Inspiring Education for Aspiring Engineers

G. Pulla Reddy Engineering College

(Autonomous)

KURNOOL - 518 007.

Accredited by NBA of AICTE and NAAC of UGC

An ISO 9001 : 2008 Certified Institution

Affiliated to JNTUA, Anantapur.

Sponsored and Managed by Gunampalli Pulla Reddy Charities Trust

SCHEME - 2010

Scheme & Syllabus For II, III & IV Years of Four Year B.Tech. Degree Course

(With effect from the batch admitted in 2010 - 2011)

Scheme of instruction and Examination
(Effective from 2010-11)

II B.Tech(ME) - I Semester **Scheme :2010**

S. No	Subject	Abbre-viation	Credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Numerical Methods & Complex variables	NMC	5	4	1	-	3	70	30	100
2	Applied Mechanics	APM	5	4	1	-	3	70	30	100
3	Engineering Thermodynamics	ETD	5	4	1	-	3	70	30	100
4	Basic Manufacturing Technology	BMFT	5	4	1	-	3	70	30	100
5	Material Science & Metallurgy	MSM	4	4	-	-	3	70	30	100
6	Machine Drawing	MD	4	1	3	-	3	70	30	100
7	Soft Skills	SS	2	1	2	-	-	-	100	100
II	**Practical**									
8	Electrical & Electronics Engineering Lab	EEE(P)	2	-	-	3	3	70	30	100
9	Metallurgy and Welding Lab	MTW(P)	2	-	-	3	3	70	30	100
	Total		34	22	9	6	-	560	340	900

NUMERICAL METHODS & COMPLEX VARIABLES (NMC)
(For II B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
To impart analytical ability in solving mathematical problems and theory of complex variables as applied to the respective branches of Engineering

Unit - I
Complex Variables: Analytic functions, Cauchy-Riemann equations, sufficient condition for analyticity, Harmonic function, Method to find the Conjugate function, Milne – Thomson method.

Unit-II
Complex Integration: Simply and multiply connected regions, Cauchy's Integral theorem, Cauchy's integral formula, Residue, Residue theorem, Method of finding residues
Unit – III
Complex Series and Contour Integration: Taylor's and Laurent's series, Evaluation of real integrals by contour integration, Integration round the unit circle and in the interval $(-\infty, \infty)$.
Unit - IV
Differential equations and Special Functions: Cauchy's homogeneous linear equation, Legendre's linear equation. Gamma function , value of $\acute{\Gamma}(1/2)$. Beta function, Relation between Beta and Gamma functions.
Unit – V
Interpolation : Newton's forward and backward interpolation formulae. Gauss forward and backward interpolation formulae. Numerical Differentiation.
Unit-VI
Numerical Methods: Solution of first order Differential equations. Taylor's method, Picard's method, Euler's and modified Euler's methods. Runge-Kutta methods of second and forth order. Milne's Predictor-Corrector method.
Unit – VII
Probability: Definitions, Baye's theorem, Random variables, Discrete random variables, probability mass function, Discrete distribution function, Continuous random variables, probability density function, Mean and variance of a random variable.
Unit-VIII

Statistics: Normal distribution, properties. Correlation Co-efficient, Rank correlation. Lines of regression.

Text Books:

1. B.S. Grewal [2005], *Higher Engineering Mathematics*, KhannaPublishers, New Delhi.
2. B.V. Ramana [2005], *Engineering Mathematics,* TMH Publishers, New Delhi.

Reference Books:

1. S.C. Gupta and V.K.Kapoor [1984], *Elements of Mathematical Statistics*, S.Chand Publishers, New Delhi.
2. Bali Iyengar [2004], *A Text Book of Engineering Mathematics*, Laxmi Publications, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course student should be able

1.To familiarize with numerical solution of equations

2. To get exposed to find poles and residues and to evaluate real and complex integrals.

3. To be thorough with the statistical measures and concept of random variable

APPLIED MECHANICS (APM)
(For II B.Tech. ME – I Semester)

Scheme: 2010 **Internal Assessment: 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits: 5 **End Exam Duration: 3 hrs**

Objectives:

To develop the student ability to analyze any problem in a simple and logical manner and to apply it to solve a few basic problems in engineering mechanics.

Unit – I

Forces and force systems: Classification of a force system, resultant of coplanar forces, resultant of collinear coplanar forces, resultant of concurrent coplanar forces , resultant of non concurrent coplanar force systems, moment of a force, Varignon's theorem.

Unit – II

Equilibrium of systems of forces: Equilibrium concept in mechanics, Lami's theorem, free body diagram of rigid body, equilibrium of coplanar force systems.

Unit – III

Supports: Types of supports, statically determinate beams, Numerical problems on equilibrium conditions and support reactions.

Unit - IV

Static analysis of simple plane trusses: Types of frames, Reactions of supports of a frame, Analysis of simple frames by method of joints, Analysis of simple frames by method of sections.

Unit – V

Centroid & Centre of gravity: Definition of centroid and Centre of gravity, Centroid of composite bodies, Centre of gravity of a body (from basic principles), centre of gravity of simple

bodies.

Unit – VI

Area and Mass moment of inertia: Area moment of inertia of compound sections, Moment of Inertia of masses, transfer formula for mass moments of inertia, mass moment of inertia of simple bodies.

UNIT – VII

Mechanics of deformable solids: Mechanical properties of materials, simple stresses and strains, types of stresses, Hooke's law, stress-strain curve for ductile material, factor of safety and working stress, stresses in compound sections

UNIT – VIII

Thermal stresses and Elastic constants: Temperature stresses in simple members, state of simple and complementary shear stresses, relation between Elastic constants.

Text Books:

1. R.K.Bansal [2006], *A text book of Engineering Mechanics*, Lakshmi Publishers, New Delhi.
2. S.S. Bhavikatti[2003], *Strength of Materials,* Vikas Publishing House Limited, New Delhi.
3. S.S Bhavikatti & K.G. Rajasekharappa [2003], *Engineering Mechanics*, New Age International Publishers. New Delhi.

Reference Books:

1. S. Thimoshenko, D.H. Young & J.V. Rao [2007], *Engineering Mechanics*, TMH Publishers, New Delhi.
2. I. B. Prasad [1984], *Engineering Mechanics and strength of materials*, Khanna Publishers, New Delhi
3. B.C. Punmia, Ashok.K. Jain and Arun .K.Jain [2010], *Mechanics of Materials*, Lakshmi Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student gains the knowledge,

1.to identify forces and moments acting on rigid body

2. to study static equilibrium of rigid bodies

3. to analyze the frame structures.

4. To find centroid, centre of gravity, area and mass moment of inertia of rigid bodies.

5. To study principles of stresses and strains and stresses in compound sections.

ENGINEERING THERMODYNAMICS (ETD)

(For II B.Tech. ME - I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits : 5 **End Exam Duration : 3 hrs**

Objectives:

This course provides the basic knowledge about thermodynamic laws and relations, and their application to various processes.

Unit – I

Basic Concepts and Definitions : Macroscopic & Microscopic approaches, Thermodynamic system, state, properties, processes and cycle, thermodynamic equilibrium, quasi-static process, zeroth law of Thermo- dynamics.

Work and Heat Transfer: Work transfer, path and point functions, displacement work in various processes, shaft work, flow work, free expansion, Heat transfer, specific and latent heats, comparison of work and heat transfer.

Unit – II

First Law of Thermodynamics: First law for a closed system undergoing a cycle and for a process, energy, different forms of stored energy, specific heat at constant volume and constant pressure, enthalpy, PMM1.

Unit – III

First Law Applied to Flow Systems: Control volume, steady flow process, mass and energy balance, applications of steady flow processes, problems.

Unit – IV

Second Law of Thermodynamics : Heat engine, Kelvin-Plank statement, Clausius statement, refrigerator and heat pump, equivalence of Kelvin-Plank and Clausius statements, reversibility and irreversibility, Carnot cycle, Carnot's theorem, corollary of Carnot's theorem, thermodynamic temperature scale, efficiency of a reversible heat engine, PMM2.

Unit – V

Entropy: Clausius' theorem, the property of entropy, T-S plot, Clausius inequality, principle of entropy increase, applications of entropy principle.

Availability: Available energy, maximum work in a reversible process, availability in non flow and flow processes, Gibbs and Helmholtz functions.

Unit – VI

Properties of Pure Substances: P-V, P-T and T-S diagrams for a pure substances, H-S or Mollier diagram, quality and dryness fraction, steam tables, charts for thermodynamic properties.

Properties of Gases and Gas Mixtures: Avogadro's law, equation of state of a gas, Ideal gas, specific heats, internal energy, enthalpy of an ideal gas, entropy change of an ideal gas, law of reversible adiabatic expansion for an ideal gas, Van der Waals equation, Mixtures of gases – Dalton's law of partial pressures, specific heats, internal energy and enthalpy of gas mixtures.

Unit – VII

Thermodynamic Relations: Some mathematical theorems, Maxwell's equation, Tds equations, Joule-Kelvin effect, Clausius-clapeyron equation.

Unit – VIII

Gas Power Cycles : Carnot cycle, Stirling cycle, Ericsson cycle, Air standard cycles- Otto cycle, Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, second law analysis of gas power cycles.

Text Book:

1. P.K. Nag [2003], *Engineering Thermodynamics,* TMH Publishers, New Delhi..

Reference Books:

1. Joel Rayner [1996], *Basic Engineering Thermodynamics*, Addison- Wesley Publication, Masachusettes.

2. E. RathaKrishna [2005], *Fundamentals of Engineering Thermo dynamics*, PHI Publishers, New Delhi.
3. G.J.Van Wylen, Sonntag [2004], *Fundamentals of Thermodynamics*, John Wiley & Sons Publishers, Singapore.
4. S.C.Gupta [2005], *Engineering Thermodynamics*, Pearson Education, New Delhi
5. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], *Thermal Data Handbook , IK International Publishers, Bangalore*

Note:
1. The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.
2. Use of Thermal Engineering data hand book is permitted.

Outcomes:
To get familiarize the students in
1.Understand the thermodynamic laws and their applications
2.Know the concept of entropy and availability
3.Know the thermodynamic relations 4.Have clear idea about the properties of steam and the use of steam tables and Mollier chart
5. Concept of gas power cycles

BASIC MANUFACTURING TECHNOLOGY (BMFT)
(For II B.Tech. ME - I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
After thorough learning of Manufacturing Process the student will understand the process of casting, metal forming, plastics and welding.

Unit-I
Casting Process : Casting, casting terms, pattern materials, types of patterns, pattern allowances, colour code for patterns, Moulding sands, core sands, properties of moulding sand and its ingredients, different types of moulding machines, use of chaplets, chills, riser and gating system. Design of patterns, moulds and cores. Riser and gating design.

Unit-II
Special Casting Processes : CO_2 moulding, die casting, centrifugal casting, shell moulding, investment or lost wax process; Casting defects causes and remedies. Furnaces used in foundry – cupola, pit furnace, electric arc furnaces.

Unit-III
Forming Processes : Stress – Strain in elastic and plastic deformation, hot working, cold working

process and relative advantages and disadvantages.

Rolling: Principle of rolling, types of rolling mill, Two high, three high and cluster mill, Planetary mill and Sendzmir mill.

Forging: Principle of forging, forging operations, forging types – smith forging, drop forging, press forging, machine forging.

Unit-IV

Extrusion and drawing Processes : Principle of extrusion, forward and back ward, cold extrusion forging, tube extrusion, hydro static extrusion and impact extrusion. Principle of drawing, wire drawing and tube drawing.

Unit-V

Processing of Plastics : Classification of plastics, thermoplastics, thermosetting plastics and applications, injection, compression and blow moulding, extrusion, calendaring and thermoforming.

Unit-VI

Gas Welding: Gas welding equipment, Oxyacetylene welding, types of flames, techniques of welding and oxy- acetylene cutting.

Unit-VII

Arc Welding: Arc welding equipment, Metal arc welding – functions of electrode coating, TIG, MIG and Submerged arc welding process (SAW),

Unit-VIII

Resistance welding: Principles of resistance welding, spot, projection, seam, butt, upset and flash welding process. Thermit welding. Soldering, brazing and braze welding.

Text Book :

1. P. N. Rao [2004], *Manufacturing Technology: Foundry, Forming and Welding*, TMH Publishers, New Delhi.

Reference Books:

1. S.C. Gupta and R. K. Jain [2004], *Production Technology,* KhannaPublication, New Delhi.
2. Hazrachowdhury and S.K. Bose [2003], *Workshop Technology Vol.1,* Media Promoters and Publication, New Delhi.
3. Roy A. Lindberg [2002], *Processes and Materials of Manufac- ture,* PHI Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions

Outcomes:

At the end of the course the student will be able to

1. Understand the role of various casting processes in industry.
2. Understand the role of various Metal forming processes.
3. Understand the role of various Metal joining processes.

MATERIAL SCIENCE & METALLURGY (MSM)
(For II B.Tech. ME - I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 4L / Week **End Exam Marks: 70**
Credits : 4 **End Exam Duration : 3 hrs**

Objectives:
After thorough learning of Material science and metallurgy the student will understand
1. About crystal structures , alloys and phase diagrams.
2. About heat treatment process of steels and theory of powder metallurgy.

Unit – I
Space Lattice and Unit Cells : Miller indices for planes and directions, Crystal packing factor for cubic systems, Coordination number, Crystal Imperfections – Point, line and surface imperfections, Dislocations in crystals & Types of dislocations.

Unit - II
Constitution of Alloys : Classification of alloys, Pure metal, Intermediate alloy phases & Solid solutions & Humerothery rules.
Phase Diagrams : Construction and interpretation of binary equilibrium diagrams, Lever rule, Phase rule, Eutectics, Peritectics, Eutectoids and Peritectoids.

Unit - III
Deformation Processes : Classification, Types of deformations, Elastic and plastic deformations, Mechanisms of plastic deformations-Slip and Twinning, Hot working and cold working, recovery, recrystalisation and grain growth, Creep, Stages of creep, Factors influencing creep.

Unit – IV
Iron Carbon Equilibrium Diagram : Cooling curve of pure iron, con- struction and interpretation of Fe-Fe_3C_c diagram, Effect of alloying elements on Fe-Fe_3C diagram.

Unit - V
Heat Treatment of Steels: Annealing, Normalising, Hardening, and Tempering, TTT diagrams, Hardenability, factors affecting hardenability, determination of hardenability.

Unit – VI
Alloy Steels and Cast Irons : Purpose of alloying, law of alloying, classification of steels- Stainless steels, Heat resistance steels, High speed steels. Properties and uses of various types of Cast irons VIZ White cast iron, Grey cast iron, malleable cast iron & S.G. cast iron.

Unit - VII
Non Ferrous Metals and Alloys : Properties and uses of important non ferrous metals and alloys like Copper, Nickel, Aluminum, Lead and Tin.

Unit – VIII
Powder Metallurgy : Introduction, advantages of Powder Metallurgy, Preparation of metal powders- Mixing, Blending, Compacting, Sintering & Hot-pressing applications of powder

metallurgy, examples of typical components produced.

Text Books :

1. Avner Sidney H [2006], *Introduction to Physical Metallurgy*, McGraw Hill Publishers, New Delhi.
2. V. Raghavan [2004], *Material Science and Engineering*, PHI Publishers, New Delhi.

Reference Books :

1. William F. Smith [1990], *Principles of Material Science and En- gineering*, McGraw Hill Publishers, New York.
2. Kenneth G. Budinski [2003], *Engineering Materials Properties and Selection,* PHI Publishers, New Delhi.
3. Dr. V.D. Kodgire, S.V. Kodgire [2006], *Material Science and Metallurgy*, Everest Publications, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course the student will be able to
1. understand the role of various materials and their properties.
2. study relationship between structure and properties of metals and alloys.
3. Aapply the concept of cooling curves for pure metal, alloys and solid solutions
4. Understand the mechanisms of age Hardening process of non ferrous alloys
5. synthesis the characteristics of Metal Powder and their effect on the production .

MACHINE DRAWING (MD)
(For II B.Tech. ME - I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (1L+3D) / Week **End Exam Marks: 70**
Credits : 4 **End Exam Duration : 3 hrs**

Objectives:

The subject enables the student to Understand the graphical representation of screwed fasteners, machine elements, correct layout of an assembly & detail drawing of components in part drawings.

Unit - I

Screwed Fastenings : Various thread profiles, Multi start threads, Right and left hand threads,

Square and hexagonal bolts and nuts, Assembly of bolt, nut and washer. Eye bolts, Cap screws and machine screws. Lock- ing arrangements for nuts, Foundation bolts.

Keys, Cotters and Pin Joints : Different types of keys in assembly, cotter joint with sleeve, cotter joint with socket and spigot ends, cotter joint with gib, knuckle joint.

Bearings : Solid and bushed journal bearing, Pedestal bearing, Footstep bearing.

Unit – II

Riveted Joints: Different types of riveted heads, Single riveted lap joint, double riveted chain and zig zag lap and butt joints.

Shaft Couplings : Muff couplings, Flanged coupling, Compression coupling, Claw coupling, Universal coupling and Oldham coupling.

Unit – III

Assembly Drawing : Assembly drawings of the following:

Engine Parts : Stuffing box, Steam engine Cross head and eccentric. **Machine Tool Parts and Accessories:** Square tool post, Lathe Tail Stock and shaper tool post.

Miscellaneous Parts: Screw Jack, Swivel bearing and pipe vice.

Part Drawing: Petrol engine Connecting rod, Drill jig and Revolving center.

Introduction to Geometric Modelling (Not for End Examination): Types of modelling, introduction to Modelling Packages.

Text Books :

1. K.L. Narayana, K. Venkata Reddy [2002], *Machine Drawing*, NAI Publication, New Delhi.
2. K.L. Narayana, K. Venkata Reddy [2002], *Production Drawing*, NAI Publication, New Delhi.

Reference Books :

1. N.Sidheswar, P. Kannaiah [2000], *Machine Drawing*, TMH Publishers, New Delhi
2. K.R. Gopalakrishna [1995], *Machine Drawing*, Subhash Publication, New Delhi.
3. P.S. Gill [1999], *Machine Drawing*, Kataria Publication, New Delhi.
4. N.D. Junnarkar [2007], *Machine Drawing*, Pearson Publication, New Delhi.

Note: The question paper shall consist of **THREE** units with **TWO** questions (each 15 Marks) in first two units and **ONE** question (40 Marks) in unit-3. The student shall answer **ONE** question in each unit.

The student will able to:

1.Practice graphical representation of Threads, Various machine elements like solid and bushed journal, knuckle joint, Oldham coupling, double riveted lap joints etc. and their sectional views.

2.Correct layout of an assemblies, able to draw sectional assembly drawings by making use of part list.

Outcomes:

3.Detailed drawings components of machine elements in part drawings

SOFT SKILLS (SS)

(Common for II B.Tech. I Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**
Contact Periods : (1L+2T) / Week
Credits : 2

Objectives:
1.Improve self awareness.
2.Set goals and reach them.
3.Set priorities.
4.Maintain harmonious interpersonal relations.
5.Offer and receive criticism effectively.
6.Be assertive in al walks of life.
7.An effective team player.
8.Confident and effective public speaker.
9.Improve creativity.
10. Solve problems and take effective decisions.

Self Awareness

Importance of Self Awareness – Johari Window in Self Awareness – four quadrants of Johari Window - Open or Arena Quadrant – Blind Spot quadrant – Hidden or Facade Quadrant – Unknown Quadrant.

Goal Setting

Importance of Goal Setting - Difference between Goals and Dreams – Importance of writing Goals – S.M.A.R.T Goals – Intermediate or Short term Goals – Medium Term Goals – Long Term Goals – How to achieve Goals.

Time Management

Importance of Time – what's your style – A few Myths – Prioritize – Procrastination – the thief of time – carving the cock – How to delegate effectively – the art of anticipating – learning to say NO – Plugging time leaks power - Tools for Time Management – Scheduling.

Inter Personal Behavioral Styles

Importance of Interpersonal Skills – Identifying Yourself - Characteristics of Socializer, Relater, Director, Thinker – Identifying others - Communication with others – Adapting yourself to others

Strokes

Importance of Strokes – Art of giving Strokes – your style – conditional and unconditional Strokes – Positive and Negative Strokes – Giving Strokes – Taking Strokes – Asking for Strokes – Refuse to give Strokes.

Assertiveness

Understanding Assertiveness – Three styles Passive, Assertive, Aggressive – Importance of Self Awareness – Self Confidence – Ability to say NO – Assertive Communication – Body Language – Behavior – Benefits of being Assertive

Team Roles

Importance of teams in Organizations – Your style – three different types Cerebral, Action, People – 8 roles Coordinator, Finisher, Innovator, Shaper, Team Worker, Resource Investigator, Organizer, Evaluator - the role of shaper.

Presentation Skills

Importance of Presentation Skills –Knowledge of the Audience - Body Language - the impact of Voice – overcoming stage fear / Nervousness - Stage Etiquettes - Importance of Content – Introduction, Body, Conclusion –Creating an Impact.

