNIT-II

One dimensional problem: Finite element modeling coordinates and shape functions, Assembly of Global stiffness matrix and load vector, Finite element equations, Treatment of boundary conditions for Bar elements, temperature effects, Elimination and penalty approaches, solution for displacements, reaction, stresses, temperature effects, Quadratic Element, solution for displacements, reaction, stresses

Heat transfer problems: One-dimensional, conduction and convection problems. Examples: - one dimensional fin.

UNIT - III

Development of truss equations: Derivation of stiffness matrix for a beam element in local coordinates, selecting approximation functions for displacement, global stiffness matrix, computation of stress for a bar in x-y Plane, solution of a plane truss, potential energy approach to derive bar element equations, comparison of finite element solution to exact solution for bar. Solution for displacements, reaction, stresses, temperature effects

Development of beam equations: Beam stiffness, example of assemblage of beam stiffness matrices, distributed loading, beam element with nodal hinge, potential energy approach to derive beam element equations. Galerkin's methods for deriving beam element equations, Frames.

UNIT-IV

Two dimensional problems: Basic concepts of plane stress and plane strain, derivation of the constant strain triangular element stiffness matrix and equations, treatment of body and surface forces, explicit expression for the constant strain triangle stiffness matrix, finite element solution of a plane stress problem.

Heat Transfer problems: Two-dimensional finite element formulation with Conduction and convection, flow chart and examples of a heat transfer program, examples: - two-dimensional fin.

Development of a linear strain and axisymmetric elements: Introduction, derivation of the linear strain triangular element stiffness matrix and equations, example LSTstiffness determination, comparison of elements, derivation of the stiffness matrix, solution of axisymmetric pressure vessels

UNIT -V

Isoparametric formulation: Isoparametric formulation of the bar element stiffness matrix, rectangular plane stress element, Isoparametric formulation of the plane element stiffness matrix, evaluation of the stiffness matrix and stress matrix by Gaussian quadrature

Structural dynamic and time dependent heat transfer: Dynamics of a spring mass system, direct derivation of the bar element equations, numerical integration in time, natural frequencies of a one-dimensional bar, time dependent one dimensional bar analysis, beam element mass matrices and natural frequencies, truss, plane frame, plane stress/strain, axisymmetric, solid element mass matrices, time-dependent heat transfer.

TEXT BOOKS:

1. A first course in Finite Element Method, Daryl L Logan, Cengage Learning
2. Introduction to Finite Elements in Engineering, Chandraputla, A and Belegundu, PHI.
3. Finite Element Methods in Engineering, SS Rao , Pergamon,

REFERENCES:

1. An introduction to Finite Element Method, JN Reddy, TMH
2. Finite Element Method, its basics and fundamentals, O.C. Zienkiewicz,Elsevier
3. Fundamentals of Finite element analysis, David V Hutton, TMH
4. Finite Element Analysis, G.Lakshminarasaiah, B.S.Publ., 2008

IV B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14034104) INSTRUMENTATION AND CONTROL SYSTEMS

COURSE OBJECTIVE:

1. To enable the students to understand the fundamentals of instrumentation and control available for monitoring/measuring in domestic / industrial applications.
2. To learn fundamentals of various types of Transducers.
3. To acquire basic understanding of principle & working of Transducers
4. To understand the methods to analyze the stability of systems from transfer function forms

UNIT-I

Definition - Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

UNIT-II

Measurement of Displacement: Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

MEASUREMENT OF TEMPERATURE: Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.

MEASUREMENT OF PRESSURE: Units - classification - different principles used- Manometers, Piston, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement - Thermal conductivity gauges - ionization pressure gauges, Mcleod pressure gauge.

UNIT -III

MEASUREMENT OF LEVEL: Direct method - Indirect methods - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

MEASUREMENT OF SPEED: Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer. Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

UNIT -I V

STRESS & STRAIN MEASUREMENTS: Various types - electrical strain gauge – gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque, Strain gauge Rosettes.

UNIT - V

MEASUREMENT OF HUMIDITY - Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, Torsion meters, Dynamometers.