Creativity

Importance of creativity – What is creativity – out of the Box thinking - Lateral Thinking – Critical thinking –Blocks in creativity - Being Creative – Tossing Ideas.

Problem Solving and Decision Making

Problem Solving as skill - Out of the Box thinking – Thinking Styles – Steps in Problem Solving - Steps in Decision Making – Types of Decisions.

References:

1. Dr. Stephen R. Covey, Simon and Schuster (1992), *The 7 Habits of Highly Effective People,* Pocket Books Publishers, London.
2. Marc Mancini, (2005), *Time Management,* TMH Publishers, New Delhi.
3. Infosys Campus Connect Portal – http://campusconnect.infosys.com
4. Stephen R. Covey, A.Roger Merrill and Rebecca R. Merrill (2002), *First Things First,* Pocket Books Publishers, London.

5. Norman Vincent Peale (1990), *The Power of Positive Living, Ballantine Books,* New York.
6. Napoleon Hill and W. Clement Stone (1987), *Success Through a Positive Mental Attitude,* Pocket Books Publishers, New York.
7. Stuart R. Levine, CEO & Michael. CROM (1993), *The Leader in You, Dale Carnegie & Associates Inc.* Pocket Books, New York.
8. Shiv Khera (2006), You Can Win, MacMillan India Publishers, New Delhi.

Outcomes:

1.Open-mindedness and harmonious interpersonal relations.
2.Well defined personal life and career.
3.Best utilization of time and resources.
4.Conducive interactions with people.
5.Bringing the best out of self and others.
6.Asking for what one wants and saying no to what is not needed.
7.Unlimited outcome from limited resources.
8.Success in co-curricular, extra curricular and competitive events.
9.Innovative ideas, communication and approaches in every walk of life.

10.Ability to find solutions at individual, group and class level in all areas of academic life.

ELECTRICAL & ELECTRONICS ENGINEERING LAB (EEE(P))

(For II B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:

1. To introduce students the practical aspects of various electrical machines.
2. To promote teamwork among students and effective communication skills
3. To develop in students the practical skills relevant to understand, analyze and operate various DC and AC electric machines.

LIST OF EXPERIMENTS

1. Swine burns test and Brake test on D.C. Shunt Motor
2. OCC of D.C. Shunt Generator

3. O.C and S.C test on single – phase transformer
4. Brake test on 3 – phase squirrel – cage induction motor
5. Determination of voltage regulation of 3 – phase alternator by synchronous impedance method
6. Study of CRO
7. Logic Gates and half adder
8. PN Diode and Zener characteristics
9. Half Wave and full wave Rectifiers
10. CE Amplifier

Outcomes:

1. Understand the working principles of generator, motor, transformer and alternator.
2. Analyze the performance of DC and AC electric machines by conducting suitable tests.

METALLURGY AND WELDING LAB (MTW(P))

(For II B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:

The Lab is designed to Know the student about

1. Material structures of various metals and their applications practically.
2. Practical study of moulding sand properties.

LIST OF EXPERIMENTS

1. Specimen preparation
2. Study of Metallurgical microscope and study of some structures of ferrous and non ferrous specimens
3. Experiment to find GFN on Sieve Shaker
4. Experiment to find percentage of clay in the moulding sand
5. Experiment to find percentage of moisture in the moulding sand

6. Permeability test on moulding sand
7. Shear test & Compression test on sand mould
8. Heat Treatment Furnace
9. Jomeny end Quench Apparatus.
10. Arc welding , Arc cutting and Fire cracker welding
11. MIG welding and Testing of weld cracks by die penetrant test
12. Spot welding
13. Gas Welding

Outcomes:

At the end of the course the student will be able to
1. study relationship between structure and properties of metals and alloys
2. understand the mechanisms of age hardening process of metals.
3. Study the sand properties like GFN, permeability, clay content , shear and compressive strength.
4. Practice on various welding process.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effective from 2010-11)

II B.Tech(ME) - II Semester Scheme:2010

S. No	Subject	Abbre-viation	Credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Mechanics of Solids	MS	4	3	1	-	3	70	30	100
2	Fluid Mechanics & Machinery	FMM	5	4	1	-	3	70	30	100
3	Production Economics &Financial Management	PEFM	4	3	1	-	3	70	30	100
4	Thermal Engineering	TE	5	4	1	-	3	70	30	100
5	Machine Tools and Modern Machining Processes	MTMP	5	4	1	-	3	70	30	100
6	Kinematics of Machines	KOM	5	4	1	-	3	70	30	100
7	Aptitude and Reasoning Skills	ARS	2	1	2	-	-	-	100	100
II	**Practical**									

8	Mechanics of Solids and Fluids Lab	MSF(P)	2	-	-	3	3	70	30	100
9	Machine Tools lab	MT(P)	2	-	-	3	3	70	30	100
10	Computer Aided Drafting	CAD(P)	2	-	-	3	3	70	30	100
	Total		36	23	8	9	-	630	370	1000

MECHANICS OF SOLIDS (MS)
(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits : 4 **End Exam Duration : 3 hrs**

Objectives:
To familiarize the students with the fundamentals of deformation, stresses, strains in structural elements.

Unit - I
Bending Moment and Shear Force : Types of determinate beams, loads, bending moment and shear force and their relation with load. Cantilever and simply supported beams with and without overhangs for all types of loads, shear force and bending moment diagram.
Unit - II
Bending and Shear Stresses : Theory of simple bending, distribution of flexural stresses and shear stresses, Resilience due to bending and shear.
Unit – III
Torsion : Theory of pure torsion in solid and hollow circular shafts, transmission of power. Analysis of members subjected to combined torsion and bending.
Unit - IV
Plane Stresses: Principal planes and Principal stresses, Mohr's circle of stress.
Unit - V

Deflection : Relationship between curvature, slope and deflection. Slope and deflection of cantilever and simply supported beams by successive integration method & Macaulay's method. Strain energy due to bending, castigiano's first theorem.

Unit - VI

Cylindrical Pressure Vessels : Thin cylinders subjected to internal fluid pressure, thick cylinders under internal and external pressures, compound thick cylinders, shrink fit.

Unit - VII

Columns : Slenderness ratio, Axially loaded columns, Euler's theory, Various end conditions, Rankine's theory.

Unit - VIII

Combined Direct and Bending Stresses : Core of section- circular and rectangular sections (solid and hollow), stress distribution due to combined bending and axial loads.

Text Book :

1. B.C. Punmia, Ashok.K. Jain and Arun .K.Jain [2003], *Mechanics of Materials*, Lakshmi Publishers, New Delhi.

Reference Books:

1. Sadhu Singh [1999], *Strength of Materials*, Khanna Publishers, New Delhi.
2. Timoshenko and Young [1968], *Elements of Strength of Materials*, CBS Publications, New Delhi.
3. P.N. Singh and P.K. Jha [1987], *Elementary Mechanics of Solids*, Wiley Easten Publication, New Delhi.
4. Junarkar and Adavi [1991], *Mechanics of Structures Vol.1*, Charotar Publications, New Delhi.
5. S. S. Rattan [2008], Strength of materials, Tata Mc Graw Hill Publishing Company Ltd., New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

Students will be able

1. to know the concepts of stress and strain
2. to analyze the beam of different cross sections for shear force, bending moment, slope and deflection, and principle stresses.
3. to understand the concepts necessary to design the columns, pressure vessels and beams subjected to combined loads.

FLUID MECHANICS & MACHINERY (FMM)
(For II B.Tech. ME - II Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits : 5 **End Exam Duration : 3**

hrs

Objectives:

To be familiar with all the basic concepts of fluids and fluid flow phenomenon, conservation equations and their applications to simple problems.

Unit – I

Fluid Properties: Definition of a Fluid, Density, Sp. Weight, Sp. Gravity, Sp. Volume, Ideal Fluid, Real Fluid, Vapour Pressure, Compressibility, Surface Tension, Capillarity, Viscosity.

Fluid Statics: Absolute Pressure, Gauge and Atmospheric Pressure, Pressure Head - Pressure Measurement and Manometers - Hydro- static Forces on Vertical, Inclined Planes and Curved Surfaces.

Unit – II

Fluid Kinematics: Types of Fluid Flow – Continuity Equation - Continuity Equation In Differential form for Three-Dimensional Flow - Velocity – Acceleration – Velocity Potential and Stream Function.

Unit – III

Fluid Dynamics: Euler's Equation of Motion - Bernoulli's Equation From Euler's Equation – Practical Applications of Bernoulli's Equation – Venturi Meter - Orifice Meter .

Unit – IV

Momentum equation: Impulse Momentum Equation and its Applications.

Flow Measurement: Velocity Measurements: Pitot Tube - Pitot Static Tube, Volume Flow Rate Measurement, Flow Through Pipes: Regimes of Flow, Reynolds Number - Hagen Poiseuille Equation - Darcy Weisbach Equation – Friction Factor – Mi nor Energy Losses - Energy Gradient and Hydraulic Gradient Line.

Unit – V

Impact of Jets: Hydrodynamic Force of Jets on Stationary Vertical and Inclined Flat Plates, Moving Vertical and Inclined Flat Plates, and Curved Vanes.

Unit – VI

Hydraulic Turbines: General Layout of Hydroelectric Power Plant – Definition of Heads and Efficiencies of a Turbine – Classification of Hydraulic Turbines - Pelton Wheel – Francis Turbine – Kaplan Turbine.

Unit - VII

Centrifugal pumps: Components – Work Done – Definitions of Heads and Efficiencies – Priming – Cavitation – Performance Characteristics

Unit – VIII

Reciprocating Pumps : Classification of Reciprocating pumps – Main components and working principle – Discharge, Work done and Power required to drive reciprocating pump – Coefficient of discharge and slip.

Text Books:

1. P.N. Modi and S.M. Seth [2005], *Hydraulics and Fluid Mechanics*, Standard Book House, New Delhi.
2. R.K. Bansal [2006], *Fluid Mechanics And Hydraulic Machines*, Laxmi Publications (P) Ltd., New Delhi.
3. S.C. Gupta [2007], *Fluid Mechanics and Hydraulic Machines,* Pearson Publications, New Delhi.

Reference Books :

1. J.A.Roberson and C.T.Crowe [1999], *Engineering Fluid Mechanics*, Jaico Publication, New Delhi.
2. S.W.Yuan [1988], *Foundation of Fluid Mechanics*, PHI Publishers, New Delhi.
3. Victor L. Streeter, E. Benjamin Wylie [1983], *Fluid Mechanics*, McGraw Hill Publication, New York.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:
The student will able to Characterizing fluids regarding their properties. Applying hydrostatic principles to determine centre of pressure and manometry. Applying Bernoulli equation to the study of flows, discharge measurement and flow velocity. Working of various turbines and pumps.

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PRODUCTION ECONOMICS & FINANCIAL MANAGEMENT (PEFM)
(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment :30**
Contact Periods : (3L+1T) / Week **End Exam Marks:70**
Credits : 4 **End Exam Duration : 3 hrs**

Objectives:
1.The objective of this course is to provide the student an understanding of the basic concepts and principles in the areas of economics, production analysis, product costing and financial management.
2.To familiarize the student with the mechanics of preparation and interpretation of financial statements

Unit - I
Introduction to Economics : Definition, Demand analysis, Types of demand, Factors determining demand, law of demand- Assumptions & exceptions, law of diminishing marginal utility, Elasticity of demand, Factors governing elasticity of demand.
Unit - II
Elements of Cost: Elements of cost - Material cost, Labour cost, Overheads (Factory overheads, Administrative overheads, Selling and distribution overheads), Methods of allocation of overheads
Unit - III
Depreciation: Definition, Causes of depreciation, Methods of calculating depreciation -Straight line method of depreciation, Diminishing balance method of depreciation, Sinking fund method of depreciation, Annuity charging method.
Unit - IV
Accountancy: Introduction, Double entry Book keeping, Journal, Ledger, Trail balance

Unit – V

Accountancy - Final Accounts: Preparation of Trading, Profit & loss account , Balance sheet with simple adjustments pertaining to closing stock, depreciation, income & expenses.

Unit -VI

Financial Management : Objectives, functions, time value of money, present value of single cash flow, multiple cash flows and Annuity, Future value of single cash flow, multiple cash flows and Annuity.

Unit - VII

Financial Statement Analysis: Ratio analysis, Liquidity ratios (current ratio, & quick ratio), Activity ratio's (Inventory turnover ratio, Debtors turnover ratio), Capital structure ratio's (Dept-Equity ratio, Interest coverage ratio) & Profitability ratios (Gross profit ratio, Net profit ratio, Operating ratio, P/E ratio & EPS)

Unit - VIII

Capital budgeting *:* Capital budgeting & its significance, capital budgeting techniques- Pay back period, Accounting rate of return (ARR), Net present value method, profitability index (Simple problems)

Leverages*:* Operating leverage, financial leverage, combined leverage.

Text Books :

1. Dewatt [2005], *Modern EconomicTheory*, Shyamlal Charitable Trust, New Delhi.
2. Prasanna Chandra [1999], *Fundamentals of Financial Management*, TMH Publishers, New Delhi.
3. S.P. Jain and K.L.Narang [2006], *Financial Accounting*, Kalyani Publications, Ludhiana.
4. Banga and Sharma [2003], *Mechanical Estimation and Costing*, Khanna Publishers, New Delhi.

Reference Book :

1. M.Y Khan and P.K Jain [2004], *Financial Management*, TMH Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1.The student gains conceptual knowledge of Economic Theories and their application for Managerial Decisions.
2.The student gains conceptual knowledge of the tools of financial analysis and management and various long-term and short-term sources of finance.
3.The student develops skills for making financial decisions in practical business situations

THERMAL ENGINEERING (TE)
(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
The course provides applications of thermodynamics and study of power plants.

Unit – I
Steam Generators: Introduction, classification of boilers, fire tube boilers, water tube boilers, merits and demerits of fire tube boilers, high pressure boilers, advantages of high pressure boilers, boiler mountings and accessories
Unit -II
Performance of steam generators and Boiler Draught : Equivalent evaporation capacity, Efficiency of boiler, types of draught, Calculation of chimney height and diameter, condition for maximum discharge through a chimney, chimney efficiency
Unit – III
Steam Power Cycles: Simple steam power cycle, Rankine cycle, comparison of Rankine and Carnot cycles, modified Rankine cycle, means of increasing the efficiency of the Rankine cycle, reheating and regenerative cycles.
Unit -IV
Steam Nozzles : Isentropic flow through nozzles, velocity of steam leaving through nozzle , Discharge of steam through nozzle , Condition for maximum discharge through nozzle - critical pressure ratio, effect of friction , nozzle efficiency.
Unit – V
Impulse Steam Turbines : Classification, Principle of operation of impulse turbine, , De-Laval Turbine - its features, compounding of impulse turbine, velocity diagram for single stage impulse turbines, effect of friction, power developed, axial trust, diagram efficiency, condition for maximum efficiency, Governing of steam turbines
Unit-VI
Reaction turbines: Principle of operation, velocity diagram, degree of reaction, Parson's reaction turbine, power produced by reaction turbine, Height of blades of reaction turbine, Comparing reaction and impulse turbines
Unit - VII
Steam Condensers: Function of condensers, classification of condensers, jet condensers, surface condensers, comparison of jet and surface condensers, mass of circulating water required in a condenser, condenser efficiency and vacuum efficiency
Unit VIII
Nuclear Power Plant and Diesel Power Plant: Nuclear Fission , Nuclear Fusion, Chain reaction, Components of nuclear power plant, Types of Nuclear reactors, Introduction of diesel power plant, essential components of diesel power plant, layout of diesel power plant

Text Books:
1. R.K.Rajput [2006], *Thermal Engineering*, Lakshmi Publications, New Delhi.
2. C.P.Arora [2005], *Refrigeration and Air Conditioning*, TMH Publishers, New Delhi.
3. P.K Nag(2005), *Power Plant Engineering* , Lakshmi Publications, Bangalore
Reference Books:
1. P.L. Ballaney [2003], *Thermal Engineering*, Khanna Publishers, New Delhi.
2. V.P. Vasandhani and D.S. Kumar [2003], *Heat Engineering*, Metropolitan Books, New

Delhi.
3. S.C.Arora and S.Domakundwar [2006], *Refrigeration and Airconditioning*, Dhanpat Rai and Sons Publications, New Delhi.
4. S.C. Gupta [2005], *Thermal Engineering*, Pearson Education, New Delhi.
5. R.J. Dossat [2002], *Principles of Refrigeration*, Pearson Education, New Delhi.
6. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], *Thermal data hand book, IK International Publishers, Bangalore*
7. *G.D.Rai(2006), Power Plant Engineering , Khanna Publishers ,New Delhi*

Note:

1. The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.
2. Use of Thermal Engineering data hand book (steam tables, mollier diagrams, refrigeration charts) is permitted.

Outcomes:

Student gets knowledge in

1. Boilers and its Performance
2. Steam power cycles and steam condensers.
3. Flow through nozzle, Nozzle efficiency
4. Working of impulse and reaction turbine
5. Working of Nuclear and diesel power plant.

MACHINE TOOLS AND MODERN MACHINING PROCESSES (MTMP)
(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:

Students Learn about
1.the various machine tools.
2. Introduction of CNC machines
3.Unconventional manufacturing methods.

Unit-I

Lathe : Introduction, types of lathes, size of lathe, parts of a lathe, lathe operations – Straight turning, Taper turning, Thread cutting.

Unit-II

Capstan and Turret Lathes: Introduction, Difference between capstan and turret lathes principal parts of capstan and turret lathes, capstan and turret mechanism (turret indexing mechanism and bar feeding mechanism)

Unit-III

Drilling : Introduction, Types of Drilling machines, upright drilling machine parts, radial drilling machine parts, drilling machine operations.

Unit-IV

Shaper, Planner, Slotter : Introduction, Types of shapers, principal parts of a shaper, shaper size, shaper mechanisms, Crank and slotted link mechanism, Whit worth quick return mechanism, Hydraulic shaper mechanism, Shaper Operations. Introduction to planner, types of planning machines, parts of a planning machine, table drive mechanism, open and cross belt drive. Planer operations. Introduction to Slottere, Slotter size, parts of a Slotting machine. Slotter operations.

Unit-V

Milling Machines : Introduction, Types of Milling machines, principal parts of a milling machine, milling machine operations (Plain milling, face milling, side milling, straddle milling, angular milling, gang milling, form milling, profile milling, end milling, milling keyways, grooves and slots and gear cutting). Dividing heads – Plain or Simple dividing head, Universal dividing head. Indexing methods, Direct or Rapid indexing, Plain or simple indexing, Compound indexing, Differential indexing.

Unit-VI

Grinding Machines : Introduction, Kinds of Grinding, Grinding machines, Grinding wheel specifications, Glazing and loading in wheels, Dressing and trueing of grinding wheels. Honing, lapping and super finishing.

Unit-VII

CNC Machines: Introduction to NC machines, parts of NC Machines, Introduction to CNC machines parts of CNC Machines, Deference between NC and CNC Machines.

Unit-VIII

Unconventional Manufacturing Methods : Electrical Discharge Machining (EDM), Electro Chemical Machining (ECM), Ultrasonic Machining (USM), Electron Beam Machining (EBM), Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Abrasive Jet Machining (AJM).

Text Book :

1. P.N. Rao [1998], *Manufacturing Technology*, TMH Publishers, New Delhi.

Reference Books :

1. S.C.Gupta & R.K.Jain [2006], *Production Technology*, Khanna Publishers, New Delhi.
2. S.K. Hajra Chowdhary & A.K. Haira Chowdhary [2004], *Work shop technology Volume*

II, Media Promoters & Publishers, New Delhi.
3. P.C.Sharma [2006], *Production Engineering*, S. Chand Publishers, New Delhi.
4. Roy A. Lindberg [2002], *Processes and Materials of Manufacture*, PHI Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:
The student get familiarize
1. with various Machining processes used in industry.
2. various unconventional machining processes like EDM,ECM,USM ,EBM etc.
3. Basic concepts of CNC machines.

KINEMATICS OF MACHINES (KOM)
(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
To expose the students to learn the fundamentals of various laws governing rigid bodies and its motions

Unit- I
Definitions And Basic Concepts : Introduction, planar mechanisms, link or element, types of links, kinematic pair, types of kinematic pairs, kinematic chain, mechanism, machine, degrees of freedom or mobility, inversion of mechanism.
Unit- II
Mechanisms With Lower Pairs: Quadric cycle chain and its inversions, single and double slider crank chain and its inversions, applications, quick return motion mechanisms , Hooke's joint, double hook's joint. Davis and Ackermann steering gear mechanisms.
Unit – III
Velocity Analysis : Absolute and Relative Motions, motion of a link, velocity of rubbing, velocity diagrams for four bar mechanism, single slider mechanism and quick return motion mechanisms, Instantaneous Center, Kennedy's theorem, Instantaneous center four bar and single slider mechanisms.
Unit- IV
Acceleration Analysis: Acceleration diagrams for four bar and single slider mechanism, Coriolis component of acceleration, acceleration diagrams for crank and slotted lever mechanism.
Unit – V
Belt-Friction : Types of belt and rope drives, angular velocity ratio of flat belts, effect of belt thickness on velocity ratio, effect of slip on velocity ratio, length of flat belts, angle of contact of

open and cross belts, Law of belting, ratio of belt tensions, power transmitted by belt drive, effect of centrifugal tension on the power transmitted, phenomenon of creep in belts, initial tension in belts and its effect on maxi- mum power transmission, Power transmitted by V-belt drive.

Dynamometers: absorption and transmission types, general description and method of operation.

Unit – VI

Gears: Classification of Gears, gear terminology, law of gearing, velocity of sliding, path of contact, arc of contact, number of pairs of teeth in contact, forms of teeth. Interference in involute gears, minimum number of teeth, interference between rack and pinion.

Unit- VII

Gear Trains: Simple gear train, compound gear train, reverted gear train, planetary or epicyclic gear train, velocity ratio of epicyclic gear train (tabular method) , torques in epicyclic trains. Simple problems on gear trains.

Unit – VIII

Governors: Types of Governors, Watt governor, Porter governor, Proell governor, Hartnell governor, sensitiveness of a governor, hunting, isochronism, stability, effort of a governor, power of a governor, controlling force

Text Books :

1. S. S. Rattan [2005], *Theory of Machines*, TMH Publishers, New Delhi.
2. Sadhu Singh [2006], *Theory of Machines*, Pearson Education, New Delhi.

Reference Books :

1. Ballaney [2003], *Theory of Machines*, Khanna Publishers, New Delhi.
2. Jagdish Lal [1997], *Theory of Mechanisms and Machines*, Metropolitan Publishers, New Delhi.
3. Thomas Bevan [2002], *Theory of Machines*, CBS Publishers, New Delhi.
4. J.S. Rao and R.V. Dukkipati [2006], *Mechanisms and Machine Theory*, NAI Publishers, New Delhi.
5. J.E. Shigley [1995], *Theory of Machines and Mechanisms*, McGraw Hill Publishers, New York.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course the student acquires the basic knowledge in

1. Simple mechanisms with their inversions.
2. velocity and acceleration of simple mechanisms
3. theory of gears, gear trains and governors.
4. theory of belt frictions and dynamometers.

APTITUDE AND REASONING SKILLS (ARS)

(Common for II B.Tech. II Semester all branches)

Scheme : 2010 **Internal Assessment : 100**
Contact Periods : (1L+2T) / Week

Objectives:

1.To enable students in cracking Career Aptitude Tests.
2.To equip students with problem solving and decision making skills.
3.To enhance skill of analysis and reasoning.
4.To enrich students with out of box thinking and better approaches to problem solving.
5.To inculcate the logical thinking.
6.To exercise speed, accuracy and hence optimum productivity.

Credits : 2

Quantitative Aptitude

- Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and Loss, Simple interest and Compound Interest, Ratio and Proportions and Variation, Time and Work, Time and Distance, Mensuration, Functions, Set Theory, Permutation and Combinations, Probability, Progressions, Inequalities, Coordinate Geometry, quadratic Equations, Logarithms

- HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Surds and Indices, Pipes and Systems, Area, Volume and Surface Areas, Races and Games, Calendar, Clocks, Stocks and Shares, True Discount, Banker's Discounts

- Data Interpretation – Tabulation – Bar Graphs – Pie Charts – Line Graphs.

Reasoning

Directions, Blood Relations, Problems on cubes, Series and sequences, odd man out, Coding and decoding, Data Sufficiency, logical deductions, Arrangements and Combinations, Groups and Teams, General Mental Ability, Puzzles to puzzle you, More Puzzles, Brain Teasers, Puzzles and Teasers.

References:

1. Arun Sharma (2003), *How to Prepare for Quantitative Aptitude*, TMH Publishers, New Delhi.
2. R.S. Aggarwal (2005), *Quantitative Aptitude,* S.Chand Publishers, New Delhi.
3. Sharon Weiner-Green, Ira K.Wolf (2006), *Barron's GRE,* Galgotia Publications, New Delhi.
4. R.S Aggarwal (1998), *Verbal and Non-Verbal Reasoning,* S.Chand Publishers, New Delhi.
5. Shakuntala Devi (2005), *Puzzles to Puzzle You,* Orient Paper Backs Publishers, New Delhi.
6. Shakuntala Devi (2006), *More Puzzles,* Orient Paper Backs Publishers, New Delhi.
7. Ravi Narula (2005), *Brain Teasers,* Jaico Publishing House, New Delhi.
8. George J Summers (2005), *Puzzles and Teasers,* Jaico Publishing House, Mumbai.

Outcomes:

1.Cracks Career Aptitude Tests with an ease and identifies his innate component of a competency, hence a better career.
2.Tends to be quick learner, highly adaptive and productive.
3.Exhibits better problem solving skills with best approaches.
4.Tends to be creative in solving problems with out of box thinking.
5.Compares, differentiates and establishes relations with rational and logical thinking.
6.Displays improved mental ability and swiftness.

MECHANICS OF SOLIDS AND FLUIDS LAB (MSF(P))

(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/ Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

1.To enable the students to acquire knowledge of flow meters.
2. Give student insight into working of various fluid machines and be able to compare performance of fluid machines under different working conditions.

Objectives:

3.To get familiarize the students with the use of stress, strain measuring instruments.

LIST OF EXPERIMENTS

1. a) Determination of coefficients of discharge, velocity and contraction for a small orifice by 'Constant head method'.
   b) Determination of coefficient of discharge for an external mouthpiece by 'Constant head method'.
2. Determination of friction factor for a given pipe line.
3. a) Calibration of Venturimeter.
   b) Calibration of Orificemeter.
4. Performance test on single stage centrifugal pump.
5. Performance test on submersible pump.
6. Performance test on Reciprocating pump.
7. To study the stress-strain characteristics of Mild steel rod using Universal Testing Machine.
8. To find the modulus of elasticity of given material by measuring deflection in simply supported beam.
9. To find the modulus of rigidity of given material using Torsion Testing Machine.
10. To find the modulus of rigidity of given material using Spring Testing Machine.
11. To find modulus of elasticity by conducting flexural test on carriage spring.
12. (a) To find Rock well hardness number of given material
    (b) To find impact strength (Izod & Charpy) using impact testing machine.

Outcomes:

1. To gain knowledge on working of centrifugal pumps, submersible pump and reciprocating pump.
2. To gain the knowledge of various flow meters and the concept of fluid mechanics.
3. The students will be able to understand procedures for conducting tensile, torsion tests on mild steel specimens
4. Determine the Young's modulus using deflection test on beams and tensile test on rods, tension and compression test on springs, and impact tests on steel.

MACHINE TOOLS LAB (MT(P))

(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : 3P/ Week **End Exam Marks: 70**

Credits : 2 **End Exam Duration : 3 hrs**

Objectives:
Understand the roll of metal removal processes in producing the components on different machines.

LIST OF EXPERIMENTS

1. Step turning
2. Taper turning by compound swivel method
3. Eccentric turning
4. Right hand thread cutting and Left hand thread cutting
5. Making of a Single point cutting tool by formed grinding wheel on tool cutter grinder.
6. Drilling, reaming, tapping and counter sinking
7. Pattern making
8. V- groove cutting on shaper.
9. Key way cutting on slotting machine and Spur gear cutting on milling machine
10. Wood turning
11. Alignment Tests on Lathe Machine
12. Alignment Tests on Radial Drilling Machine

Outcomes:
The Students learn
1. To produce the components from raw material to finished products by selecting the sequence of machining processes on Lathe machine, drilling machine, Milling machine, shaper, planner and slotting machine.
2. To produce Single point cutting tools on Tool and cutter grinder.
3. To conduct alignment tests on machine tools.

COMPUTER AIDED DRAFTING (CAD(P))

(For II B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/ Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:
To provide hands-on training to the students in computer aided drafting.

LIST OF EXPERIMENTS

2D Drafting: AUTO CAD

1. Introduction to CAD software
2. Exercise on usage of Auto CAD 2D Drawing Commands
3. Exercise on usage of Auto CAD 2D Editing Commands
4. Exercise on usage of Auto CAD 2D dimension commands

5. Exercises on Auto CAD 2D Drawings -I
6. Exercises on Auto CAD 2D Drawings - II

3D Drafting : AUTO CAD

7. Introduction to 3D Modeling Using Autocad Software
8. Modeling of Component in 3D – V block
9. Modeling of Component in 3D – Open Bearing
10. Modeling of Component in 3D – Angular block
11. Modeling of Component in 3D – Dovetail Guide
12. Modeling of Component in 3D – Dovetail Bracket
13. Modeling of Component in 3D – Dovetail stop

C-Graphics

14 Construction of line, Circle, Arc, Ellipse, Hatching etc. using C-graphics built in functions

15. Construction of graph using C-graphics

Outcomes:

To get familiarize the students to use computer aided drafting package to draw 2D and 3D parts of mechanical components.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effective from 2010-11)

III B.Tech(ME) - I Semester **Scheme :2010**

S. No	Subject	Abbre-viation	Credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Industrial Engineering & Management	IEM	5	4	1	-	3	70	30	100
2	IC Engines & Gas Turbines	ICGT	5	4	1	-	3	70	30	100
3	Instrumentation & Control systems	INCS	5	4	1	-	3	70	30	100
4	Engineering Metrology	EMTR	4	4	-	-	3	70	30	100
5	Dynamics of Machines	DOM	5	4	1	-	3	70	30	100
6	Design of Machine Members – I	DMM1	5	4	1	-	3	70	30	100
II	**Practical**									
7	Geometric Modeling Lab	GM(P)	2	-	-	3	3	70	30	100
8	Thermal Engineering Lab	THE(P)	2	-	-	3	3	70	30	100
	Total		33	24	5	6	-	560	240	800

INDUSTRIAL ENGINEERING & MANAGEMENT (IEM)
(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment: 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits: 5 **End Exam Duration : 3 hrs**

Objectives:
To identify and implement effective solutions to engineering problems by applying industrial engineering and management tools in production systems.

Unit - I
Management: Introduction to Management, Scientific Management, Systems approach to Management, MBO, Decision Making Process.
Unit - II
Personnel Management: Functions of personnel management, types of training, Job evaluation and Merit rating, Collective bargaining and labour participation in management.
Unit - III
Plant Location: Factors affecting plant location, Comparison between urban and rural location, Breakeven analysis- Mathematical method, Graphical Method, Assumptions, Applications, Limitations.
Unit - IV
Plant Layout: Plant layout objectives, Types of layouts, merits and demerits, Factors governing the design of layout, Muthor's principles of plant layout. Objectives and principles of materials handling, types of material handling equipment.

Unit - V

Work Study: A brief introduction to method study and work measurement, Standard time calculations, Methods of rating, Work sampling, Wages and incentives, types of incentive plans.

Unit - VI

Project management: Introduction, Rules for drawing network diagram, Project Evaluation & Review Technique (PERT), Event time computations-Earliest expected time and latest allowable Occurrence time, Slack, Critical Path, Critical Path method (CPM), Activity time estimates (EST,EFT,LST,LFT) and determination of Total Float, Free Float, Independent float, crashing of network.

Unit-VII

Plant Maintenance: Objectives, Functions and Types of plant maintenance.

Unit - VIII

Industrial Acts: Industrial safety, Accidents prevention and control, Factories act, Workmen compensation act, Industrial disputes act.

Text Books:

1. Buffa Elwood S [2002], *Modern Production / Operations Man agement*, John Wiley Publishers, Singapore.
2. Punmia B.C [2002], *Project Planning and Control with PERT & CPM*, Laxmi Publications, New Delhi.
3. Martand T Telsang [2007], *Industrial and Business Management*, S. Chand Publishers, New Delhi.

Reference Books :

1. Banga & Sharma [2005], *Industrial Engineering and Management*, Khanna Publishers, New Delhi.
2. ILO [2000], *Introduction to Work Study*, Universal Publications, Mumbai.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1. Be able to apply the tools and techniques of industrial engineering to make value-based decisions.
2. Be able to design a system, component, or process to meet desired needs within constraints
3. Be able to identify deficiencies of existing systems and to propose solutions for improvements.
4. Be able to perform function as a member/leader of a multi-disciplinary team.

IC ENGINES & GAS TURBINES (ICGT)

(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment :**

30

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits : 5 **End Exam Duration : 3 hrs**

Objectives:

To familiarize working principle and performance of IC Engines and Gas Turbines.

Unit – I

I.C. Engines : Energy conversion, basic engine components, Working principle of engines - two stroke and four stroke engines, SI and CI engines, Classification of I.C. Engines, Valve and port timing diagrams, comparison of two stoke and four stroke engines, comparison of SI and CI engines, application of I.C engines.

Unit – II

Engine Performance Parameters: The First law analysis of engine cycle, Brake power, indicated power, friction power, mean effective pressure, engine efficiencies, performance calculations, Heat balance.

Unit – III

Measurements and Testing: Measurement of Brake power – Rope brake, hydraulic, Eddy current and swinging field DC dynamometers; Friction power – Willian's line method, Morse test, motoring test and retardation test.

Unit – IV

Combustion in S.I Engines: Homogeneous and heterogeneous mixtures, principle of carburetion, stages of combustion in S.I Engines, , knocking.

Combustion in C.I Engines: Disintegration of fuel jet, stages of combustion, knocking.

Super Charging: types of superchargers, advantages and limitations of super charging.

Unit – V

Reciprocating air Compressors: Introduction and classification of compressors, mechanical details and working principle of a single stage reciprocating compressor, equation for work, effect of clearance volume, isothermal, adiabatic, and volumetric efficiencies, two-stage compression, Condition for minimum work.

Unit – VI

Centrifugal& Axial flow Compressors: introduction, essential parts of a centrifugal compressor, principle of operation. – Introduction to axial flow compressor, geometry and working principle.

Unit – VII

Gas Turbines : Simple Gas Turbine, ideal cycle, essential components, open and closed cycle arrangements, requirements of working medium, applications of Gas Turbines, comparison of Gas Turbines with reciprocating engines, work output and efficiency of a simple Gas Turbine cycle, optimum pressure ratio for maximum specific output, Gas Turbines with regeneration, reheating and intercooling. .

Unit – VIII

Jet Propulsion : Introduction to Propeller engines and Gas Turbine engines, working principle of Ramjet engine, Pulse jet engine, Turboprop engine and Turbojet engine, Thrust and thrust equation, specific thrust, parameters affecting flight performance, introduction to Rocket propulsion, classification of Rockets and principle of Rocket propulsion,

Text Books :

1. V.Ganeshan [2004], *Internal Combustion Engines*, TMH Publishers, New Delhi.

2. V.Ganeshan [2003], *Gas Turbines*, TMH Publishers, New Delhi..

Reference Books :

1. R.K Rajput [2005], *Thermal Engineering*, Lakshmi Publications, New Delhi.
2. S. L. Soma Sundaran [1996], *Gas dynamics and Jet Propulsion*, NAI Publishers, New Delhi.
3. P.L. Ballaney [2003], *Thermal Engineering*, Khanna Publishers, New Delhi.
4. Sarvanamutto and GFC Rogers [2005], *Gas Turbine Theory*, Pearson Education, New Delhi.
5. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], *Thermal data hand book, IK international Publishers, Bangalore*

Note:

1. The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.
2. Use of Thermal Engineering data hand book is permitted.

The student gains :

1. Internal combustion engine components, Working principle of SI and CI engine and performance parameters
2. Combustion of S.I and C.I engines and super charging.

Outcomes:

3. Working of Gas compressor, Gas turbine cycle analysis, Jet propulsion

INSTRUMENTATION & CONTROL SYSTEMS(INCS)
(For III B.Tech, ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:

To enable the students to understand the fundamentals of instrumentation and control available for monitoring/measuring in domestic / industrial applications.

Unit - I

Measurement and Instrumentation: Measurement, measurement methods, generalized measurement system and its functional elements, classification of instruments, error and its classification, static and dynamic characteristics, **Sensors and Transducers:** Introduction, mechanical detector transducer elements, electrical transducers, transducers classification and description, transducer sensitivity, variable resistance transducers, variable inductance transducers, capacitive transducers, LVDT, piezo electric and photo electric transducers.

Unit – II

Measurement of Pressure, Flow and Temperature : Pressure measurement terms, measurements of low pressure gauges such as McLeod gauge, thermal conductivity gauge, Ionization gauge, measurement of high pressure such as Bourdon gauge, resistance gauge, CRO for varying pressure measurement.

Unit – III

Classification of flow measurement techniques, special flow meters such as Turbine flow meter, Magnetic flow meter, Hot wire anemometer, Ultrasonic flow meter. Temperature measurement instruments, thermocouples, resistance thermometers and thermistors, radiation and optical Pyrometers.

Unit – IV

Measurement of Force, Torque, Acceleration : Basic force measurement methods such as elastic load cells, elastic strain gauge load cells, hydraulic and pneumatic load cells, Torque measurement, different types of torsion meters, piezo electric accelerometer, seismic accelerometer, strain gauge accelerometer.

Unit – V

Strain Gauges and Measurement : Strain measuring techniques, requirement of strain gauges, resistance strain gauges, strain gauges alloys and material, bonded and unbonded strain gauges, bonding techniques, temperature compensation in strain gauges.

Unit – VI

Control Systems, Mathematical Models and Transfer Function : Introduction, examples of control systems, classification of control systems, open loop and closed loop control systems, control system terminology, servomechanism.

Physical system and mathematical models, mechanical systems, thermal systems, electrical systems, hydraulic and pneumatic systems, linear control system, transfer function, block diagram and its reduction process, signal flow graphs, mason's rule.

Unit - VII

Performance of Control Systems : Standard test inputs, response of first order control systems, performance of second order control systems, properties of transient response, steady state error and error constants

Unit - VIII

Concept of stability, necessary conditions for stability, relative stability, Routh-Hurwitz stability criterion, bode plots, gain and phase margin.

Text Books :

1. Beckwith and Buck [1997], *Mechanical Measurements*, Narosa Publication, New Delhi.
2. S. Ghosh [2005], *Control Systems – Theory & Applications*, Pearson Education, New Delhi.

Reference Books :

1. D.S. Kumar [2002], *Mechanical Measurements and Control*, Metropolitan Books, New Delhi.
2. B.S.Manke [2004], *Linear Control Systems*, Khanna Publishers, New Delhi.
3. Doeblin.E.O. [2004], *Measurement Systems*, TMH Publishers, New Delhi.
4. Nagarathan and Gopal [2003], *Control System Engineering*, Narosa Publishers, New Delhi.
5. Naresh K. Sinha [1998], *Control Systems*, NAI Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the conclusion of this course, the students will be able to:

1. To learn fundamentals of various types of Transducers.
2 To acquire basic understanding of principle & working of Transducers.
3 To Understand the methods to analyze the stability of systems from transfer function forms.

ENGINEERING METROLOGY (EMTR)
(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 4L / Week **End Exam Marks: 70**
Credits : 4 **End Exam Duration : 3 hrs**

Objectives:

The main objectives of this course are:

1. To provide to the students an understanding and appreciation of the science of Measurement.

2.To expose the students to various mechanical and electrical engineering measuring devices

Unit - I

Standards of Measurements : Line standards, End standards and Wave length standards

Limits, Fits and Gauges: Tolerances, limits and Fits, Basic types fits, Interchangeable and Selective assemblies, Systems of limits and fits as exemplified in British, International and Indian standards for Plain work, Limit gauging- Plug, ring and gap gauges, Taylor's principle of limit gauges. Problems on limits, fits and design of GO and NO GO gauges.

Unit - II

Precision Measurement : Construction and typical uses of Dial indicators, Comparators- Mikrokator comparator, Sigma comparator, optical comparator, Electrical comparator, Solex pneumatic comparator and Tool Makers microscope and its applications.

Unit - III

Angular Measurement : Bevel protractor, Clinometer, angle dekkor, Sine bar, Spirit level, Auto collimator, Applications of Slip gauges, rollers and balls in testing of tapers.

Unit - IV

Screw Thread Measurement : Terminology of screw threads, effect of pitch errors and angle errors, concept of virtual effective diameter, Measurement of major, minor and effective diameter.

Unit - V

Measurement of Gears: Terminology of gear tooth, tooth to tooth pitch measurement, profile checking, tooth thickness measurement and Parkinson gear tester.

Unit - VI

Measurement of Surface Finish : Significance of surface finish, order of geometrical errors occurring during machining, magnitude, sample length, methods of measuring surface finish-stylus probe instruments, Tomlinson surface meter and Taylor- Hobson- Talysurf.

Interferometry : Interference of light, optical flat and its uses, Michelson interferometer, NPL flatness interferometer, NPL gauge interferometer.