ELEMENTS OF CONTROL SYSTEMS: Introduction, Importance - Classification – Open and closed systems Servomechanisms-Examples with block diagrams-Temperature, speed & position control systems

TEXT BOOKS:

1. Measurement systems: Application and design, Doeblin O. Earnest..Adaptation by Manik and Dhanesh, TMH

2. Mechanical Measurements, Beckwith, Marangoni, Linehard, PHI, PE

REFERENCES:

1. Instrumentation, Measurement & Analysis, B.C.Nakra & K.KChoudhary, TMH

2. Measurement Systems: Applications & design, D.S Kumar.

3. Instrumentation and Control Systems, S.Bhaskar, Anuradha Agencies.

4. Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers.

5. Instrumentation & Mechanical Measurements, AK. Tayal ,Galgotia Publ.

6. Principals of Industrial Instrumentation and Control Systems, Chennakesava, R.A., Cengage Learning, 2008

IV B.Tech. - I Sem

L	T	P	C
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(14034105) PRODUCTION AND OPERATIONS MANAGEMENT

(Elective-II)

COURSE OBJECTIVE:

To get acquainted with the basic aspects of production management
To learn techniques of PERT and CPM and its application to management of project
To learn various scheduling and sequencing techniques
To study different types of production systems
To learn various quality and productivity improvement techniques

UNIT – I

Introduction to production and operations management, Production management v/s operations management, Objectives of production and operations management, Benefits of production and operations management

Production systems: Definition, components of production system, Types of production system ,Mass production system, Flow production system, Batch production system, Job shop production system, Project type production system, Flexible production system, Lean production, Agile production, Just in time production system and Kanban system

Total quality management: Main principles of TQM, Quality chains, Introducing TQM into business and Benefits of TQM
Six Sigma Quality Control: Six sigma, Comparison of three sigma with six sigma, Six sigma methodologies and benefits of implementing a six sigma project

UNIT – II

Forecasting: Importance of forecasting, Types of forecasting, their uses, Forecasting techniques, Qualitative methods, Quantitative methods: Regression analysis, Moving average ,Weighted moving average, Exponential smoothing method, Forecast for seasonal variations, Fore cast error : Mean absolute deviation, BIAS, Mean square error , Standard deviation, Tracking signal
Aggregate production planning: Master production schedule, Strategies for aggregates planning, Aggregate planning methods.

UNIT – III

Factors affecting facilities location, Methods of evaluating location alternatives: Cost analysis, Profit analysis, Return on investment, Factor rating system and Centre of gravity method location
Types of facilities layout: Product layout, process layout and group technology layout, Travel chart, Relationship chart. Computerized layouts: ALDEP, CRAFT and CORELAP.

Assembly line balancing: Introduction, Objectives, Terms used in line balancing, Line balancing algorithms: Ranked positional weight technique and largest candidate rule

UNIT – IV

Inventory management: Functions of inventories, relevant inventory costs, ABC Analysis and VED analysis, Simple EOQ model, Inventory control systems: P–Systems and Q-Systems(S, s) Policy

PERT and CPM: Terms used in PERT and CPM, Rules for drawing network diagram, CPM, PERT, Crashing of network, Resource management, Resource allocation, Resource aggregation, Resource leveling and applications of PERT and CPM

UNIT – V

Loading and scheduling: Terms used in scheduling, Factors affecting scheduling, Objectives of scheduling, Methods used in scheduling: Forward scheduling backward scheduling and Gantt chart

Sequencing: Priority sequencing rules, Johnson algorithm: n jobs through two machines, n jobs through three machines, n jobs through m machines

Material requirement planning, Capacity planning and production control

TEXT BOOKS:

1. Analysis of production systems and Operations and production Management, Rajagopal Kurnool, CBS publishers
2. Modern Production, Operations Management, Baffa & Rakesh Sarin.
3. Operation Management, B. Mahadevan, Pearson Edu.
3. Production & Operations Management: Concepts, Models and Behavior, Adam & Ebert 5/e, PHI

REFERENCES:

1. Operations Management, S.N. Chary.
2. Inventory Control Theory and Practice, Martin K. Starr and David W. Miller.
3. Production Control A Quantitative Approach , John E. Biegel.
4. Production & Operations Management, Kanishka Bedi, Oxford Univ Press.