Unit - VII

Alignment Tests on Lathe : Levelling of the machine, True running of locating cylinder of main spindle, True running of headstock center, Parallelism of the main spindle to saddle movement, True running of taper socket in main spindle, Parallelism of tail stock guide ways with the movement of carriage, Parallelism of tailstock sleeve taper socket to saddle movement, Alignment of both the centers in vertical plane, Axial slip of lead screw.

Unit - VIII

Co ordinate Measuring Machines : CMM construction, Possible sources of error in CMM, Accuracy specifications of coordinate measuring machines, Advantages of CMM.

Introduction to Micro and Nano Metrology.

Text Book :

1. R.K.Jain [2002], *Engineering Metrology*, Khanna Publishers, New Delhi.

Reference Books :

1. ASTME [1988], *Hand Book of Industrial Metrology*, PHI Publication, New Delhi.
2. P.C.Sharma [2006], *A textbook of Production Engineering*, S. Chand Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of this course the student is expected:

1. To be familiar with the different instruments that are available for linear, angular, roundness and roughness measurements.
2. To be able to select and use the appropriate measuring instrument according to a specific requirement in terms of accuracy, etc.
3. Understand the gauges, tolerances, comparators and methods of measuring surface roughness and alignment test on lathe.
4. To get introduction about modern measuring machines like CMM.

DYNAMICS OF MACHINES (DOM)
(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits : 5 **End Exam Duration : 3 hrs**

Objectives:

To expose the students to learn the fundamentals of dynamics of machines.

Unit – I

Cams: Types of cams, types of followers, terminology of cam and follower, types of motion of the follower - uniform velocity, simple harmonic motion, uniform acceleration and retardation and cycloidal motion. Drawing of cam profile for knife edge, roller and flat faced reciprocating follower for the given motion. Cam profile with offset roller follower.

Unit - II

Inertia Force Analysis: D'Alembert's Principle, simple and compound pendulum, equivalent dynamic system, correction couple, Klein's construction for velocity and acceleration, velocity and acceleration of piston, angular velocity and angular acceleration of connecting rod, piston effort, crank effort, turning moment on crank shaft, Inertia of a connecting rod.

Unit – III

Flywheel : Function of fly wheel, co-efficient of fluctuation of energy and speed in flywheels, relation between fluctuation of speed and energy, size of flywheel, flywheel in punching press.

Unit – IV

Gyroscopic Effects: Introduction, Gyroscopic couple, effects of gyroscopic couple on an aeroplane, gyroscopic effects on a naval ship during steering, pitching and rolling, stability of four wheel automobile moving in a curved path, Stability of a two wheel vehicle taking a turn.

Unit – V

Balancing of Rotating Masses: Static Balancing, dynamic balancing, balancing of several masses in different planes.

Unit-VI

Balancing of Reciprocating Masses: Balancing of reciprocating masses, partial balancing of locomotives, effects of partial balancing in locomotives, secondary balancing, balancing of inline engines and balancing of V-engines.

Unit – VII

Principles of Vibrations : Types of vibrations, free vibrations, frequency for free longitudinal, transverse vibrations, differential equation of S.H.M. energy method to find frequency of oscillations or time period, free oscillations of spring mass system, determination of equivalent spring stiffness, free damped vibrations, under damping, critical damping and over damping. Forced vibrations, Vibration isolation and Transmissibility.

Unit – VIII

Transverse Vibrations : Dunkerley's method and rayleigh's method for finding critical speed of the shaft.

Torsional Vibrations : Free torsional vibrations of single rotor, free torsional vibrations of two-rotor and three-rotor system, torsionally equivalent shaft and geared systems.

Text Books :

1. S.S. Rattan [2005], *Theory of Machines*, TMH Publishers, New Delhi.
2. Sadhu Singh [2006], *Theory of Machines*, Pearson Education, New Delhi.

Reference Books:

1. Ballaney [2003], *Theory of Machines*, Khanna Publishers, New Delhi.
2. Jagdish Lal [2002], *Theory of Mechanisms and Machines*, Metropolitan Publishers, New Delhi.
3. Thomas Bevan [2006], *Theory of Machines*, CBS Publishers, New Delhi.
4. J.S. Rao and R.V. Dukkipati [2006], *Mechanisms and Machine Theory*, NAI Publishers, New Delhi.

5. J.E Shigley [1995], *Theory of Machines and Mechanisms*, TMH Publishers, New Delhi

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

. Familiarize the students
1.to draw cam profiles
2. to analyze inertia forces of simple mechanisms.
3. to analyze the balancing of rotating and reciprocating masses
4. To analyze vibrations of simple bodies
5. About the functioning of flywheel and gyroscopic effect.

DESIGN OF MACHINE MEMBERS - I (DMM1)
(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits: 5 **End Exam Duration : 3 hrs**

Objectives:

To study the basic design principles and apply the principles to the design of various elements encountered in machines and structures.

Unit – I

Design Methods: The art and science of machine design, types of design methods, stages in machine design, selection of materials, types of loads and factor of safety.

Unit – II

Theories of Failure: Maximum Principal stress theory, Maximum shear stress theory, Maximum principal strain theory, Maximum strain energy theory, Maximum distortion energy theory, impact loads.

Unit – III

Strength of Machine Elements : Stress Concentration, theoretical stress concentration factor, fatigue stress concentration factor, design for fluctuating stresses, endurance limit, S-N curves, Goodman's line, soderberg's line.

Unit – IV

Bolted Joints: Bolted joints, stresses in bolts, bolts of uniforms strength bolted joints under eccentric loading.

Unit – V

Riveted Joints : Types of riveted joints, modes of failure, strength and efficiency of riveted joints, pitch of the rivets, design stresses, boiler joints, diamond joints, and riveted joints under eccentric loading.

Unit – VI

Welded Joints: Types of welded joints, strength of welds, Design of simple welded joints.

Unit – VII

Keys, Cotters and Knuckle Joints: Types of Keys, stresses in Keys, design of rectangular, square and taper Keys, design of standard cotter and knuckle joints.

Unit – VIII

Design of Clutches and Brakes : Pivot and Collar friction, uniform pressure and uniform wear, cone clutch, single and multiple plate clutches. Simple block brake, band brake, Internal expanding shoe brake

Design of belt drives: Design of flat belt drive, V-belt drive, design of CI pulleys.

Text Books :

1. R.K. Jain [1996], *Machine Design*, Khanna Publishers, New Delhi.
2. V.B.Bhandari [2005], *Design of Machine Elements* , TMH Publishers, New Delhi.

Reference Books :

1. Schaum's series [2002], *Machine Design*, TMH Publishers, New Delhi.
2. Sadhu Singh [2000], *Machine Design*, Khanna Publishers, New Delhi.
3. Joseph E. Shigely [2004], *Mechanical Engineering Design*, TMH Publishers, New Delhi.
4. M.F. Spotts [1985], *Design of Machine Elements*, PHI Publishers, New Delhi.
5. Pandya and Shah [2002], *Machine Design*, Charotar Publishers, Anand.

Data Hand Book :

1. Mahadevan and Balaveera Reddy [1996], *Machine Design Data Hand Book*, CBS Publishers, New Delhi.

Note: 1. Design data books are permitted in the examinations.

2. The question paper shall consist of **EIGHT Questions** with **ONE** question from each unit. The student shall answer any **FIVE** questions

On completion of this course the student is expected

1. To design components subjected to gradual and variable loadings.
2. To design bolted, welded and riveted joints subjected to direct and eccentric loading.
3. to design belt drives with pulleys, clutches and brakes

Outcomes:

4. to design keys, cotter and knuckle joints.

GEOMETRIC MODELING LAB (GM(P))

(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : 3P/ Week **End Exam Marks: 70**

Credits : 2 **End Exam Duration : 3 hrs**

Objectives:

To provide hands-on training to the students in computer aided modeling.

LIST OF EXPERIMENTS

1.. Part Modeling:

a)Modeling of a Component in 3D – V block

b) Modeling of a Component in 3D – Open Bearing
c) Modeling of a Component in 3D – Angular block
d) Modeling of a Component in 3D – Dovetail Guide
e) Modeling of a Component in 3D – Dovetail Bracket
f) Modeling of a Component in 3D – Dovetail stop

2..Assembly Modeling:

a) Assembly of a screw jack parts
b) Assembly of a knuckle joint
c) Assembly of a Oldham's coupling
d) Assembly of a footstep bearing
e) Assembly of a stuffing box
f) Assembly of a square tool post

Outcomes:

To familiarize the students to use computer aided modeling softwares to develop 3D modeling and assembly of mechanical components.

THERMAL ENGINEERING LAB (THE(P))

(For III B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/ Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:

This laboratory course is intended to give the students, experimental knowledge on the performance and operations of I.C. Engines, blower and compressor.

LIST OF EXPERIMENTS

1. Determination of Viscosity of Liquid fuels / Lubricants.
2. a) Determination of flash and fire points fuels / lubricants.
   b) Determination of calorific value of gaseous fuels.
3. To Study mechanical details and operation of I.C. Engines and draw valve timing diagram.
4. To Conduct Performance Test on 10 HP Diesel Engine with hydraulic dynamometer
5. To conduct Performance Test on VCR Engine.
6. To conduct Heat Balance Test on 5 HP Diesel Engine with generator loading
7. To Conduct Retardation Test on 5 HP Diesel Engine with rope brake dynamometer
8. To Conduct Morse Test on MPFI Multi Cylinder Petrol Engine
9. a) To conduct performance, heat balance test and draw P-V and P-theta diagrams on Computerized diesel engine test rig. `
   b) To measure emissions of I.C engines using Emission Gas Analyzer

10. Test on Two-stage reciprocating air compressor
11. Test on Blower Test Rig
12. Determination of Lift, Drag force, P-V distributions on bodies with different geometries using low speed Wind Tunnel.

To impart knowledge about
1.Testing the engines, lubricants and fuels used for IC engines
2. Using various dynamometers used for testing IC engines.

Outcomes:

3. Operating and testing of blower and compressor.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effective from 2010-11)

III B.Tech(ME) - II Semester **Scheme :2010**

S. No	Subject	Abbre-viation	Credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Refrigeration & Air Conditioning	RAC	4	3	1	-	3	70	30	100
2	Operations Research	OR	5	4	1	-	3	70	30	100
3	Heat Transfer	HT	5	4	1	-	3	70	30	100
4 5	Fundamentals of Tool Design	FTD	4	3	1	-	3	70	30	100
5 6	Design of Machine Members – II	DMM2	5	4	1	-	3	70	30	100
6	Introduction to Information Systems	IIS	5	4	1	-	3	70	30	100
7	Open Elective – I		2	2	-	-	-	-	100	100
II	**Practical**									
8	Engineering Metrology Lab	EMT(P)	2	-	-	3	3	70	30	100
9	Heat Transfer Lab	HT(P)	2	-	-	3	3	70	30	100
10	Introduction to Information Systems Lab	IIS(P)	2	-	-	3	3	70	30	100
	Total		36	24	6	9	-	630	370	1000

REFRIGERATION AND AIR CONDITIONING (RAC)

(For III B.Tech. ME –II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits :4 **End Exam Duration : 3 hrs**

Objectives:
To understand the basic concepts of refrigeration and air conditioning.

Unit – I
Refrigeration system-Introduction, Refrigeration fundamentals, Methods of refrigeration,
Air refrigeration system- Carnot and Bell Colleman cycles
Vapor compression refrigeration system- Working principle of VCR, Representation of cycle on P-H, & T-S diagrams, Analysis of Vapor compression refrigeration system, Effect of sub-cooling and super-heating, Merits & demerits of Vapor compression refrigeration system over Air refrigeration system.
Unit – II
Refrigerants: Introduction and classification of refrigerants, Required properties of an ideal refrigerant, Refrigerant mixtures, azeotropes, non-azeotropes, HFC refrigerants, Environmental effects of CFC refrigerants, ozone depletion and green house effects.
Unit – III

Components: Compressors – General classification – comparison, Advantages and disadvantages, Evaporators – classification – Working, Condensers – classification – Working, Expansion devices- Types –working

Unit – IV

Vapour Absorption Refrigeration system: Introduction – Basic absorption refrigeration system, Actual Ammonia absorption refrigeration system, Lithium-Bromide absorption refrigeration system, Three fluid absorption refrigeration system (Electrolux refrigerator), Comparison of compression and absorption refrigeration systems.

Unit - V

Steam jet refrigeration system – principle of working, H-S & T-S diagrams- Applications - Merits & demerits,

Non- Conventional Refrigeration Systems – Thermoelectric refrigerator, and Vortex tube refrigerator.

Unit – VI

Air conditioning: Introduction to Air conditioning, Psychometric Properties, processes & Psychometric Chart, Sensible & Latent, Concepts of Bypass factor, SHF, Concept of Human comfort and effective temperature, Comfort air-conditioning & Industrial air-conditioning.

Unit – VII

Cooling load calculation: Heat sources, Infiltration air load & Fresh air load, RSHF, ESHF, GSHF & ADP, Cooling Load Calculations – simple problems

Unit – VIII

Cryogenic: Introduction to Cryogenics – Liquefaction of Air, Hydrogen and Helium – Low temperature insulation - Typical Applications of cryogenics.

Text Books:

1. C.P.Arora [2005], *Refrigeration and Air Conditioning*, TMH Publishers, New Delhi.
2. Barron R.F. [1985], *Cryogenic Systems*, Oxford University Press, New York.

Reference Books:

1 Dossat [2002], *Principles of Refrigeration*, Pearson Education, New Delhi.
2 Manohar Prasad [2003], *Refrigeration and Air Conditioning*, NAI Publishers, New Delhi.
3. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], *Thrmal data hand book, IK International Publishers, Bangalore*

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student will able to

1. Understand the refrigeration systems like Air refrigeration, vapor compression refrigeration and vapor absorption refrigeration..
2. Refrigerants – classification and their properties and echo friendly refrigerants.
3. Components of refrigeration system.
4. Concept of psychometric and Air conditioning systems and design.

OPERATIONS RESEARCH (OR)
(For III B. Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods: (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
To teach students, mathematical modeling and optimization techniques to solve real life problems in the areas of transportation, sequencing, replacement, queuing theory and so on.

Unit- I
Introduction*:* Definition & Scope of OR, Basic OR models.
Linear Programming : Introduction, Formulation of linear programming problems, Graphical method of solving LP problem, simplex method, Artificial variable Technique, Degeneracy in LP, Duality, unbounded infeasible and multiple optimum solution.

Unit-II
Transportation Models: Finding an initial feasible solution – North West Corner method, Least cost method, Vogel's Approximation Method, Finding the optimal solution, Special cases in Transportation problems - Unbalanced Transportation problem, Degeneracy in transportation problem, multiple optimal solutions, prohibited routes.

Unit-III
Assignment problems: Hungarian method of Assignment problem, maximization in Assignment problem, unbalanced Assignment problem, prohibited Assignments, multiple optimum solutions, Traveling salesman problem.

Unit-IV
Replacement Models*:* Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – Individual replacement policy, Group replacement policy.

Unit-V

Game Theory : Introduction, Two-person zero sum games, Maxi-min and Mini-max principle, Principle of dominance, solution of mixed strategy problems, Graphical method for 2 x n and m x 2 games, solution of game by linear programming, Iterative method for m x n game.

Unit-VI

Sequencing Models: Introduction, General Assumptions, Priority rules for job sequencing (Single machine Scheduling), Measures of Performance- Average Completion Time, Average Lateness, Processing n jobs thorough 2 machines, Processing **n** jobs through **3** machines, Processing n jobs thorough m machines, Processing 2 jobs through m machines.

Unit-VII

Queuing Theory*:* Introduction, Single Channel – Poisson arrivals – Exponential service times with infinite population & finite population, Multi channel – Poisson arrivals – Exponential service times with infinite population.

Unit-VIII

Simulation : Introduction, Definition, Types of Simulation, Monte-Carlo Simulation, Pseudo Random Numbers, Mid-square Method of Generating Random Numbers, Application of simulation to inventory control and queuing problems.

Text Books:

1. S.D. Sarma [2004], *Operations Research*, Kedarnnath, Ramnath & Co., Meerut.
2. Hillier and Liberman [2005], *Operations Research*, TMH Publishers, New Delhi.

Reference Books:

1. N.D. Vohra [2002], *Quantitative Techniques in Management*, TMH Publishers, New Delhi.
2. V.K.Kapoor [2004], *Operations Research*, S. Chand Publishers, New Delhi.
3. Prem Kumar Gupta and Hira [1993], *Operations Research*, S. Chand Publishers, New Delhi.
4. Jerry Banks-*Discrete Event Simulation*, PHI

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

Gain knowledge in

1.The methods of Operations Research

2.The mathematical procedures of linear programming techniques

3. Advanced topics such as Replacement models, Game theory, sequencing models and Queuing models.

HEAT TRANSFER (HT)

(For III B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits :5 **End Exam Duration : 3 hrs**

Objectives:

The student gets knowledge in three modes of heat transfer and its applications.

Unit – I

Introduction: Basic modes of heat transfer, Fundamental laws of conduction, convection and radiation, general conduction equation in Cartesian and cylindrical co-ordinates.

Steady- State Conduction – One Dimension: Concept of driving potential, combined mechanism of heat transfer, heat flow through a plane wall, cylinder and sphere.

Unit – II

Multi layer conduction: One dimensional heat transfer through a composite wall, multilayer cylindrical and spherical systems, critical thickness of insulation.

Heat Source Systems: Simple Systems with uniform heat generation in Plane Wall and Cylinder.

Unit – III

Fins: Types of fins, equation for temperature distribution and heat transfer for long and short fins, fin efficiency and effectiveness, circumferential fins.

Transient Heat Conduction: Introduction, One-dimensional lumped heat capacity systems, Transient Heat flow in a semi-infinite solid

Unit- IV

Principles of Convection: Introduction, Boundary Layer Concept, Reynolds analogy, mass, momentum and energy equations in differential and integral forms, dimensional analysis applied to free and forced convection, Buckingham's P - theorem, physical significance of different dimensionless parameters.

Unit- V

Forced convection: Empirical relations for flow over flat plate, cylinder and sphere, Pipe and tube flow

Free convection: Empirical relations for free convection from vertical planes and cylinders, horizontal cylinders and plates, spheres.

Unit – VI

Radiation Heat Transfer: Nature of thermal radiation, emissive power, absorption, reflection and transmission, concept of black body, laws of black body radiation, emissivity, kirchoff's law.

Radiative Heat Exchange between Surfaces: Radiation, Shape factor, heat exchange between black and gray bodies, electrical network analogy, and radiation shields.

Unit – VII

Heat Transfer With Phase Change: Introduction, concept of film wise and drop wise condensation, simple problems on condensation on vertical plates.

Boiling heat transfer: Introduction, Régimes of Pool boiling, the heat pipe (theoretical concepts only).

Unit – VIII

Heat Exchangers: Introduction, Overall heat transfer coefficient, fouling factors, types of heat exchangers, LMTD method of heat exchanger analysis, multi pass and cross flow heat exchangers,

correction factor, Effectiveness – NTU method.

Text Books:

1. J.P. Holman [2004], *Heat Transfer*, TMH Publishers, New Delhi.
2. R.C. Sachdeva [2005], *Engineering Heat and Mass Transfer*, NAI Publishers, New Delhi.

Reference Books :

1. M.N. Ozisik [1987], *Elements of Heat Transfer*, McGraw-Hill Publishers, New York.
2. F.P. Incropera [2000], *Introduction to Heat Transfer*, John Wiley Sons Publishers, New York.
3. Donald Pitts [1998], *Heat Transfer,* McGraw Hill Publishers, New York.
4. M. Thirumaleshwar [2006], *Fundamentals of Heat and Mass Transfer*, Pearson Education, New Delhi.
5. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], *Thermal data hand book, IK International Publishers, Bangalore*

Note:

1. The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.
2. Use of Heat Transfer data book/ Thermal data hand book is permitted.

Outcomes:

The student familiarize in

1.The concept of energy balances and the three modes of heat transfer - conduction, convection, and radiation 2. After completing this course, the student will have an understanding of the mechanisms of heat transfer in physical systems and be able to calculate heat transfer rates and temperature distributions in practical engineering applications.

FUNDAMENTALS OF TOOL DESIGN (FTD)
(For III B.Tech. ME –II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits :4 **End Exam Duration : 3 hrs**

Objectives:

1.To gain an understanding and appreciation of the breadth and depth of the field of metal cutting and the related area of machine tools.
2.To become familiar with the basic principles and theories used to describe the machining process.
3..To be able to design the tools and other components of machine tools.

Unit - I

Metal Cutting : Classification of metal cutting operations, mechanics of metal cutting, tool signature, built up edge formation, mechanism of chip formation, types of chips, oblique and orthogonal cutting - Merchant's force diagram, two component tool dynamometer, Merchant's theory of metal cutting, Lee and Schaffler's theory of metal cutting.

Unit - II

Tool Wear and Tool Life : Sources of heat in metal cutting, heat dissipation and distribution to chip, tool and work piece, methods of evaluating temperature at tool-chip interface. Machinability, factors affecting machinability, Taylor's tool life equation, crater wear and flank wear, mechanics of tool wear and various types of tool failure. Effects of tool geometry, feed, depth of cut, cutting speed on tool wear.

Unit- III

Cutting Tool Materials : Essential requirements of a tool material, tool materials - HCS, HSS, Cast alloys, Carbides, Ceramic tools, Diamond tool bits.

Unit - IV

Essential requirements of a good cutting fluid, types of cutting fluids and their relative applications. Economics of machining - introduction, economic tool life, optimal cutting speed to maximum production and maximum profit.

Unit- V

Press Tools : Press tool design - press operations, press working terminology, working of cutting die

Unit - VI

press operations - strip layout, punching, blanking-center of pressure, drawing and deep drawing, bending dies and forging - forging die design.

Unit - VII

Jigs and Fixtures : Design of jigs and fixtures. Locating devices, clamping devices, principles of design of jigs and fixtures, some examples.

Unit - VIII

Design of Cutting Tools: Broach design, elements of twist drill, HSS twist drill design, design of rotary milling cutter. Design of single point cutting tool.

Text Books :

1. Donaldson [2001], *Tool Design*, TMH Publishers, New Delhi.
2. Roy A. Lindberg [2002], *Processes and Materials of Manufacture*, PHI Publishers, New Delhi.

Reference Books :

1. G. R. Nagpal [2004], *Tool Engineering & Design*, Khanna Publishers, New Delhi.
2. ASTME [1987], *Fundamentals of Tool Design*, PHI Publishers, New Delhi.
3. Amitha Ghose and Mallik [2004], *Manufacturing Science*, EWP Publishers, New Delhi.
4. R.K. Jain [2006], *Production Technology*, Khanna Publishers, New Delhi.
5 . P.C.Sharma [2006], *Production Engineering*, S. Chand Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The learning outcomes includes

1.understanding the objectives of the machine tools, constructional details and mechanisms involved in each and every machine tool. Concept of theory of metal cutting, force analysis with the help of merchants circle diagram. The concept of heat generation zones and tool temperature measuring methods.

2.This course aimed also to identify the different types of cutting tool materials, cutting fluids and their properties.
3.The course also enables the students to design the single and multi point cutting tools and have an idea of different locating and clamping devices.

DESIGN OF MACHINE MEMBERS – II (DMM2)
(For III B.Tech. ME – II Semester)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits: 5 **End Exam Duration: 3 hrs**

Objectives:
To study the design of various mechanical power transmission elements and IC-engine parts

Unit – I

Springs: Classification of springs, design of coiled springs of various cross section, concentric springs, leaf springs, Belleville springs.

Unit – II

Journal Bearings: Types of journal bearings, lubrication, bearing modulus, full and partial journal bearings, clearance ratio, Heat dissipation of bearings, bearing materials, journal bearing design.

Unit – III

Antifriction Bearings: ball and roller bearings, static load, dynamic load equivalent radial load, design and selection of ball and roller bearings.

Unit – IV

Design of Spur and Helical gears: Classification of gears, design of spur gears, Lewis equation - bending strength, dynamic load and fatigue of gear tooth, Design of Helical gears.

Unit – V

Design of Bevel and Worm gears: Design of bevel gears and Design of worm gears.

UNIT – VI

Design of Shafts : Design of solid and hollow shafts for strength and rigidity, design of shafts for combined loads.

UNIT – VII

Design of Shaft Couplings : Design of sleeve or muff coupling, split muff coupling, CI flange coupling, protected type of flange coupling, rigid flange coupling, bushed pin type flexible coupling.

Unit – VIII

Design of I.C Engine Parts: Design of connecting rod, design of piston for I.C engine, design of crank and crankshafts, Flywheel. Introduction to optimum design.

Text Books :

1. R.K. Jain [1996], *Machine Design*, Khanna Publishers, New Delhi.
2. V.B.Bhandari [2005], *Design of Machine Elements*, TMH Publishers, New Delhi.

Reference Books:

1. Schaum's series [2002], *Machine Design*, TMH Publishers, New Delhi.
2. Sadhu Singh [2000], *Machine Design*, Khanna Publishers, New Delhi.
3. Joseph E. Shigely [2004], *Mechanical Engineering Design*, TMH Publishers, New Delhi.
4. M.F. Spotts [1985], *Design of Machine Elements*, PHI Publishers, New Delhi.
5. Pandya and Shah [2002], *Machine Design*, Charotar Publishers, Anand.

Data Hand Book:

1. Mahadevan and Balaveera Reddy [1996], *Machine Design DataHand Book*, CBS Publishers,
New Delhi.

Note: 1. Design data books are permitted in the examinations.
2. The question paper shall consist of **EIGHT Questions** with **ONE** question from each unit. The student shall answer any **FIVE** questions..

Outcomes:

To familiarize the students with the design of: Shafts, couplings, springs, bearings, gears and IC-Engine parts.

INTRODUCTION TO INFORMATION SYSTEMS (IIS)

(**Common to III B.Tech II Semester ECE, EEE & ME**)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods: (4L+1T)/week **End Exam Marks: 70**
Credits: 5 **End Exam Duration: 3hrs**

Objectives:

1. Students will learn the fundamentals of computer organization, how operating systems are implemented, assemblers, compilers, loaders, linkers, interpreters, complete software development life cycle.

2. To interpret an entity relationship diagram (ERD) to express requirements and demonstrate skills to model data requirements and create data models into normalized designs, concurrency control and database locking techniques.

Unit – 1

Fundamentals of Computers & Computer Architecture: Introduction, Organization of a small computer, Central Processing Unit, Execution cycle, Instruction categories, measure of CPU performance Memory, Input/output devices, BUS, addressing modes

Unit – 2

System Software : Assemblers, Loaders and linkers, Compilers and interpreters.

Operating System : Introduction , Process Management, CPU scheduling, Memory Management Schemes , Page replacement algorithms.

Unit – 3

Software engineering: Introduction to software engineering, Life cycle of a Software Project, Software Development Models.

Testing, Debugging and Code Reviews: Unit Testing, Debugging, Debugging using the IDE, Code Review.

Unit – 4

Coding Standards and Best Practices: Introduction to C Programming, Basics of C Language, Data Types in C, Steps in creating programmes, Functions, arrays, pointers, structures.

Importance of Adhering to standards and best practices.

Sorting and Searching Techniques : Searching Algorithms – Linear Search, Binary Search, Sorting Algorithms – Bubble Sort, Selecting Sort and Insertion Sort.

Unit – 5

Relational Database Management System : Introduction to DBMS, the database technology, data models. Database Users.

Entity Relationship (E-R) Modeling : Introduction, Notations, Modeling E-R Diagrams, Case Study 1,2 & 3, Merits and Demerits of E-R modeling.

Unit - 6

Structured Query languages (SQL): History of SQL, Data Types, Data Definition Language Statements (DDL), Data Manipulation Language (DML), writing simple queries, Embedded SQL, Online Transaction Processing

Unit – 7

Normalization : Introduction, Need for Normalization, Process Normalization, Types of Normal Forms (1 NF, 2 NF, 3 NF & BCNF), Merits and Demerits of Normalization, case study.

Unit – 8

Transaction properties and concurrency: Acid properties, issues with concurrency – lost update, inconsistent summary and dirty read.

Data base locking techniques: Shared lock, exclusive lock and intent locks, Backup and Recovery

Text Books :

1. Campus Connect Foundation Programme – Computer Hardware and System Software Concepts, Programming Fundamentals- Vol. – 1, INFOSYS.
2. Campus Connect Foundation Programme – Relational Database management System, Client Server Concepts, Introduction to Web Technologies - Vol. – 2, INFOSYS
3. Campus Connect Foundation Programme – Object Oriented Concepts – System Development Methodology, User Interface Design - Vol. – 3, INFOSYS
4. Yashwant Kanetkar, Let us ''C'' - bpb Publications 8th ed., 2007.

Reference Books :

1. Andrew S. Tanenbaum, Structured Computer Organization, PHI, 3rd ed., 1991
2. Silberschatz and Galvin, Operating System Concepts, 4th ed., Addision-Wesley, 1995
3. Kernighan, Ritchie, ANSI C language PHI,1992
4. Alfred V Aho, John E Hopcroft, Jeffrey D Ullman, Design and Analysis of Computer Algorithms, Addison Wesley Publishing Co., 1998
5 Wilbert O. Galitz, Essential Guide to User Interface Design, John Wiley, 1997
6. Alex Berson, Client server Architecture, Mc Grew Hill International, 1994
7. Henry F Korth, Abraham Silberschatz, Database System Concept, 2nd ed. McGraw-Hill International editions, 1991
8. Brad J Cox, Andrew J.Novobilski, Object – Oriented Programming – An evolutionary approach, Addison – Wesley, 1991.
9. Rojer Pressman, Software Engineering-A Practitioners approach, McGraw Hill, 5th ed., 2001

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions

1.Students will learn the concepts of computer organization, operating systems, compiler design including its phases and components and become acquainted with the life cycle of a software project, and its various phases.

Outcomes:

2.To use SQL to create database objects and able to understand transaction properties, concurrency and data base locking techniques.

ENGINEERING METROLOGY LAB (EMT(P))

(For III B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : 3P/ Week **End Exam Marks: 70**

Credits : 2 **End Exam Duration : 3 hrs**

Objectives:
This laboratory course will help the students to understand the need of precise measurements of various complicated contours

LIST OF EXPERIMENTS

1. Measurement of Screw Threads.
2. Measurement of angle of Taper plug gauge.
3. Measurement of angle of Taper ring gauge.
4. Measurement of co-ordinates of Jig plate.
5. Measurement of angle using Sine bar.
6. (a) Measurement of angle of the V-block using ball and height gauges.

   (b) Measurement of the Radius of Curvature.
7. Measurement of Gears parameters.
8. Work Study.
9. Statistical Quality Control.
10. a) To find small angles and length measurement on objects using Tool Makers micro scope.
    b) To find small angles and length measurement on objects using Profile Projector
11. Acceptance Sampling
12. To collect the anthropometric data using "Anthropometer".
13. Measurement of surface roughness using surface roughness meter.

Outcomes:
After successful completion of this course, the student will be able to know different measuring techniques and about the calibration using the gauging devices like limit gauges and measuring devices like tool maker. microscope, dial indicator, etc.

HEAT TRANSFER LAB (HT(P))

(For III B.Tech. ME – II Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/ Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:
To study the conduction, convection and radiation heat transfer phenomenon practically.

LIST OF EXPERIMENTS

1. Test on Composite wall
2. Test on Lagged pipe
3. Test on lagged sphere
4. a) Test on emissivity apparatus

b) Test on critical heat flux apparatus

5. Test on Stefan Boltzman Apparatus
6. Test on Natural convection Equipment
7. Test on Pin fin Apparatus
8. Test on Heat Exchanger
9. Test on Dropwise and Film Wise Condensation apparatus
10. Test on heat pipe apparatus
11. Test on unsteady state heat transfer apparatus
12. Performance test on refrigeration tutor
13. a) Study of basic psychrometric processes on Air-conditioning Test Rig.
    b) Determination of COP and Bypass factor of Air-conditioning Test Rig
14. Test on Solar flat plate collector

Outcomes:

The student gain knowledge in

1. conductionheat transfer phenomenon
2. convection heat transfer phenomenon
3. Radiation heat transfer phenomenon

INTRODUCTION TO INFORMATION SYSTEMS LAB (IIS (P))
(Common to III B.Tech II Semester ECE, EEE & ME)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods: 3 hrs/week **End Exam Marks: 70**
Credits: 2 **End Exam Duration: 3hrs**

Objectives:

1. To implement different sorting and searching techniques in 'C' language.
2. To write simple SQL queries and generate reports for a given database.

List of Experiments Using C

1st Week:

1. Programs on Basic Programming constructs (if, switch-case, while, do while, for)

2nd Week:

2. Programs on Arrays
3. Write a program to Implement the Transpose of the matrix.(Modify the same matrix)

3nd Week:

Implementation of Searching Techniques

Linear Search
Binary search

4th Week:

Implementation of Sorting Techniques

Write a program to sort the given list with arrays using the following sorting techniques.

Selection sort
Bubble sort
Insertion sort
Quick sort

An institute wants to automate the process of allocating courses to vendors. Initially automation is considered for 5 vendors.
Assumption: one course could be allotted to many vendors.
Declare and initialize the following **arrays each of size 5:**

- An array to store the Vendor Ids. Initialize it with the following values 101, 102, 103, 104 and 105.
- An array to store the course Id's and initialize it with zeros.
- An array to store the amount (to be paid to the vendor for that course) and initialize it with zeros.

All the three arrays have one to one correspondence.

Consider the following table for the course id and their corresponding amount details.

Course Id's	Amount
1001	25000
1002	35000
1003	20000
1004	15000
1005	20000

Display a menu to implement the following functionalities:

1. **Allocate course**
2. **Deallocate course**
3. **Report**

Implement the following functionality for each of the given options:

1. **Allocate course**

- Accept the VendorId

    - Display appropriate error message if the vendor id is invalid(if it is not found in the array of Vendor Ids)
    - Display appropriate error message if the vendor is already allotted to a course

- Accept the Course Id.
    - Display appropriate error message if the course id is invalid(not between 1001 and 1005)

- After validation, update CourseId and the related amount for the corresponding vendor.
- Display a message on successful allocation

2. Deallocate course

- Accept the VendorId

    - Display appropriate error message if the vendor id is invalid(if it is not found in the array of Vendor Ids)
    - Display appropriate error message if the vendor is not allotted with a course

- After validation corresponding CourseId and amount should be set to Zero.
- Display a message on successful deallocation.

3. Report

Generate a report in the following format for ONLY those vendors who have been allocated the courses.

Vendor Id	Course Id	Amount
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

6th Week:

Queries using Aggregate functions

Account(BRANCHNAME, ACCNO, BALANCE)
Branch(BRANCHNAME, BRANCHCITY, ASSETS)

1. Find the average account Balance at the each branch.
2. Find the number of depositors at each branch
3. Find the names of all branches that have assets greater than at least one branch located at a particular city.

Sales (SNO, SNAME, AREA, GENDER, SAMOUNT)

1. List out the sales amount and names of the top 3 sales persons
2. List out the names and sales amount whose sales amount crosses the average sales amount of north and south.
3. List out the names and sales amount of those persons whose sales amount is greater than minimum sales amount of company and less than average sales amount of company.
4. List out top 5th sales person name sales amount.

7th Week:

Emp (EMPNO, ENAME, SAL, HIREDATE, DEPTNO, MGRNO)

5. Display all employ names which have the character 'TH' or 'LL' in them
6. List all employees hired between two given dates
7. List all employees by name, number, along with their manager name and number

8th Week:

Create the following tables and insert the data with appropriate constraints.

Table: Politician:Politician Details

Column Name		Description
VoterID	Number(5)	Primary Key
Name	Varchar2(15)	Name of the politician. Mandatory.
Address	Varchar2(50)	Address of the politician
City	Varchar2(20)	Place of Residence
ElectionsLost	Number(2)	Must be 0 or greater than zero

Sample Data:

VoterID	Name	Address	City	ElectionsLost
10001	Mohan	Hyderabad Road	Kurnool	2
10002	Ram	56, Ramapuram	Nandyal	3
10003	Eric	Kondareddy fort area	Kurnool	1
10004	William	Vijayanagar	Allagadda	7

Table: Party:Party Details

Column Name		Description
PartyCode	Number(3)	Primary Key
Name	Varchar2(15)	Name of the political party. Mandatory.
HQ	Varchar2(15)	Place where HQ is located

Sample Data:

PartyCode	Name	HQ
101	Party One	Hyderabad
102	Party Two	Kurnool
103	Party Three	

Table: ElectionResult : Details of Politicians who have won the election

Column Name		Description
Year	Number(4)	Year when elected.
Constituency	Varchar2(20)	Must be 'Kurnool' OR Nandyal' OR 'Allagadda'
PartyCode	Number(3)	Must be existing party code
VoterID	Number(5)	Must be existing Voter-id
Votes	Number(6)	Total number of votes the politician won by.

(Year, Constituency) is the Primary Key

Sample Data:

Year	Constituency	PartyCode	VoterID	Votes
1984	Kurnool	101	10003	12967
1986	Nandyal	102	10004	80876
1986	Kurnool	101	10003	100000
1986	Kurnool	102	10002	7023
1992	Nandyal	103	10001	602
1992	Nandyal	101	10004	6021

NOTE:

You are supposed to fill in the given records in above tables following these rules:

1. Identify the primary key and foreign key (if applicable) in each table.
2. Take care of the constraints and the relationships among the tables.

Queries

1. List details of all politicians whose name contains atleast one 'a' and stay in 'Bangalore'.
2. List the Party name and the Politicians name who won from the Nandyal constituency in the year 1986.
3. List the Politicians details who have won by maximum number of votes after 1990.
4. List the party name, corresponding HQ, total number of times the party has won

respectively.

Outcomes:

1. An ability to write programs in 'C' language.

2. An ability to create database using Structured Query Language.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effective from 2010-11)

IV B.Tech(ME) - I Semester **Scheme : 2010**

S. No	Subject	Abbre-viation	Credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Operations planning & Control	OPC	5	4	1	-	3	70	30	100
2	CAD/CAM	CADM	4	3	1	-	3	70	30	100
3	Finite Element Methods	FEM	5	4	1	-	3	70	30	100
4	Automobile Engineering	AME	4	4	-	-	3	70	30	100
5	Professional Elective – I		4	3	1	-	3	70	30	100
6	Professional Elective – II		4	3	1	-	3	70	30	100
II	**Practical**									
79	CAE and CAM Lab	CC(P)	2	-	-	3	3	70	30	100
8	Dynamics & Instrumentation Lab	DIN(P)	2	-	-	3	3	70	30	100
9	Mini Project & Comprehensive viva	MPCV(P)	3	-	-	4	-	70	30	100
	Total		33	21	5	10	-	630	270	900

OPERATIONS PLANNING & CONTROL (OPC)
(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (4L+1T) / Week **End Exam Marks: 70**
Credits : 5 **End Exam Duration : 3 hrs**

Objectives:
To impart students basic knowledge of production planning and control related aspects covering forecasting, aggregate planning and master scheduling, inventory management etc.

Unit – I
Introduction: Definition, functions of PPC, Types of production – job, batch and continuous production, Product design and development, standardization, simplification, specialization, Product life cycle.

Unit - II

Forecasting: Introduction, Forecasting Objectives and Uses, Forecasting methods – Opinion and judgmental methods, Time series method, Exponential smoothing, Regression & Correlation method.

Unit - III

Aggregate Planning & Master Scheduling: Introduction, Objectives of Aggregate Planning, Costs in aggregate planning, Strategies in aggregate planning, Master Production Scheduling,

Unit – IV

Assembly line balancing – Methods of line balancing

Material Requirement Planning (MRP): Importance of MRP, MRP system inputs and outputs, Bill of Materials, MRP calculations.

Unit – V

Inventory Management: Introduction, Types of Inventories, Inventory Costs.

Deterministic Inventory models: Basic EOQ model, Manufacturing model without shortages, Purchase model with instantaneous replenishment and with shortages, Inventory models with price breaks.

Unit - VI

Inventory Management Systems: Fixed order inventory system and Periodic review system, ABC analysis.

ERP: MRP-II, Introduction to ERP

Unit - VII

Quality Control : Concept of quality, types of inspection, assignable and chance causes, Variable Control charts (and R charts)

Unit - VIII

Attributes control charts (P chart and C chart),

Acceptance Sampling – Single Sampling, Double Sampling and Multi sampling plans – OC curves.

Text Books :

1. Eilon Samuel [2004], Elements of Production Planning and Control, Universal Publishers, Mumbai.
2. Panneer Selvam [2003], Production and Operations Management, PHI Publishers, New Delhi.

Reference Books :

1. S.N. Chary [2004], Operations Management, TMH Publishers, New Delhi.
2. Joseph Monk [2004], Operations Management, TMH Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question from each unit. The student shall answer any **FIVE** questions.

Outcomes:

The students

1. Have an overview of the production operation management system
2. Obtain knowledge of management tools in production operations management
3. Improve production operations and monitoring systems and reduce the cost of operations
4. Make better decisions and resolve operations problems in a faster and logical manner using appropriate techniques.

CAD/CAM(CADM)
(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (3L+1T) / Week **End Exam Marks: 70**

Credits :4 **End Exam Duration : 3 hrs**

Objectives:

To study advanced features of CADCAM so as to be capable of accepting professional responsibilities and to understand the associativity between design and manufacturing

Unit - I

Fundamentals of CAD : The design process , applications of computers for design, benefits of CAD, Computer configuration for CAD application , Computer peripherals for CAD Design work station, Graphic terminal.