IV B.Tech. - I Sem

L	T	P	C
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(14034106) COMPUTATIONAL FLUID DYNAMICS

(ELECTIVE – II)

COURSE OBJECTIVE:

1. To impart knowledge about various computational methods of fluid flow and solve simple fluid flow problems
2. The formulation of governing equations for fluid flow and their mathematical behavior.
3. Various discretization techniques.
4. Different techniques to solve the numerical equations.
5. Development of various types of grids to solve the problem.
6. The finite volume approach to discretize the governing equations

UNIT-I

Elementary details in numerical Techniques: Number system and errors, Representation of integers, Fractions, Floating point Arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, Convergence of Sequences.

UNIT - II

Applied Numerical Methods: Solution of a system of simultaneous Linear Algebraic Equations, iterative schemes of Matrix Inversion, Direct Methods for Matrix inversion, Direct Methods for banded matrices

Finite Difference Applications in Heat conduction and Convention - Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, and finite difference application in convective heat transfer.

UNIT - III

Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, Conservative property, the upwind scheme

UNIT - IV

Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of motion, expanded forms of Navierstokes equations, conservation of energy principle, and special forms of the Navier-stokes equations.

UNIT - V

Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.
Finite Volume Method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, Upwind interpolation, Linear interpolation and
Quadratic interpolation

TEXT BOOK:

1. Numerical heat transfer and fluid flow, Suhas V. Patankar, Butter-Worth Publ.
2. Computational fluid dynamics, Basics with applications, John. D. Anderson, Mc Graw Hill.

REFERENCES:

1. Computational Fluid Flow and Heat Transfer, Niyogi, Pearson Publ.
2. Fundamentals of Computational Fluid Dynamics, Tapan K. Sengupta,
Universities Press.
3. Computational Fluid Dynamics, Jiyuan and Others, Elsevier, 2008.

IV B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14034107) MECHATRONICS
(ELECTIVE –II)

COURSE OBJECTIVE:

This course sets out to produce Mechatronics engineers able to come up with innovative solutions, manage a multidisciplinary team and work at all levels of an integrated production system. Products or procedures resulting from a mechatronics, or concurrent approach, offer a level of performance that could not have been achieved otherwise. Typical examples of successful mechatronics engineering include robots, automated guided vehicles systems, active suspensions, interactive laser disk drives, etc.

UNIT – I

INTRODUCTION: Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Systems, Graphical User Interface, and Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

SIGNAL CONDITIONING: Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , speed channels Filtering Noise using passive components –Resistors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT – II

PRECISION MECHANICAL SYSTEMS: Pneumatic Actuation Systems -Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

ELECTRONIC INTERFACE SUBSYSTEMS: TTL, CMOS interfacing -Sensor interfacing – Actuator interfacing – solenoids , motors Isoation schemes- optocoupling, buffer IC's - Protection schemes – circuit breakers , over current sensing ,resetable fuses , thermal dissipation - Power Supply - Bipolar transistors/ mosfets

UNIT – III

ELECTROMECHANICAL DRIVES: Relays and Solenoids - Stepper Motors -DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives -Drive System load calculation.

MICROCONTROLLERS OVERVIEW: 8051 Microcontroller, micro processor structure - Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming –Assembly, C (LED Blinking ,Voltage measurement using ADC).

UNIT – IV

ROGRAMMABLE LOGIC CONTROLLERS: Basic Structure -Programming: Ladder diagram -Timers, Internal Relays and Counters - Shift Registers -Master and Jump Controls - Data Handling -Analog input / output - PLC Selection -Applications.

UNIT – V

PROGRAMMABLE MOTION CONTROLLERS: Introduction -System Transfer Function - Laplace transform and its application in analyzing differential equation of a control system - Feedback Devices: Position, Velocity Sensors – Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive ,Infrared – Continuous and discrete processes - Control System Performance & tuning - Digital Controllers- PPI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles –Trapezoidal- S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear ,Circular - Core functionalities – Home, Record position , Goto Position - Applications : SPM, Robotics.

TEXT BOOKS :

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering , W Bolton, 3/e, Pearson Edu. Press, 2005.
2. Mechatronics, M.D.Singh, J.G.Joshi, PHI.