CAD software : Definition of system software and application software. CAD database and structure.

Unit – II

Geometric modelling : 3- D wire frame modelling, wire frame entities and their definitions, Interpolation and approximation of curves, concept of parametric and non parametric representation of curves.

Unit – III

Curve and Surface Modelling: Generation of plane and space curves. Wire frame models and curve representation - parametric representation of curved shapes - cubic spline, Bezier, B-spline curves.Curve manipulations, Hidden line algorithms surface modelling.

Unit – IV

Solid Modelling: Solid models and entities, solid representation, fundamentals of solid modelling, boundary representation (B-rep). Solid modellers, Constructive Solid Geometry (CSG) and sweep representation. Hidden surface algorithms, shading and colouring of surfaces, organization of solid modellers. Solid manipulations.

Unit - V

Numerical Control of Manufacturing : Numerical control (NC) definition, Classification of NC machines, Open loop, Closed loop, Absolute, Incremental system, Advantages of NC machines, Machining centre.Method of NC part programming, computer assisted programming, APT language, APT -statements, geometric statement, Motion statement, Post processing statement, Auxilary statements, Structure of APT programming, simple problems using APT language. CNC, DNC, Adaptive control.

Unit - VI

Group Technology : Group technology fundamentals, Part classification methods, coding systems, advantages of GT, applications of GT.

Unit – VII

Flexible Manufacturing Systems (FMS) : Introduction, What is FMS, components of FMS, computer system configuration FMS layouts, FMS compared to other types of manufacturing systems, Types of FMS, benefits of FMS, applications of FMS.

Unit - VIII

Automated Material Handling : Types of material handling equipment**,** Automated guided vehicles(AGVs), Vehicle guidance and routing; Traffic control,Benefits of AGV.

Computer Integrated manufacturing (CIM): Computer integrated production planning systems, Computer aided process planning (CAPP)

Text Books:

1. Ibrahim Zeid [2005], CAD/CAM Theory and Practice, TMH Publishers, New Delhi.

2. M.P.Groover and E.W.Zimmers [2005], CAD/CAM, PHI Publishers, New Delhi.

Reference Books :

1. Joe Rooney and Philip [1990], Principles of CAD, EWP Publishers, New Delhi.
2. Mikell P. Groover [1999], Automation Production Systems and Computer Integrated Manufacturing, PHI Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

The student gain knowledge

1. On 3D modeling , geometric modeling and computer graphics

Outcomes:

2. Numerical control machines, Group technology, CAPP, CIM and flexible manufacturing systems.

FINITE ELEMENT METHODS (FEM)
(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (4L+1T) / Week **End Exam Marks: 70**

Credits :5 **End Exam Duration : 3 hrs**

Objectives:

To understand the basics of finite element analysis and its applications in engineering.

Unit - I

Matrices: Types of matrices- banded and triangular matrices, properties of matrices and basic matrix operations, inversion of matrix, methods of solution of simultaneous algebraic equations - triangularisation, co-ordinate transformations.

Unit-II

Finite Element Technique: Fundamental concepts of the Finite Element Methods, advantages and applications of FEM, steps followed in FEM, Discretization of the domain, types of elements.

Unit- III

Shape functions and Boundary conditions : Shape functions, element stiffness matrix, element mass matrix, applying of boundary conditions, natural coordinate systems and global coordinate systems. Formulation of finite element model and solution.

Unit - IV

Analysis of Bar Structures : Axial or Bar element, stiffness matrix for bar element, problems on bar element.

Unit - V

Analysis of Truss Structures: Two-dimensional truss element, stiffness matrix for two-dimensional truss, simple problems on two-dimensional truss structures.

Unit - VI

Analysis of Beam Structures: Beam elements, stiffness matrix for beam element, transformation matrix, simple problems on beam structures – stresses and deflection of beams – cantilever and simply supported beams.

Unit - VII

Two Dimensional Stress Analysis: Finite element modeling for two-dimensional stress analysis, element stiffness matrix for constant strain triangle (CST) and treatment of boundary conditions.

Unit - VIII

Steady State Heat Transfer Analysis: One-dimensional analysis of a fin and wall. Analysis of a uniform shaft subjected to torsion.

Text Books:

1. Tirupati Chandrapatla and Bellagundu [2003], *Introduction to Finite Element in Engineering*, Pearson Education, New Delhi.
2. S.S.Rao [1989], *Finite Element Methods*, Pergamom Press, New York
3. J.N.Reddy [2003], *Introduction to FEM*, TMH Publishers, New Delhi.

Reference Books:

1. C.S. Krishna Moorthy [1994], *Finite Element Analysis*, TMH Publishers, New Delhi.
2. David V. Hutton [2004], *Fundamentals of Finite Element Analysis*, TMH Publishers, New Delhi.
3. Desai and Abel [2002], *Introduction to the Finite Element Methods*, CBS Publishers, New Delhi.
4. O.P.Gupta [2000], *Finite and Boundary Methods in Engineering*, Oxford and IBH Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

To familiarize the students

1. Basics of Finite Element analysis,
2. Analysis using Different elements like bar, truss, beam and triangular elements

Outcomes:

3 Analysis of one dimensional heat transfer and torsional problems.

AUTOMOBILE ENGINEERING (AME)
(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 4L / Week **End Exam Marks: 70**
Credits :4 **End Exam Duration : 3 hrs**

Objectives:
To study the basics of automobile engineering and design economical auto products using their technical know how.

Unit- I

Engine Parts : Function and constructional details of Cylinder block, Cylinder liners - wet and dry types, Piston, Connecting rods, Crank shaft, Cam shaft, Air cleaner, Intake and Exhaust manifolds, Mufflers.

Unit II

Cooling System : Need for cooling of automobile-Types of cooling-air cooling, water-cooling. Natural circulation (Thermo-syphon system), Forced circulation and sealed Systems. Components of water-cooling system. Water pump, fan, Radiator, Thermostats and temperature indicators. Anti-freeze mixtures.

Unit - III

Fuel Supply Systems : Fuel supply system of diesel engine, fuel injection pumps, Super charging of diesel engines. Fuel supply system for petrol engines- Carburetors, Air- fuel ratios at different vehicle running conditions, Working of a simple carburetor. Various carburetor systems- Float, Starting, Idle, Low speed, High speed and acceleration systems. MPFI and EFI systems.
Types of carburetors - Working and constructional details of SU, Zenith and Carter carburetors.

Unit- IV

Lubricating Systems : Need for lubrication - Functions of lubricating oil. Properties of lubricating oil, and S.A.E grading of lubricants. Lubricating systems - Petroil. Splash, Pressure feed, Wet and Dry sump, Semi pressure and-pre-lubrication system-Components of lubricating system- oil pumps, Oil filters,

Unit -V

Ignition -System: Electronic ignition systems. Storage battery, Battery rating, Dynamo, Alternators, Cutouts, Voltage and Current regulators. Starting motors. Spark plugs-Hot and Cold, Computer controlled coil ignition sensors.

Unit - VI

Transmission System: Clutch-Principle and requirements of a clutch, types s of clutches - Single plate, Multi plate and Centrifugal, Semi-centrifugal clutches.
Gearbox -Requirements of a gearbox, Gear selecting mechanism, Types of gear boxes-Sliding mesh, Constant mesh and Synchro mesh. propeller shaft Functions and constructional details,
Differential : Principle of working and it's construction, Front axle-stub axle-types of stub axles. Rear axle-Semi floating. Three-quarter floating and Full floating axles. Steering- Wheel alignment. Steering geometry-Camber-Castor, Kingpin inclination, Toe in, and Toe -out. Steering linkages-Under steering and over steering. Power steering

Unit - VII

Suspension : Types of suspension springs, Front axle independent sus- pension systems-Wish bone type. Trailing link type, Vertical link type. Rear axle suspension systems, Shock absorbers, Air suspension system.

Unit – VIII

Brakes : Requirements of good braking system. Types of brakes-Mechanical, Hydraulic and pneumatic systems Emission control , environ- mental effects on engines, Euro Standards I & II. Introduction to concept of Mechatronics

Text Books :

1. Kirpal Singh [1994], *Automobile Engineering Vol. 1&2*, Standard Publishers, New Delhi.
2. R.B Gupta [2003], *Automobile Engineering,* Satya Prakasam Pub lishers, New Delhi.

Reference Books :

1. W.H.Crowse [2004], *Automotive Mechanics*, TMH Publishers, New Delhi.
2. Joseph Heitner [1967], *Automotive Mechanics*, EWP Publishers, New Delhi.
3. Heldt [1965], *High Speed Combustion Engines*, Oxford and IBH Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student gains knowledge in

1 Thebasicsof automobiles.

2.The engine systems like fuel supply, cooling, lubrication, ignition, transmission suspension ,braking systems etc

3. Emission control, Euro standards I&II. Air conditioning of automobiles.

CAE AND CAM LAB (CC(P))

(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : 3P/ Week **End Exam Marks: 70**

Credits : 2 **End Exam Duration : 3 hrs**

Objectives:

To get familiarize with different manufacturing softwares and analyzing different structures

LIST OF EXPERIMENTS

CAE

Introduction to Analysis Software Package

Structural analysis:

1. Analysis of a rectangular plate with a hole
2. Analysis of a truss member under loading
3. Analysis of a bracket plate with axial loading
4. Analysis of a bracket plate with eccentric loading
5. Static Analysis of Prismatic bar
6. Static Analysis of a Corner Bracket
7. Static Analysis of beam
8. Analysis of Thermally Loaded support Structure
9. Analysis of Hinged support member
10. Analysis of Tapered plate under transverse load

Thermal analysis:

1. Analysis of a square plate considering conduction
2. Analysis of a square plate considering conduction and convection
3. Analysis of a compound bodies considering conduction and convection

Student must do at least One exercise from the following Analysis packages.

- ANSYS
- ALGOR
- NASTRAN
- NISA

CAM

1. Introduction to CNC & NC Machines
2. Introduction to CNC & NC part programming – for Different operations like Turning, Threading, Milling, Drilling etc., (G-Codes & M-Codes)
3. Experiments on CNC lathe -Turning, Threading operations
4. Experiments on Milling Machine - Plane Milling, Drilling Operations
5. Experiment on Robot – pick up an object with & without using teach window
6. Developing a CNC code for a given job using
   i) ESPRIT CAM
   ii) CNC Tutor
   iii) MASTER CAM

Outcomes:

1.The student will be able to do stress analysis on different components using ANSYS software.
2. He will be able to simulate components in ESPIRIT CAM, MASTER CAM,CNC TUTOR.
3.Able to write CNC programs using G and M codes and manufacture prototypes in CNC machines

DYNAMICS & INSTRUMENTATION LAB (DIN(P))
(For IV B.Tech. ME –I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 3P/ Week **End Exam Marks: 70**
Credits : 2 **End Exam Duration : 3 hrs**

Objectives:
To study the static and dynamic behaviour of machines

To study the static and dynamic behaviour of machines

LIST OF EXPERIMENTS

DYNAMICS

1. Determination of Radius of Gyration of Connecting Rod
2. Longitudinal Vibrations of Spring-Mass System.
3. Experiment on Governors
4. Static and Dynamic balancing of rotating masses and reciprocating masses
5. Velocity & Acceleration of Cam & Follower
6. Test on Gyroscope
7. Study of Damped and Undamped Torsional Vibration
8. Torsional Vibration of Single and Two Rotor System
9. Verification of Dunkerly's Rule
10. Critical speed or Whirling speed of shaft

INSTRUMENTATION

1. Test on Instrumentation Tutors
2. Calibration of Dead Weight Presser Gauge.
3. Study of simple control systems
4. Calibration of rotameter

Students will be able to
Understand and use various measurement methods
Understand and verify the laws governing the dynamics of machines
Outcomes:
Understand the case studies on the field of Vibration.

MINI PROJECT & COMPREHENSIVE VIVA
(For IV B.Tech. ME – I Semester)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : 4L / Week **End Exam Marks: 70**
Credits :3 **End Exam Duration :**

Objectives:
The students will be vigorously tested on the understanding of all the concepts in engineering that they have learnt so far in the Mechanical Engineering programme. This will enable the students to gain the confidence and competence to solve real life engineering problems.

1.Class room exercises, case studies and topics on how the things work are assigned to students on an individual basis and evaluation done by a panel of teachers.
Outcomes:
2.The students are required to take-up an end semester examination and they have to submit a mini project related to Mechanical engineering.

FOUR YEAR B.Tech DEGREE COURSE

Scheme of instruction and Examination

(Effective from 2010-11)

IV B.Tech(ME) - II Semester # Scheme: 2010

S. No	Subject	Abbre-viation	credits	Scheme of Instruction periods/week			Duration of end Exam (Hours)	Scheme of Examination Max Marks		
				L	D/T	P		End Exam	Internal Assessment	Total
I	**Theory**									
1	Professional Elective – III		4	3	1	-	3	70	30	100
2	Professional Elective - IV		4	3	1	-	3	70	30	100
3	Open Elective-II		2	2	-	-	-	-	100	100
II	**Practical**									
4	Project Work	PW(P)	10	-	-	6	-	7	30	100

								0		
	Total		20	8	2	6		210	190	400
OR										
I	Practice School / Internship	PS	10	-	-	-	-	-	100 *	100
II	Project work	PW(P)	10	-	-	-	-	70	30	100
	Total		20	-	-	-		70	130	200

A student either to study 3 subjects (2 professional electives and one open elective) in IV B.Tech – II Semester of Scheme 2010 or to attend practice school / internship to be arranged by the Training and Placement cell of the College.

***** Out of 100 marks, 70 marks will be evaluated by the external supervisor of the concerned company based on their attendance and day-to-day performance. 30 marks will be evaluated by the concerned department of the college based on the report submitted by the student and viva-voce.

LIST OF OPEN ELECTIVES

OPEN ELECTIVE-I

1. PROFESSIONAL ETHICS AND HUMAN VALUES (PEHV)
2. INTELLECTUAL PROPERTY RIGHTS (IPR)
3. ENTREPRENEURSHIP DEVELOPMENT (EDP)

OPEN ELECTIVE-II

1. INDIAN CONSTITUTION AND SOCIETY (ICTS)
2. RESEARCH METHODOLOGY (RM)

3 GENERAL PSYCHOLOGY (GPY)

PROFESSIONAL ETHICS AND HUMAN VALUES (PEHV)

(Open Elective for III B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**

Contact Periods : 2L / Week

Credits : 2

Objectives:

To impart professional ethics and human values among the students by teaching various concepts, theories and models of relevance.

Unit - I

Human Values : Morals- Values- Ethics-Integrity-Work Ethic- Respect for others-Peaceful Life- Honesty- Courage Valuing Time- Empathy- Character- Spirituality

Unit - II

Engineering Ethics : Senses of Engineering Ethics- Variety of Morals-Types of Inquiry-Kohlberg's Theory- Gilligan's Theory-Consensus & Controversy-Models of Professional Roles -Customs and Religion-Uses of Ethical Theories

Unit - III

Safety, Responsibilities & Rights : Safety and Risk-Risk benefit analysis, risk – reward benefits and reducing risk-Collegiality and loyalty-Respect for Authority Confidentiality-Occupational Crime-Professional Rights-Employee Rights-Intellectual property Rights (IPR) – it's Discrimination

Unit - IV

Global Issues : Multinational Corporations-Environmental Ethics-Computer Ethics-Engineer as Managers-Consulting Engineer-Moral Leadership-Sample ode of Ethics Like ASME, ASCE, IEEE, Institute of Engineers, Indian Institute of Materials Management, IETE etc.,

Text Books :

1. M.P. Raghavan [*2006],* Professional Ethics And Human Values*, Scitech Publications, Chennai.*

2. Jayashree Suresh and B.S.Raghavan [2007], *Human Values and Professional Ethics*, S.Chand Publishers, New Delhi.

Reference Books :

1. Mike Martin and Roland Schinzinger [1996], Ethics in Engineering, McGraw Hill Publishers, New York.
2. Charles D.Fleddermann [1999], Engineering Ethics, Prentice Hall Publishers, New Mexico.
3. S. Dinesh Babu [2007], Professional Ethics & Human Values, Laxmi Publications, Hyderabad.

Outcomes:

Students learning the professional ethics and human values may create good and harmonious working environment at their place of work thus leading to a better society.

INTELLECTUAL PROPERTY RIGHTS (IPR)

(Open Elective for III B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**

Contact Periods : 2L / Week

Credits : 2

Objectives:

To create awareness among students about intellectual property rights, process of patenting, copy rights, registration & trademarks.

Unit - I

Basics of IPR : Introduction to IPR-IPR Systems-Benefits of IPR-Various Types of IPR-Violation of IPR

Unit - II

Patents : Introduction to Patents-Various kinds of Patents-Patenting Process-Copy Right-Remedies against Infringement

Unit - III

Method of Designing Registrations : Designing Registrations-How Chart for Registration-Trade Mark-Geographical Indications

Integrated Circuits-Trade Secrets

Unit - IV

IPR Policy and Management: IP in various sectors like Government and Nation-R &D organizations-IT, Media, Entertainment

Chemical Engineering & Services Sector-Industries & Small Scale Industry

Text Books :

1. Bainbridge David [2003], Intellectual Property Rights: Key to New Wealth, National Research Development Corporation, Pearson Education, New Delhi.
2. Prabuddha Ganguli [2006], Intellectual Property Rights, TMH Publishers, New Delhi.

Outcomes:

Students will be able to secure their intellectual property, get patents for their innovative creations, and get acquainted with trademarks and other relevant aspects.

ENTREPRENEURSHIP DEVELOPMENT (EDP)

(Open Elective for III B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**
Contact Periods : 2L / Week
Credits : 2

Objectives:
To encourage students to take up entrepreneurship as their alternate career by exposing them to the concepts of entrepreneurship.

Unit - I

Introduction : Concept of an entrepreneur; Definition of an entrepreneur; Types of entrepreneurs; Characteristics of an entrepreneur.
Entrepreneurship : Definitions; Theories of entrepreneurship; Key elements of entrepreneurship; Six important segments of entrepreneurship environment; Advantages of entrepreneurship; Barriers to entrepreneurship; Role of entrepreneurship in economic development.

Unit – II

Rural Entrepreneurship : Meaning; Need; Retrospection of rural industrialization in India; Problems of rural entrepreneurship; Development plan for rural entrepreneurship.
Small Enterprises : Definition of SSI; Types, Characteristics of SSI; Role of SSI in economic development; Problems faced by SSI.

Unit – III

Project Planning : Project Identification; Project Selection; Project Report – Contents & Formulation; Methods of Project Appraisal.
Ownership Structures : Sole Proprietorship; Partnership; Company; Co-operative; Selection of appropriate ownership structure.

Unit – IV

Institutional Finance : Types of financiers, Commercial banks; Other Financial Institutions – IDBI, IFCI, ICICI, IRBI, SFC, SIDC, SIDBI & EXIM Bank.
Institutional Support : Need; Support to Small Entrepreneurs – NSIC, SIDO, SSIB, SSIDC, SISI, DICs.

Text Books :

1. Prof. Satish C. Ailawadi & Mrs. Romy Banerjee [2007], *Principles of Entrepreneurship*, Everest Publishing House, Pune.

2. S.S. Khanka and V.G. Patel [2007], *Entrepreneurial Development*, S. Chand Publishers, New Delhi.

Outcomes:

Motivated students getting awareness about entrepreneurship may take up technocrat roles, thus helping for the overall economic development of the nation.

INDIAN CONSTITUTION AND SOCIETY (ICTS)

(Open Elective for IV B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**

Contact Periods : 2L / Week

Credits : 2

Objectives:

To educate students about our constitution and society to better serve Indian people and to make them good and responsible citizens

Unit - I

Historical back ground-Preamble to the Constitution of India-Fundamental rights-Derivative principles of state policy-Elections in India- Indian Judiciary

Unit - II

Union Executive: Structures of Union Government & Functions-President-Vice President-Prime Minister-Cabinet Parliament-Supreme Court of India

State Executive : Structures and Functions-Governor-Chief Minister-Cabinet-State Legislature-High Courts & Sub ordinate courts

Unit - III

Central – State Relations-President's Rule-Constitutional Amendments [42, 44, 74, 76, 86 & 91]-Constitutional functionaries-Working of Parliamentary system in India

Unit - IV

Nature, Meaning & Definition, Indian Social Structure-Language in India-Political Parties & Pressure groups-Right of Women-S.C's, S.T's & other weaker sections.

Text Books :

1. Durga Das Basu [2006], Introduction to the Constitution of India, Wedwe and Co. Publishers, New Delhi.

2.Macivel and Page , Society – An Introduction Analysis.