REFERENCES :

1. Mechatronics Source Book , Newton C Braga, Thomson Publ..
2. Mechatronics , N. Shanmugam , Anuradha Agencies Publi..
3. Mechatronics System Design , Devdas Shetty, Richard,Thomson.
4. Mechatronics, A. Smaili & F. Mrad, Oxford H.E., 2008.
5. Mechatronics: Integrated Mechanical Electronic Systems, Ramachandran,Wiley India.

IV B.Tech. - I Sem

L	T	P	C
3	1	0	3

(14034108) MODERN MANUFACTURING METHODS

(ELECTIVE – III)

UNIT – I

INTRODUCTION – Need for non-traditional machining methods, Classification of modern machining processes , considerations in process selection, Materials and Applications.

UNIT – II

Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development, Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR,application and limitations.

UNIT – III

ELECTRO – CHEMICAL PROCESSES: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tools, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate.

UNIT – IV

THERMAL METAL REMOVAL PROCESSES: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

Electron Beam Machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes.

Laser Beam Machining: General Principle and application of laser beam machining –thermal features, cutting speed and accuracy of cut.

UNIT-V

Plasma Machining: Principle, metal removal mechanism, process parameters, accuracy and surface finish, applications.

Chemical Machining: Fundamentals of chemical machining- Principle- maskants – etchants-advantages and applications.

Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, shaped tube electrolytic machining

Rapid Prototyping: Classification – Stereo lithography, Selective Laser Sintering, and applications.

TEXT BOOKS:

1. Advanced machining processes, VK Jain, Allied publishers.

REFERENCES:

1. Modern Machining Process, Pandey, P.C. and Shah H.S., TMH.
2. New Technology, Bhattacharya A, The Institution of Engineers, India 1984.
3. Manufacturing Technology, Kalpakzian, and Pearson.

IV B.Tech. - I Sem

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3	1	0	3

(14034109) TOOL DESIGN

(ELECTIVE-III)

UNIT-I

Tooling materials and heat treatment: Properties of materials, ferrous, nonferrous, non metallic, tooling materials, heat treating, Limits, tolerances; and FITS, Gauges and gauge design coated tools, ceramic tools. Design of single point cutting tools: Single point, cutting tools-various systems of specifications, geometry and their interrelation, theories of formation of chip and their effect, design of broach.

UNIT - II

Design of multipoint cutting tools: Drill geometry, Design of Drills, Rake & Relief angles of twist drill, speed, feed and depth of cut, machining time, forces, milling cutters, cutting speeds and feed-machining times-design-form cutters, combination tools, reamers etc.

Design of jigs and fixtures: Basic principles of location and clamping, locating, methods and devices, jigs, definitions, types, general consideration in the design of jigs, drills bushing, methods of construction, fixtures-vice fixtures milling, boring, and lathe grinding fixtures.

UNIT-III

Design of sheet metal blanking and piercing: Fundamentals of die cutting operating, power press types, General press information, Material handling equipment, cutting action in punch and die operation. Die clearance, and types of Die construction. Die design fundamentals-blanking and piercing die construction, pilots, striper and pressure pads presswork material, strip layout, short run tooling for piercing.

UNIT-IV

Design of sheet metal bending, forming and drawings die: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies. Tool life and tool wear: theories of tool wear-adhesion, abrasive and diffusion wear mechanisms forms of wear, tool life criteria and Mach inability index, tool wear criterion, measurement of tool wear.

UNIT-V

Using plastics as tooling materials: introduction, plastics commonly used as tooling material application of epoxy plastic tools, construction methods of plastic tooling metal forming operations with Urethane dies. Calculating forces for urethane pressure pads, economics of tooling

TEXT BOOKS:

1. Tool Design, Donaldson, Lecain and Goold,TMH.

2. Principles of Metal cutting, A Bhattacharya, New Central Book Agency,Calcutta

REFERENCES:

1. Production Engineering Design (Tool Design) , Surendra Kenav and Umesh Chandra, Satyaprakashan, New Delhi 1994..
2. Design of Cutting Tools. Use of Metal Cutting Theory, Amitabh Battacharya and Inyong Ham, ASTME publication Michigan USA, 1969.
3. Fundamentals of Machining and Machine Tools, RK Singal and Others, I.K.International, 2008.
4. Metal Cutting Principles, Shaw, Oxford Univ. Press.

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(14034110) POWER PLANT ENGINEERING
(ELECTIVE - III)

COURSE OBJECTIVE:

This course serves as an introduction to fossil-fuel plants for both steam generation and electricity production and electricity production using I.C engine power plants, gas turbine power plants, hydroelectric power plants, nuclear power plants and power from non-conventional sources. Following an overview of an entire plant and an introduction to combustion processes, each subsystem of a fossil-fuel plant will be considered. The subsystems include fuel preparation and handling, boiler types and the fundamentals of steam generation, water systems (condensate-feed water, makeup, cooling, and waste). Consideration will be given to environmental aspects of steam and power generation as well as operations, maintenance, and controls issues.

Objectives that students will meet at the end of the course:

1. list the subsystems of a plant, indicating the function of each subsystem
2. Sketch typical subsystems of a power plant (example: sketch the coal and ash handling system
3. Perform basic analyses associated with each subsystem
4. Sketch the flow of water-steam, fuel, and air through a plant
5. Select the type of plant appropriate for a given application

UNIT – I

Introduction to the Sources of Energy – Resources and Development of Power in India

STEAM POWER PLANT: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems, cooling towers and condensers.

UNIT – II

INTERNAL COMBUSTION ENGINE PLANT: DIESEL POWER PLANT: Introduction –IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

GAS TURBINE PLANT: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison

UNIT – III

HYDRO ELECTRIC POWER PLANT: Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Pondage –classification of dams and spill ways.

HYDRO PROJECTS AND PLANT: Classification – Typical layouts – plant auxiliaries –plant operation pumped storage plants.

NUCLEAR POWER STATION: Nuclear fuel – breeding and fertile materials – Nuclear reactor – reactor operation.

TYPES OF REACTORS: Pressurized water reactor, boiling water reactor, sodium graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT IV

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar- Collectors-Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy. DIRECT ENERGY CONVERSION: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, and load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution contro

TEXT BOOK:

1. A Text Book of Power Plant Engineering , Rajput. R.K., 4/e, Laxmi Publ,2007.
2. Power Plant Engineering, P.C.Sharma , S.K.Kataria Publ.

REFERENCES :

1. Power Plant Engineering, P.K.Nag, 2/e, TMH.
2. Power plant Engineering, Ramalingam, Scietech Publ.
3. A Course in Power Plant Engineering, Arora and S. Domkundwar.
4. Power Plant Engineering, C. Elanchezian and others, I.K. International, 2010.

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(14034111) INSTRUMENTATION AND CONTROL SYSTEMS LAB

Minimum number of 10 experiments from the following list

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.
12. Study of anemometer

IV B.Tech. - I Sem

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(14034112) CAD / CAM LAB

1. **Drafting:** Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting, Study of script, DXE AND IGES FILES
2. **Part Modeling:** Generation of various 3D Models through Protrusion, revolve, shell sweep. Creation of various features, Study of parent child relation, Feature based and Boolean based modeling surface and Assembly Modeling. To Study various standard Translators. Design simple components.
3. Part analysis

a. Determination of deflection and stresses in 2D and 3D trusses and beams.
b. Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
c. Determination of stresses in 3D and shell structures (at least one example in each case)
d. Estimation of natural frequencies and mode shapes Harmonic response of 2D beam.
e. Steady state heat transfer Analysis of plane and Axisymmetric Components

4.

a. Development of process sheets for various components based on tooling Machines.
b. Development of manufacturing and tool management systems.
c. Study of various post processors used in NC Machines.
d. Development of NC code for free form and sculptured surfaces using CAM packages.
e. Machining of simple components on NC lathe and Mill by transferring NCCode / from a CAM package through RS 232.
f. Quality Control and inspection.

Any Six Software Packages from the following:
Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM,
Gibbs CAM and Master CAM

Note: Minimum number of 10 experiments

IV B.Tech. - II Sem

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(14034201) AUTOMATION & ROBOTICS

COURSE OBJECTIVE:

To provide knowledge of sensors used in Robotics

To make the student to understand

1. The basics and the latest technology of sensors used in robotics.
2. The different sensing variables
3. Robot vision system
4. Robot programming

UNIT – I

Introduction to Automation: Need, Types, Basic elements of an automated system, levels of automation, hardware components for automation and process control, Mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT – II

Automated flow lines: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, qualitative analysis.