3. M.V. Pylee [2006], India's Constitution, S.Chand Publishers, New Delhi.

Outcomes:

Students, having awareness about union and state executives, rights and responsibilities of Indian citizens, Indian judiciary, social structure in India, may better serve the society in their respective roles

RESEARCH METHODOLOGY(RM)

(Open Elective for IV B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**

Contact Periods : 2L / Week

Credits : 2

Objectives:

To guide students with flair in research, by exposing them to various tools, techniques and methodologies of research, to better pursue their research work

Unit - I

Research Methodology : Introduction -Objectives of Research-Types of Research-Research Methods (Vs) Methodology

Researching process-Technique involved in defining a problem

Unit - II

Research Design and Sampling Design : Need for Research Design-Features of good Design-Concepts Related to Research Design-Different research designs-Basics Principles of Experimental Designs-Steps in sampling design-Characteristics of good sample design-Various types of sample designs-Complex Random sampling designs

Unit - III

Data Collection and Processing :

Data Collection through observation method & Interview Method-Data Collection through Questionnaires & schedules -Collection of Secondary data

Processing : Measures of Central Tendency-Measures of Dispersion-Measures of Asymmetry -Measures of Relationship-Simple Regression Analysis-Chi-square Test for comparing valiance

Unit - IV

Sampling Fundamentals & Report writing : Central Limit Theorem-Sampling Theory-Concept of standard error-Estimating population Mean-Sample size & Determination-Technique for Interpretation-Significance of Report writing-Types of Reports-Mechanics of writing a Research Report

Text Book:

1. C.R. Kothari [2004], Research Methodology (Methods & Techniques), NAI Publishers, New Delhi.

2. R. Cauvery, U.K Sudha Nayak and M.Girija [2007], Research Methodology, S.Chand Publishers, New Delhi.

Outcomes:

Students learning research methods and methodologies will be better able to apply the right tools and techniques to pursue their research / project works more effectively.

GENERAL PSYCHOLOGY (GPY)

(Open Elective for IV B.Tech-II Semester All Branches)

Scheme : 2010 **Internal Assessment : 100**
Contact Periods : 2L / Week
Credits : 2

Objectives:
To educate students to understand various related aspects of psychology and behavior of people

Unit – I

Introduction : Defining Psychology & Behavior-Branches and fields of Psychology-Utility of Psychology

Methods of Psychology : Introspection Method-Naturalistic observation-Experimental Method-Differential Method-Clinical Method-Psycho Physical Methods

Unit - II

Physiological Basis of Behavior : The Neuron-Central Nervous system-Brain and localization of Brain functions-Spinal chord

Influence of Nervous system on human behavior-Endocrine system and it's impact-The role of heredity and environment in the development of personality

Unit - III

Instincts, Emotions Senses and Sensitivity : Instincts and Reflex actions-Emotion & it's characteristics-Physiology of Emotions-Sensation and Sensitivity

Thinking, Reasoning and Problem solving : Nature of thinking-Elements of thoughts-Tools of thinking-Rigidity-Types of thinking-Reasoning & types-Problem solving and it's methods

Unit - IV

Motivation and Behavior & Attention & Learning : Biological and socio psychological Needs-Drives and Incentives-Motives and Types of Motives-Types & Effect of attention-Types of Learning-Problem Solving-Mechanism of Memorization

Intelligence – Aptitude – Personality : Nature of Intelligence-Concept of Metal age and IQ-Constantly of IQ-IQ Classification-Aptitude Ability & Achievement-Measurement of Aptitude -Features and Characteristics of Personality-Personality Assessment-Walters social Learning Theory

Text Book
:

1.S..K. Mangal [2005], General Psychology, Sterling Publishers, New Delhi.

Reference Book :

1. Saundra K.Ciccarelli and Glenn E.Meyer [2007], Psychology, Pearson Education, New Delhi.

Outcomes:

Applying the general psychology rightly, results in better coordination, understanding among persons, and improved ability of problem solving

LIST OF PROFESSIONAL ELECTIVES

1. ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (AIES)

2. BASICS OF COMPUTER GRAPHICS (BCG)

3. ENERGY CONSERVATION AND MANAGEMENT (ECM)

4. HYDRAULIC AND PNEUMATIC CONTROLS (HPC**)**

5. NANOTECHNOLOGY (NANOT)

6. MECHANICAL VIBRATIONS (MV)

7. PRODUCTIVITY MANAGEMENT (PM)

8. POWER PLANT ENGINEERING (PPE)

9. OBJECT ORIENTED PROGRAMMING THROUGH C++ (OOPC)

10. ADVANCED PRODUCTION METHODS (APM)

11. COMPUTATIONAL FLUID DYNAMICS (CFD)

12. EXPERIMANTAL STRESS ANALYSIS (ESA)

13. INDUSTRIAL ROBOTICS (IRT)

14. MECHATRONICS (MT)

15. OPTIMIZATION METHODS (OM)

16. MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

17. QUALITY & RELIABILITY ENGINEERING (QRE)

18. RENEWABLE ENERGY SOURCES (RES)

19.ADVANCED INFORMATION SYSTEMS (AIS)

20 INTRODUCTION TO AIRCRAFT INDUSTRY AND AIRCRAFT SYSTEMS (IAIAS)
21 DESIGN OF AIRCRAFT STRUCTURES (DAS)

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (AIES)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
1. The subject is aimed at bringing out a comprehensive presentation of Artificial Intelligence (AI) based methodologies focusing on addressing a wide spectrum of problems in engineering.
2. This also introduces the basic concepts of expert systems.

Unit – I

Introduction : Artificial intelligence : AI problems, foundation of AI and history of AI agents, agents and environment, the concept of rationality, the nature of environment ,structure of agents, problem solving agents, problem formulation.

Unit – II

Searching : The underlying assumptions, The level of the model , Criteria for success, searching for solutions ,uniform search strategies-Heuristic Search Techniques, Generate and test, hill climbing , Breadth first search, problem Reduction , Constraint Satisfaction , means- ends analysis.

Unit - III

Knowledge Representation: Representations and mappings, approaches to knowledge representation, issues in knowledge representation, the frame problem.

Unit – IV

Representing Knowledge using rules: Procedural verses declarative knowledge, logic programming, Forward verses backward reasoning, matching, control Knowledge.

Unit - V

Intelligent manufacturing: System components, system architecture and data flow, system operation,

Unit –VI

Components of know ledge based systems: First order logic, production rules, structured production rules, frames, Inference engine, Knowledge acquisition.

Unit - VII

Machine Learning: Conceptual learning, learning and Neural net works.
Process Planning, Phases of process planning, Volume decomposition, Selection of alternative machines, tools, Fixtures, Matching optimization.

Unit - VIII

Knowledge based systems for FMS: Knowledge based system for group Technology, Knowledge based systems for machine layout, Knowledge based system for scheduling.

Text Books:

1. Elaine Rich, Kevin Knight [2000], Artificial Intelligence, TMH Publishers, New Delhi.
2. Andrew Kusaik [2002], Intelligent Manufacturing Systems, Prentice Hall Publishers, New Delhi.

Reference Books:

1. Stuart Russell, Peter Norvig [2002], Artificial Intelligence A Modern Approach, Pearson Education, New Delhi.
2. Jackson .P [2003], Expert Systems, Pearson Education, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1. The student gains knowledge on the importance of the use of AI-based methodologies for solving engineering problems.
2. He also learns about knowledge representation, intelligent manufacturing and machine learning

BASICS OF COMPUTER GRAPHICS (BCG)
(Professional Elective For IV B.Tech. ME)

Scheme : 2010 **Internal Assessment : 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits :4 **End Exam Duration : 3 hrs**

Objectives:
The student gets the knowledge in computer graphics modules and its utilization.

Unit - I

Graphics Out put Devices: Video display devices- CRT monitors, refresh displays, raster scan displays, direct view storage tube.

Unit - II

Input devices-key boards, mouse, track ball, joysticks, digitizers, light pens, touch panels. Graphics work stations and graphics standards.

Unit - III

Graphics Primitives: Points and lines. Line algorithms- DDA algorithm, Bresenham's algorithm, parallel line algorithms.

Unit – IV

Circle algorithms, Loading the frame buffer, circle and ellipse generating algorithms. Character generation, fill area functions.

Unit - V

Two Dimensional Geometric Transformations: Basic transformations-Translation, rotation, scaling. Matrix representation and homogeneous coordinates. Composite transformations, Reflection and shearing. Transformations between coordinate systems. Clipping and viewing.

Unit - VI

Three Dimensional Geometric Transformations : Translation, rotation, scaling, composite transformations, reflection and shearing. Three dimensional geometric transformation functions. Modeling coordinate transformations.

Unit - VII

Computer Animation : General animation functions, raster animation, computer animation methods, key frame systems, motion specification.

Unit – VIII

Parametric representation of curves: Analytic & synthetic Curves , curve manipulation, design examples.

Text Books:

1. Donald Hearn and Baker [2004], Computer Graphics, PHI Publishers, New Delhi.
2. Steven Harrington [1987], Computer Graphics, McGraw Hill Publishers, New York.

Reference Books:

1. Ibrahim Zeid [2005], CAD/CAM Theory & Practice, TMH Publishers, New Delhi.
2. S. Kumar and A.K. Jha [1998], Technology of CAD/CAM, Dhanpat Rai and Sons Publishers, New Delhi.
3. Dr. P. Radhakrishnan and C.P. Kothandaraman [2005], Computer Graphics and Design, Dhanpat Rai and Sons Publishers, New Delhi.
4. Michael Landon and Mckissick [1987], Computer Aided Drafting and Design,

Prentice Hall Publishers, New Jersey

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student gains in a thorough introduction to computer graphics techniques, focusing on line and circle algorithms, representation of curves, geometric transformations and animation.

ENERGY CONSERVATION AND MANAGEMENT (ECM)

(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

The course will enable the student to get knowledge on different energy conservation and management techniques, engineering economics and energy auditing.

Unit - I

Introduction to Energy Conservation and Management: Power scenario in India and world- Rules for energy conservation- Technologies for energy conservation-Energy conservation patterns.

Unit - II

Thermal Insulation and Refractors: Heat loss through uninsulated surfaces – Effect of insulation on current carrying wires- Critical thickness of insulation- Classification and properties of refractories and insulators.

Unit - III

Cogeneration: Principle of Co generation-topping cycle and bottoming cycle, Amount of energy saving through cogeneration

Unit - IV

Engineering Economics: Steps in planning – Efficiency of organization- Capital budgeting- Time value of money- Cash flow Diagrams – Present worth factor-Capital recover factor- Equal annual payment methods-Nominal and effective interest rates-Discrete and continuous compounding – Equivalent between cash flows

Unit - V

Project Management: Method of investment appraisal- Rate of return method- Pay back method- Net present value method- Types of project- Types of budgets- Purpose of project management- Roles and responsibilities of project manager.

Unit - VI

Energy Auditing : Objectives- Level of responsibility- Control of energy- Use of energy-Schemes of energy conservation- Energy index and cost index-Pie charts and sankey diagrams –Load profiles – Preliminary and detailed energy audit – Energy saving potential

Unit - VII

Energy Management Programs: Necessary steps of energy management program-Concepts of energy management –General principles of energy management.

Unit - VIII

Energy management in manufacturing and process industries: Qualities and functions of energy managers – Language of energy manager – Checklist for top management.

Text Books :

1. W.R. Murphy and G. Mickay [2001], Energy Management, Butterworths Publishers, New Delhi.
2. P.W.O. Callghan [1998], Energy Conservation, Pergmon Press, New York.

Reference Books :

1. D.A. Reay [1995], Waster Heat Recovery Systems, Pergmon Press, New York.
2. Albert Thumann [2000], Hand Book of Energy Audits, Prentice Hall, New Jersey.
3. Craig B. Smith [2001], Energy Management Principles, Pergmon Press, New York.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

The student will able to 1.Understand different technologies of energy conservation.

2.Understand different steps in planning

3.Get knowledge on project management like types of projects and budgets.

Outcomes:

4.Understand the concept of energy auditing and energy management programs.

HYDRAULIC AND PNEUMATIC CONTROLS (HPC)

(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

The course will enable the student to get knowledge on hydraulic pumps and pneumatic systems.

Unit - I

Basic Principles: Hydraulic Principles - Hydraulic pumps - Characteristics - Pump Selection -Pumping Circuits

Unit - II

Hydraulic Actuators - Linear Rotary - Selection -Characteristics - Hydraulic Valves - Pressure - Flow - Direction Controls - Applications - Hydraulic Fluids-Symbols.

Unit - III

Hydraulic Circuits : Hydraulic circuits - Reciprocating - Quick return - Sequencing synchronizing - Accumulator circuits – Safety circuits - Industrial circuits –

Unit - IV

Applications of Hydraulic Circuits: Press - Milling Machine - Planner - Fork Lift, Crane etc.

Unit - V

Design & Selection : Design of Hydraulic circuits - Selection of components.

Unit - VI

Pneumatic Systems : Pneumatic fundamentals - Control Elements - Logic Circuits - Position - Pressure Sensing - Switching – Electro Pneumatic - Electro Hydraulic Circuits - Robotic Circuits.

Unit - VII

Design & Selection : Design of Pneumatic circuits - Classic-Cascade-Step counter - Combination -Methods - PLC-Microprocessors - Uses - Selection criteria for Pneumatic components

Unit - VIII

Installation and Maintenance of Hydraulic and Pneumatic power packs - Fault finding - Principles of Low Cost Automation - Case studies

Text Books :

1. J.Michael, Pinches and John G.Ashby [1989], Power Hydraulics, Prentice Hall Publishers, New York.
2. Andrew Parr [1999], Hydraulics and Pnematics (HB), Jaico Publishing House, New Delhi.

Reference Books :

1. Dudleyt, A. Pease and John J. Pippenger [1987], Basic Fluid Power, Prentice Hall Publishers, New York.
2. Anthony Esposite [1980], Fluid Power with Applications, Prentice Hall Publishers, New York.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student will able to

1 Understand hydraulic principles and its circuits used in machine tools.
2. Design and selection of hydraulic circuits.
3.Fundamentals of pneumatic systems and its design.

NANOTECHNOLOGY(NANOT)

(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

The student gets the knowledge in

1. Introduction to the practice and discipline of nanotechnology
2. Physical basis and principles of nanotechnology and Industry applications

UNIT-I

General Introduction: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

Unit - II

Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,

Nanoparticles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nanocomposites,

UNIT-III

Mechanical properties: Strength of nanocrystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties,

Unit - IV

Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nanoparticles

Optical properties: Optical properties, special properties and the coloured glasses

Process of synthesis of nanopowders, Electro deposition, Important nanomaterials

UNIT-V:

Investigating and manipulating materials in the nanoscale: Electron microscopics, scanning probe microscopics, optical microscopics for nanoscience and technology, X-ray diffraction.

UNIT-VI

Nanobiology : Interaction between bimolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies,

Unit - VII

Application of nano in biology, nanoprobes for Analytical Applications-A new Methodology in medical diagnostics and Biotechnology, Current status of nano Biotechnology, Future perspectives of Nano biology,

UNIT-VIII

Nanomedicines : Developing of Nanomedicens Nano sytems in use, Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications,

Molecular Nano mechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nano tribology applications.

TEXT BOOKS:

1. T.Pradeep [2007],Nano: The Essentials- Tata Mc Graw Hill Publishing company Limited New Delhi
2. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

student will be able to:

1.Demonstrate a working knowledge of nanotechnology principles and industry applications.

2.Apply key concepts in chemistry, physics, biology, and engineering to the field of nanotechnology.

Outcomes:

3. Ability to identify current nanotechnology solutions in design, engineering, and manufacturing.

MECHANICAL VIBRATIONS (MV)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
To study the students with the sources of vibration and noise in machines and make design modifications to reduce the vibration and noise and improve the life of the components.

Unit – I

Single Degree Freedom Systems: Undamped free vibration: Classical method, Energy method, equivalent systems.

Unit – II

Damped Free Vibration: Viscous damping, under damping, critical damping, over damping, equivalent damping coefficient, Simple problems.

Unit – III

Single Degree Freedom Systems with Forced Vibration: Steady state forced Vibration, sources of excitation, impressed harmonic force, impressed force due to unbalance,

Unit – IV

Support Excitation
Motion excitation, transmissibility and isolation, performance of different type of isolators. General theory of seismic instruments, accelerometer and vibrometer.

Unit – V

Two Degree Freedom Systems: Natural frequencies and modes of vibration by classical method of spring-mass system, forced vibration, dynamic vibration absorber

Unit – VI

Multi Degree Freedom Systems: Influence co-efficient method, lumped mass and distributed mass systems, Stodola method, Holzer's method, matrix iteration method, orthogonality of mode shapes.

Unit – VII

Transverse Vibrations : Natural frequencies of beams- Simply supported beam with point load and uniformly distributed load. Rayleigh's and Dunkerley's methods.

Unit – VIII

Vibration in Continuous Systems: Whirling of shafts, critical speed of shafts, critical speed of shafts with and without damping.

Text Book:

1. G. K. Grover [2003], Mechanical Vibrations, New Chand and Bro's Publishers, Roorkee.
2. V.P. Singh [2003], Mechanical Vibrations, Dhanpat Rai and Sons Publishers, New Delhi.

Reference Books:

1. Thomson William T [2005], Vibration Theory and Applications, Pearson Education, New Delhi.
2. J. S. Rao and K. Guptha [1995], Theory and Practice of Mechanical Vibrations, WEL Publishers, New Dehi
3. Timoshenko SP and Young DH [1989], Introductory Course on Vibration Problems in Engineering, John Wiley and Sons Publishers, Singapore.
4. Singrasu S. Rao [2005], Mechanical Vibrations, Pearson Education, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

Students will be able

1. to know the concepts of vibration and noise
2. to understand the case studies on the free and forced vibrations with and without damping.
3. to analyze the Single Degree, Two Degree and Multi degree of Freedom Systems
4. to analyze the torsional problems

PRODUCTIVITY MANAGEMENT (PM)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
To familiarize the student in the basic concepts of the productivity and measurement, productivity planning models and productivity improvement programs

Unit - I
Basic Concepts of Productivity: Basic definitions of Productivity, Productivity vs. Inflation, vs Standard of Living, vs. Political Power, vs. Economic power. Factors affecting productivity, Productivity Benefit Model, Production cycle & Definition and scope of Productivity Engineering and Management.
Unit - II
Productivity Measurement1: Productivity measurement at the industrial level: Productivity Measurement in industry in general, Productivity Measurement in Manufacturing Industry,
Unit - III
Productivity Measurement2: Productivity Measurement in Service Industry & Productivity Measurement in Federal Government Agencies. Benefits, approaches, problems in measurement, limitations, inter - industry comparisons.
Unit - IV
Total Productivity Model (TPM): Basic model, computations in the application of the model & Steps in implementing the TPM
Unit - V
Productivity Planning Models : **Short term productivity models** - Weighted partial productivity model - productivity evaluation tree model - linear trend model using double exponential smoothing - comparative productivity evaluation tree model, seasonal variation model using Winter's method.
Unit - VI
Productivity Planning Models: Long **Term Productivity Planning Models**: Total productivity - Maximization model & Total Productivity - Profit model.
Unit - VII
Productivity Improvement: Causes of productivity decline in companies & Productivity improvement techniques - Technology based Materials based, Employee based & Product task based.
Unit - VIII
Productivity Improvement Programme: Formal productivity improvement - organisation structure for productivity programme - planning aspects, human aspects, implementation schedule, evaluation of the effectiveness of the formal productivity programme, problems encountered and the ways to counter them

Text Book :
1. David J. Sumanth [1985], Productivity Engineering and Management, McGraw Hill Publishers, Singapore.

Reference Book:

1. Prem Vrat [2006], Productivity Management- A Systems Approach, Narosa Publications, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1. The student gains knowledge in the tools of productivity measurement and analysis.
2. The student develops skills for making efficient manufacturing decisions in practical industry situations

POWER PLANT ENGINEERING (PPE)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

To understand different cycles of power plants and economics of power generation.

Unit – I

Sources of Energy: Introduction, different sources of energy, principal types of power plants, essential requirements of a power plant.

Fuels and Combustion: Coal, fuel oil, natural and petroleum gas, industrial wastes and byproducts, biomass, thermodynamic view, combustion reactions, calculation of weight of air required for combustion, heat of combustion.

Unit –II

Combined Cycle Power Generation: Characteristics of ideal working fluid for vapour power cycle, binary vapour cycles, concept of combined cycle plants, Gas turbine – Steam turbine (combined) power plant, advantages of combined cycle power generation.

Unit –III

Economics of Power Generation: Terms and definitions, load duration curves, power plant economics – construction costs, Fixed cost and depreciation, fuel cost, present worth concept, incremental heat rate, input-output curves.

Unit - IV

Steam Power Plant: Introduction, classification of steam power plants, layout of a modern steam power plant, fuel handling, combustion equipment for boilers, fluidized bed combustion, advantages and disadvantages of steam power plants, efficiencies in a steam power plant – calculation of different efficiencies – simple problems.

Unit - V

Diesel Engine Power Plant: Introduction, advantages and disadvantages of diesel power plant, applications of diesel power plant, general layout, essential components of diesel power plant, layout of a diesel engine power plant.