UNIT – III

Introduction to Industrial Robots: Definition**,** Classification, basic components of a robot, Robot configurations, degrees of Freedom., types of joints, body and arm motions ,specification characteristics, performance parameters, end effectors and grippers.

UNIT – IV

Manipulator Kinematics: Homogeneous transformations as applicable to rotation and translation - D-H notation for forward kinematics,

Trajectory Planning: Trajectory planning, third order polynomial

Robot programming: Types – features of languages and software packages.

UNIT V

Robot actuators: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors,

Robot sensors: Position sensors – potentiometers, resolvers, encoders – Velocity sensors, tactile sensors, Proximity and range sensors.

Robot Applications: industrial and non industrial applications.

TEXT BOOKS:

1. Automation , Production systems and CIM, M.P.Groover, Pearson Edu.
2. Industrial Robotics, M.P. Groover, TMH.

REFERENCES:

1. Robotics, Fu KS, McGraw Hill.
2. An Introduction to Robot Technology, P. Coiffet and M.Chaironze, Kogam Page Ltd. 1983 London.
3. Robotics Engineering, Richard D.Klafter, Prentice Hall
4. Robotics, fundamental Concepts and analysis, Ashitave Ghosal, Oxford Press, 2006
5. Robotics and Control, Mittal RK & Nagrath IJ, TMH.
6. Introduction to Robotics, John J. Craig, Pearson Education

IV B.Tech. - II Sem

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(14034202) RENEWABLE ENERGY SOURCES

COURSE OBJECTIVE:

The purpose of this course is to provide a survey of the most important renewable energy resources, and the technologies for harnessing these within the framework of a broad range of simple to state-of the-art advanced energy systems. After completion of the course, students will be able to:

Describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.

Explain the technological basis for harnessing renewable energy sources

Describe the main components of different renewable energy systems

Compare different renewable energy technologies and choose the most appropriate based on local conditions

UNIT – I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion

UNIT-II

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT-III

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions

TEXT BOOKS:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources , G.D. Rai

REFERENCES:

1. Renewable Energy Sources, Twidell & Weir
2. Non-Conventional Sources, Khan, B.H., 2/e, TMH, 2009
3. Solar Power Engineering, B.S.Magal Frank Kreith & J.F.Kreith.
4. Renewable energy sources and emerging Technologies, Solanki, PHI.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern
6. Non-Conventional Energy Systems, K Mittal, Wheeler.

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(14034203) GAS TURBINES AND JET PROPULSION

COURSE OBJECTIVE:

To Familiarize with basic components of gas turbine
To analyze the power cycles and performance predictions
To understand Aircraft propulsion
To understand different types of Rocket propulsion systems and performance predictions

UNIT-I

Gas Turbines; gas turbine applications, gas turbine advantages & disadvantages, Simple open cycle gas turbine, deviation from ideal cycle, gas turbine with regeneration, thermal efficiency of gas turbine with & without regenerator, gas turbine engines with inter cooling & reheating.

UNIT-II

Jet propulsion**:** Historical sketch- reaction principle- essential features of propulsion devices- Thermal jet engines, classification of – energy flow, thrust, thrust power and propulsion efficiency- need for thermal jet engines and applications.

UNIT-III

Turboprop and turbojet – thermodynamic cycles, plant layout, essential components, and principles of operation – performance evaluation – thrust augmentation and Thrust reversal – contrasting with piston engine propeller plant.

UNIT-IV

Ram jet- Thermo dynamic cycle, plant lay out, essential components – principle of operation – performance evaluation – comparison among atmospheric thermal jet engines- serqu jet and pulse jet, elementary treatment.

UNIT-V

Rocket Engines**:** Need for, applications- basic principle of operation and parameters of performance – classification, solid and liquid propellant rocket engines, advantages, domains of application – propellants – comparison of propulsion systems ,staging of rockets advanced propulsion systems, elementary treatment of Electrical nuclear and plasma Arc Propulsion.

TEXT BOOKS:

1. Gas Turbines , V. Ganesan TMH
2. Gas Dynamics & Jet Propulsion, Dr. S.L. Somasundaram.

REFERENCES:

1. Gas turbines, Cohen , Rogers & Sarvana Muttoo , Addision Wiley & longman
2. Thermodynamics of Propulsion, Hill & Paterson.
3. Rocket Propulsion , Sutton.

4. Element of Gas Turbines Propulsion , Jack D Matingly, MGH, Mc Graw Hill
5. Gas Dynamics and Space Propulsion, Ramaswamy, Jaico.

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(14034204) GEOMETRIC MODELLING

(ELECTIVE – IV)

COURSE OBJECTIVE:

The students will learn principles and practices used in the creation of 3D models; mathematical principles of geometric modeling; theory and application of modeling techniques, Study representation schemes for curves, surfaces, solids, and other spatial data and the impact of representation on graphics algorithms. Topics include spline curves and surfaces, quadric surfaces, and how to design, program and analyze algorithms and systems for interactive 3D shape modeling, including, Boolean operations, parametric modeling; lighting setup and control.

UNIT- I

Introduction, Application area of Computer graphics, overview of graphic system, video display devices, raster- scan systems, random scan systems, graphics monitors and work stations and input devices.

Output primitives: Points and lines, line drawing algorithms, mid-point circle algorithm, **Filled area primitives**: scan-line polygon fill algorithm, boundary-fill and flood –fill algorithm.

UNIT- II

2-D viewing: The viewing pipe line, viewing coordinate reference frame, window to view–port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus –beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT- III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B- spline curve, Bezier and B- spline surfaces, Basicillumination models, shading algorithms.

UNIT- IV

2-D geometrical transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

3-D geometric transformations: Translation, rotation, scaling, reflection and shear transformation and composite transformations.

UNIT- V

Visible surface detection methods: Classification, back-face detection, depth- buffer, scan-line, depth sorting.

Computer animation: Design of animation sequence, general computer animation functions, raster animation. Computer animation language, key frame system, motion specification

TEXT BOOKS:

1. Mathematical Elements for computer graphics, David 1 Rodgers, TMH
2. Computer Graphics C version , Donald Hearn and M.Pauline Baker,Pearson/PHI
3. Computer Graphics Principles & Practice, C.Foley, Vndom, Fener, Hughes,2/e, Peason Publ.

REFERENCES:

1. CAD/CAM Theory, Ibrahim Zeid, TMH
2. Computer Graphics second edition, Zhigandxiang, Roy Plastock, Schaum'soutlines, TMH.
3. Computer Graphics, Steven Harrington, TMH
4. Principles of computer Graphics, ShaliniGovil, PHI, 2005, Springer.
5. Computer Graphics and Automation, M.C. Trivedi, Jaico Pub./ PearsonEducation

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(14034205) COMPOSITE MATERIALS

(ELECTIVE – IV)

Course Objective:
To understand the variety of composite materials (anisotropic material) vis a vis metals and alloys from the view point of industrial applications.
To understand manufacturing methods of composites for economic production
To understand methods of analysis to help effective product design.

UNIT – I
INTRODUCTION TO COMPOSITES
Fundamentals of composites - need for composites – Enhancement of properties – classification of composites – Matrix-Polymer matrix composites (PMC), Metal matrix composites (MMC),Ceramic matrix composites (CMC, Fiber reinforced composites. Applications of various types of composites

UNIT II
POLYMER MATRIX COMPOSITES
Polymer matrix resins – Thermosetting resins, thermoplastic resins – Reinforcement fibres – Woven fabrics – Non woven random mats – various types of fibres. PMC processes - Hand layup processes –Spray up processes – Compression moulding – Reinforced reaction injection moulding - Resin transfer molding – Pultrusion – Filament winding – Injection moulding. Fibre reinforced plastics (FRP)

UNIT III
METAL MATRIX COMPOSITES
Characteristics of MMC, Various types of Metal matrix composites Alloy vs. MMC, Advantages of MMC, Limitations of MMC, Metal Matrix.. Effect of reinforcement - Volume fraction – Rule of mixtures, Processing of MMC – Powder metallurgy process - diffusion bonding – stir casting – squeeze casting

UNIT IV
CERAMIC MATRIX COMPOSITES
Engineering ceramic materials – properties – advantages – limitations – Monolithic ceramics - Need for CMC – Ceramic matrix - Various types of Ceramic Matrix composites- oxide ceramics – non oxide ceramics – aluminum oxide – silicon nitride – reinforcements – particles- fibres- whiskers. Sintering -Hot pressing – Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing).

UNIT V

ADVANCES IN COMPOSITES

Carbon / carbon composites – Advantages of carbon matrix – limitations of carbon matrix Carbon fibre –chemical vapor deposition of carbon on carbon fibre perform. Sol gel technique, Composites for aerospace applications

Text Books:

1. Mathews F.L. and Rawlings R.D., Composite materials: Engineering and Science, Chapman and Hall,London, England, 1st edition, 1994.
2. Chawla K.K., Composite materials, Springer – Verlag, 1987

Reference Books:

1. Clyne T.W. and Withers P.J., Introduction to Metal Matrix Composites, Cambridge University Press,1993.
2.Strong A.B., Fundamentals of Composite Manufacturing, SME, 1989.
3.Sharma S.C., Composite materials, Narosa Publications, 2000.
4.Short Term Course on Advances in Composite Materials, Composite Technology Centre, Department of Metallurgy, IIT- Madras, December 2001.

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(14034206) PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS (ELECTIVE-IV)

UNIT I

NATURE AND SCOPE OF ENGINEERING ETHICS Definition, Nature, Scope- Moral Dilemmas- moral Autonomy- Kohlberg's theory-Gilligan's theory, Profession Persuasive, Definitions, Multiple motives, Models of professional goals. Moral Reasoning and Ethical theories – Professional Ideals and Virtues- Theories of Right Action, Self- interest, Customs and Regions- Use of ethical Theories.

UNIT II

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation- Engineers as responsible experimenters, the challenger case, Codes of Ethics, A balanced outlook on law.

UNIT III

ENGINEER'S RESPONSIBILITY FOR SAFETY

Concept of safety and risk, assessment of safety and risk- risk benefit analysis and reducing the risk- three- mile island, Chernobyl and safe exists.

GLOBAL ISSUES

Multinational corporations- Environmental ethics- Computer ethics and Weapons developments

UNIT I V

INTRODUCTION TO INTELLECTUAL PROPERTY

Meaning and Types of Intellectual Property, Intellectual Property Law Basics, Agencies responsible for intellectual property registration, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

FOUNDATIONS OF TRADEMARKS

Meaning of Trademarks, Purpose and Functions of Trademarks, types of Marks, Acquisition of Trademark rights, Common Law rights, Categories of Marks, Trade names and Business Name, Protectable Matter, Exclusions from Trademark Protection

UNIT V

FOUNDATIONS OF COPYRIGHTS LAW

Meaning of Copyrights, Common Law rights and Rights under the 1976 copyright Act, Recent developments of the Copyright Act, The United States Copyright Office

FOUNDATIONS OF PATENT LAW

Introduction, Meaning of Patent Law, Rights under Federal Law, United States patent and Trademark Office, Patentability, Design Patents, Plants patents, Double Patenting.

TEXT BOOKS:

1. Ethics in Engineering, Mike Martin and Roland Schinzinger, TMH, 2009.

2. Intellectual Property Rights, Deborah E. Bouchoux, Cengage,2005.

REFERENCES:

1. Human values and Professional Ethics, Jayashree Suresh & B.S. Raghavan,S. Chand, 2009.
2. Engineering Ethics, Govindarajan, Natarajan and Senthilkumar, PHI, 2009.
3. A Text Book on Professional ethics and Human values, Nagarajan, New AgeInternational, 2009.
4. Engineering Ethics, Charles & Fleddermann, Pearson, 2009.
5. Practical Approach to Intellectual Property rights, Rachana Singh Puri and Arvind Viswanathan, I.K. International Publishing House, New Delhi. 2010.
6. Business Ethics and Professional Values, A.B.Rao, Excel, 2009.