Unit –VI

Gas Turbine Power Plant: General aspects, closed cycle and open cycle plants, applications, advantages and disadvantages of a gas turbine plant, analysis of a gas turbine plant, gas turbine fuels, performance of gas turbine plants, components of gas turbine power plant.

Unit - VII

Hydro-Electric Power Plant: Introduction, advantages and disadvantages, selection of site, essential elements of hydro-electric power plant, classification of hydro-electric power plants, calculation of available hydro power.

Unit –VIII

Nuclear Power Plant: Chemical and Nuclear reactions, Nuclear Fission, chain reaction, main components of nuclear power plant, essential components of a nuclear reactor, types of reactors, power of nuclear reactor, safety measures for nuclear power plants.

Text Book :

1. P.K Nag [2005], Power Plant Engineering, TMH Publishers, New Delhi.

Reference Books :

1. R.K Rajput [2004], Power Plant Engineering, Lakshmi Publications, Bangalore.
2. G.D. Rai [2003], Power Plant Technology, Khanna Publishers, New Delhi.
3. G.R. Nagpal [2006], Power Plant Engineering, Khanna Publishers, New Delhi.

Note:

1. The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.
2. Use of Thermal Engineering data hand book is permitted.

Outcomes:

The student gains Knowledge in

1. Different energy sources, fuels.
2.The economics of power generation
3.Different power plants like steam, diesel , gas turbine, hydro electric and nuclear power.
4. Combined cycle power generation.

OBJECT ORIENTED PROGRAMMING THROUGH C++ (OOPC)
(Professional Elective For IV B.Tech. ME)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods : (3L+1T) / Week **End Exam Marks: 70**

Credits :4 **End Exam Duration : 3 hrs**

Objectives:

To study the fundamental concepts that are essential to understanding how to use oops effectively and how to structure a program that uses C+.

Unit – I

Principles of Object Oriented programming : A look at Procedure Oriented Programming, Object Oriented Programming Paradigm, Basic Concepts of OOP, Benefits of OOP, Object Oriented Languages.

C++ : A Simple C++ Program, An example with Class, Structure of C++ Program

Unit – II

Tokens, Expressions and Control Structures : Tokens, Keywords, Identifiers and Constants, Basic Data Types, User- Defined Data Types, Derived Data Types, Dynamic Initialization of Variables.

Unit – III

Operators in C++: Scope Resolution Operator, Member Dereferencing Operators, Expressions and their Types, Implicit Conversions, Operator Precedence and Control Structures.

Unit – IV

Functions in C++: The Main Function, Function Prototyping, Inline Functions, Function Overloading, Friend and Virtual Function.

Classes and Objects: Specifying a Class, Defining Member Functions.

Unit – V

Constructors and Destructors:: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors.

Unit – VI

Operator Over loading:: Defining Operator Overloading, Overloading Unary Operators and Binary Operators, Overloading Binary Operators using Friends, Rules for Overloading Operators.

Unit – VII

Inheritance: Defining Derived Classes, Single Inheritance, Multi Level Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid In- heritance, Abstract Classes.

Unit – VIII

Introduction to data structures : Types of Data Structures: Arrays, Single Linked List, Double Linked List, Operations on Linked List, Stacks, Operations and Applications on Stacks, Queues, Circular Queues, Operations on Queues and Circular Queues, Linear Search and Binary Search.

Text Books :

1. E.Balaguruswamy [2005], Object Oriented Programming with C++, TMH Publishers, New Delhi.
2. M.P. Bhave and S.A. Patekar [2005], Object Oriented Program ming with C++, Pearson Education, New Delhi.

Reference Books :

1. Herbert Schildt [2004], The Complete Reference of C++, TMH Publishers, New

Delhi.
2. Jean Paul Tremblay and Paul G. Soreason [2001], An Introduction to Data Structures with Applications, TMH Publishers, New Delhi.
3. Mark Allen Weiss [1994], Data structures and Algorithm Analysis, The Benjamin Cummins Inc., New York .
4. Robert Lafore [2005], Object Oriented Programming in TurboC++, Galgotia Publishers, New Delhi

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student gain knowledge

1. On basic concepts of object oriented programming.
2. To write programs in C++ by using classes and objects, functions, constructors and different overloading operators.
3. Knowledge on data structures.

ADVANCED PRODUCTION METHODS (APM)

(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

1. Understand and appreciate the importance of basic principles of Manufacturing Systems..

Objectives:

2..To learn special moulding processes, modern welding techniques, powder metallurgy, rapid prototyping systems.

Unit – I

Production Systems : Types of production, Continuous and intermittent production, Mass and flow production, Batch production, Job order production.

Unit – II

Functions in Manufacturing, Organization and Information Processing in Manufacturing, Plant Layout, Production Concepts and Mathematical Models.

Unit -III

Special moulding processes : Carbon dioxide process, Ferro silicon process, Shell molding, Investment casting, Plaster molding, Full mould casting.

Unit – IV

Modernization and Mechanization of Foundry, Need for Modernization and Mechanization of Foundry, Description of various equipments such as Sand conditioners.

Unit – V

Modern Welding techniques: Plasma arc Welding, Explosion Welding, SAW, Electro slag welding, Electron beam and Laser beam Welding, Forge welding.

Unit – VI

Welding Design – Principles of sound welding design, Welding joint design, Types of welding joints and their characteristics, Variables affecting the strength of welded joint, Design of welds subjected to combined stresses, Mathematical problems.

Unit – VII

Powder Metallurgy : Introduction, advantages and limitations of powder metallurgy, preparation of metal powders, mixing, die and isostatic compacting methods, sintering, stages of sintering and methods, sintering furnaces, classification and sintering atmosphere, applications of power metallurgy, heat treatment of power metallurgy parts, surface treatment, impregnation treatment, machining of sintering parts.

Unit – VIII

Rapid Prototyping : Need for the compression in product development History of RP systems, Survey of applications, Growth of RP industry, classification of RP systems. Brief Introduction of RP systems, Stereolithography systems, Selective Laser Sintering, Fusion Deposition Modeling, Solid ground curing.

Text Books:

1. P. N. Rao [2004], Manufacturing technology: Foundry, Forming and Welding, TMH Publishers, New Delhi.
2. S.C. Gupta and R. K. Jain [2004], Production technology, Khanna Publication, New Delhi.

Reference Books:

1. H.F.Taylor [1987], Foundry Engineering, Wiley Eastern Publishers, New Delhi.
2. Heine and Rosenthal [2005], Principles of Metal Casting, TMH Publishers, New Delhi.
3. Dr. R.S.Parmar [2004], Welding Processes and Technology, Khanna Publishers, New Delhi.
4. Paul. F. Jacobs [1996], Stereo Lithography and other RP & M Technologies, ASME Press, New York
5. P.C.Sharma [2006], Production Engineering, S. Chand Publishers, New Delhi.
6. P. L. Jain [2004], Principles of Foundry Technology, TMH Publishers, New Delhi.
7. R. Little [1989], Welding And Welding Technology, TMH Publishers, New Delhi.
8. O.P. Khanna [2003], Text Book of Welding Technology, Dhanpat Rai & Sons, New Delhi.
9. D.T. Pham and S.S. Dimov [2001], Rapid Manufacturing, Springer Publishers, London.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end student get the knowledge of types of production, different types of special moulding processes, types of modern welding techniques, introduction and methods of powder metallurgy, its applications and introduction of RP. types of RP.

COMPUTATIONAL FLUID DYNAMICS (CFD)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
To understand the major approaches and methodologies used in CFD and Increase skills in implementing the basic CFD methods

Unit – I
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.

Unit – II
Finite Difference Applications in Heat conduction and Convention: Heat conduction, steady heat conduction in a rectangular geometry,, transient heat conduction , finite difference application in convective heat transfer, closure.

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

Unit - IV
Errors and stability analysis, introduction, first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme .

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

Unit - VI
Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function- Vorticity formulation, Boundary-layer theory, Buoyancy – Driven Convection and stability.

Unit -VII
Simple CFD Techniques, viscous flows conservation form space marching, relovation techniques, viscous flows, conservation from space marching relovation techniques, artificial viscosity, the alternating direction implicit techniques, pressure correction technique.

Unit – VIII
Computer graphic techniques used in CFD Quasi one dimensional flow through a nozzle, turbulence models, standard and high Reynolds number models and their applications.

Text Book :

1. John.Anderson [1995], Computational Fluid Dyanamics -The basics with applications, Mc Graw Hill Publishers, New York.

Reference Books :

1. Suhas V, Patankar Hema [2005], Numerical Heat Transfer and Fluid Flow, Shava Publishers and Mc Graw Hill, New Delhi .
2. Muralidharan [2003], Computational Fluid Flow and Heat Transfer, Nasora Publications, New Delhi
3. Tapan K. Sengupta [2005], Fundamentals of Computational Fluid Dynamics, Universities Press, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

It helps the students to familiarize in

1. To identify, formulate and solve engineering problems.
2. To work individually and in teams to learn the fundamentals used in modern computer analysis and simulation of fluid dynamical systems. This understanding is applied to series of problems to demonstrate the connection between the controlling physical processes and the appropriate solution procedures.

EXPERIMANTAL STRESS ANALYSIS (ESA)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

To study the students of various methods for measurement of stresses and strains.

Unit - I

Introduction: Theory of Elasticity, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, Three-dimensional stress strain relations.

Unit - II

Strain Measurement: Introduction- mechanical, optical, pneumatic, acoustic methods of strain measurement.

Unit - III

Electrical resistance strain gauges - gauge factor, types, properties of a gauge material, backing material, adhesive material, protective coatings; method of bonding strain gauges, strain gauges lead wire and connections, semiconductor strain gauges.

Unit - IV

Photo Elasticity : Nature of light-harmonic wave, phase amplitude, polarisation. Crystal optics-passage of light through crystalline media, absolute and relative phase difference, quarter wave plate, half wave plate, production of plane polarized light.

Unit -V

Two-dimensional photo elasticity: stress optic law, plane Polaris cope, is chromatics and isoclinic, circular polariscope, dark fields and bright field arrangements, isoclinic and isochromatic fringe order at a point.

Unit - VI

Bi-refringent Coatings: Introduction to Bi-refringent coating theory and Reflection Polariscope. Moire techniques phenomenon, Moir fringe analysis, Moire techniques for in plane problems.

Unit - VII

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

Unit - VIII

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

Text Books :

1. L.S. Srinath, M.R. Raghavan, K. Lingaiah, G. Gargesh, K. Ramachandra and B. Pant [1984], Experimental Stress Analysis, TMH Publications, New Delhi.
2. Dally and Riley [1991], Experimental Stress Analysis, McGraw Hill Publishers, New York.

Reference Books :

1. Durelli Philips and Tsao [1958], Theoretical and Applied Stress Analysis, McGraw Hill Publishers, New York.
2. Sadhu Singh [2000], Experimental Stress Analysis, Khanna Publishers, New Delhi.
3. Abdul Mubeen [2000], Experimental Stress Analysis, Dhanpat Rai and Sons, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Students are familiarize in measurement of stress and strains using strain gauges, photo elasticity, moiré methods.

Outcomes:

INDUSTRIAL ROBOTICS (IRT)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**

Contact Periods : (3L+1T) / Week **End Exam Marks: 70**

Credits: 4 **End Exam Duration: 3 hrs**

1. To introduce the concepts of automation in manufacturing and direct & indirect applications of robotics in manufacturing.
2. Understand and appreciate the importance of basic principles of Robotic Systems.

Objectives:

3. Understand the application of those principles in practice.

Unit – I

Fundamentals of Robotics and Robot technology: Automation and robotics, robot definition, robot anatomy, robot configurations, work volume, precession of movement, robot actuation and feed back component, actuators, hydraulic actuators, electrical actuators (variable reluctance type and permanent magnet type stepper motor). Position sensors (potentiometer, resolvers, and encoders), velocity sensors (tachometer), power transmission devices.

Unit - II

End Effectors and Sensors : Robot end effectors, types of end effectors, mechanical grippers, other type of grippers, Hooks, Scoops and other miscellaneous devices, sensors in robotics tactile sensors, proximity and range sensors, Machine Vision, use of sensors in robotics.

Unit – III

Robot Motion Analysis and Control: Introduction to manipulator kinematics, position representation, forward transformation and reverse transformation of two degree freedom robot arm, three degree of freedom arm in two dimensions, four degree freedom manipulators in three dimension, homogeneous transformation and homogeneous transformation matrix.

Unit - IV

Robot Programming Languages : Methods of robot programming, WAIT, SIGNAL and delay commands; The textual robot programming languages, robot language structures, constants, variables and other data objects, motion commands, end effectors and sensors commands, computations and operations, program control and subroutines, monitor mode commands.

Unit – V

Robot Work Cell: Robot cell design and control- robot cell layout, work cell control, interlocks, error detection and recovery, graphical simulation of robot work cell.

Unit – VI

Economic analysis for robotics: Basic data required for economic analysis, methods of economic analysis.

Unit – VII

Robot Applications in Manufacturing: Material transfer and machine loading and unloading- general considerations in material handling.

Unit – VIII

Processing Operations: Spot welding, continuous arc welding, spray coating, and other processing operations.

Text Books :

1. Robert J Schilling [2007], Fundamentals of Robotics Analysis and Control, Pearson Publishers, New Delhi.
2. Mickel. P.Groover and Mitcheel Seisstel [1986], Industrial Robotics – Technology, Programming and Applications, McGraw Hill Publishers, New Delhi.

Reference Books :

1. Deb Satya Ranjan [2003], Robotics Technology and Flexible Automation, TMH Publishers, New Delhi
2. Janaki Raman P.A. [2004], Fundamentals of Robotics and Image Processing an Introduction, TMH Publishers, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course, students will be familiarized in basic components of robotics, classification of robots, robot grippers, Machine vision functions, Robot sensory devices, and transformations and kinematics of robot joints.

MECHATRONICS (MT)

(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

To develop an innovative curriculum in electro mechanical system design that will serve the basic requirements of mechatronics.

Unit – I

Introduction : The concept of Mechatronics, Elements and techniques needed in he design and control of Electro- Mechanical systems. Application in industries and systems development.

Unit – II

Drive mechanisms: Feeding and indexing, orientation, escapement and sorting devices, conveyor systems etc.

Unit – III

Electronic systems : Conductors, Insulators and Semiconductors; Passive components used in Electronics; Transformers, Transistors, Silicon controlled Rectifiers (SCR), Integrated circuits (IC) ; Digital circuits.

Unit – IV

Mechatronics and measurement systems: Data acquisition , sensors& actuators. Digital –to – analog and/ or analog –to –digital conversion. Signal processing using operational amplifiers. Temperature measurement interface and LVDT interface. Systems Response.

Unit - V

Design of CNC Machines: Design of modern CNC machines and Mechatronics elements; Machine Structure ; Guide ways, Feed drives, Spindle / Spindle bearings; Thermal behaviour of machine tools ; Measuring systems

Unit – VI

Control systems: Controls, Gauging, Tool monitoring system ; Adaptive control for the cutting process ; Wear sensors for adaptive control; Controls used in CNC machines ; FANUC, SINUMERIC et.,: Structure and design of these control systems.

Unit - VII

Pneumatic circuits. Applied Industrial Pneumatics and hydraulics:. Merits of fluid power of pneumatic and hydraulic elements symbols. Study of hydraulic control valves, accessories, pumps. Hydraulic circuits and mechanical servo control and Electro-Hydraulic and Hydro pneumatic circuits.

Unit - VIII

Modern manufacturing and Mechatronics systems: Special purpose machines, automation, mechanisation, elements of flexible manufacturing systems. Multipurpose control machines; PLC programming, Mechatronics systems.

Text Books :

1. HMT Limited [2002], Mechatronics, TMH Publishers, New Delhi.
2. Auslander D.M and Kempf C.J., Mechatronics, Mechanical System Interfacing, Prentice Hall,
   New York.

Reference Books :

1. Bolton W. [2001], Mechatronics Electronics Control Systems in Mechanical Engineering, Addison Willy Publishers, New Delhi.
2. Michael B. Histand & David G. Alciaore, Introduction to Mechatronics and Measurement Systems, New McGraw Hill International Edition, New York.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course student able to know the basic electronic systems like conductors, insulators, sensors and actuators and structure and design of controls used in CNC machines, applied pneumatics and hydraulics, PLC programming.

OPTIMIZATION METHODS (OM)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
To familiarize the students with various methods of optimization for solving linear and non linear engineering problems.

Unit - I
Dynamic Programming: Introduction- Bellman's principle of optimality-Application of dynamic programming-Linear programming problem-Capital budgeting problem

Unit - II
Decision Theory : Introduction, Decision, Decision Making & Decision Theory, Types of Decisions, decision making process, Types of Decision making Environment: **Decision making under certainty** –Expected Monetary Value(EMV), Expected Opportunity Loss (EOL) Criterion & Expected Value of Perfect Information(EVPI) Criterion

Unit - III
Decision making under risk- Criterion of Pessimism or Manimax, Criterion of Optimism or Maximin, Minimax Regret Criterion, Criterion of Realism & Criterion of Rationality

Unit - IV
Decision making under uncertainty and **Decision tree analysis**: Introduction, Procedure of Constructing Decision Trees & Solution through Decision Tree Analysis.

Unit - V
Integer Programming-1: Introduction, Types of Integer Programming Problems, Gomory's Cutting Plane method.

Unit – VI
Integer Programming -2: Branch and Bound method for all Integer Programming Problems & Mixed Integer Programming Problems

Unit-VII
Classical Optimization-1: Introduction; Unconstrained problems of maxima and minima, constrained problems of maxima and minima;

Unit - VIII
Classical Optimization-2: Constraints in the form of equations - Lagrangian method; Constraints in the form of inequalities -Kuhn-tucker conditions.

Text Books :
1. S.D.Sharma [2004], Operations Research, Kedarnath and Co. Publishers, Meerut.

Reference Books :
1. V. K. Kapoor [2004], Operations Research, S. Chand, New Delhi.
2. Bronson-Schaum series [1983], Operations Research, McGraw Hill, Singapore.
3. Hamdy A.Taha [2001], Operations Research, Pearson Education, New York.
4. S.S.Rao [1995], Optimization Theory and Applications, NAI Publishers, Hyderabad.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

Students get exposure in
1. Theory of simulation and simulation models
2. Concepts of dynamic programming and integer programming.
3. Solving non-linear optimization problems using appropriate methods / techniques.

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
1.To introduce the fundamental basis of MEMS and devices, such as micro actuators and micro sensors, as well as their principles of operation.

UNIT- I
Introduction : Production Engineering, Precision Engineering and Ultra-Precision Engineering, Integrated Circuits (IC), Microelectro mechanical Systems (MEMS), Microsensors , Microactuators , Microelectronics Fabrication , Micromachining , MEMS classes ofproducts, Nanotechnology , Modeling and Simulation, Microinstrumentation.
Micromachining: Photolithography , Structural and Sacrificial Materials, Other Lithography Methods ThinFilm-Deposition, Imptirity Doping , Etching ,Problems with Bulk Micromachining , Surface Micromachining , Bulk Versus Surface Micromachining , Wafer Bonding , LIGA.
UNIT-II
System Modeling and Properties of Material: The Need for Modeling, System Types, Basic Modeling Elements in Mechanical System , Electrical Systems , Fluid Systems and Thermal Systems, Translational and Rotational Pure Mechanical System with Spring, Damper and Mass , ,Modeling Hybrid Systems, Analogy between 2nd Order Mechanical and Electrical Systems , Properties of Materials , Relationship between Elastic constants
Passive Components and Systems : System-On-A-Chip (SOC) ,Passive Electronic Systems , Passive Mechanical Systems (PMS)
UNIT-III
Mechanical Sensors and Actuators : Principles of Sensing and Actuation, Beam and Cantilever, Microplates ,Capacitive Effects , Piezoelectric Material as Sensing and Actuating Elements , Strain and , Pressure Measurement, Flow Measurement using Integrated Paddle-Cantilever Structure, Pressure Measurement by Microphone, MEMS Gyroscopes, Shearmode Piezoactuator , Gripping Piezoactuator , Inchworm Technology
Unit – IV
Thermal Sensors and Actuators: Thermal Energy Basics and Heat Transfer Processes, Thermistors, Thermodevices, Thermocouple , Micromachined Thermocouple Probe , Peltier Effect Heat Pumps , Thermal Flow Sensors , Microhotplate Gas Sensors , MEMS Thermovessels , Pyroelectricity , Shape Memory Alloys (SMA) , U-Shaped Horizontal

and Vertical Electrothermal Actuator, ThermallyActivated MEMSRelay , Microspring Thermal Actuator , Data Storage Cantilever

UNIT-V

Micro-opto-electromechanical Systems : Fundamental Principle of MOEMS Technology , Review on Properties of Light , Light Modulators, Beam Splitter, Microlens , Micromirrors , Digital Micromirror Device (DMD) , Light Detectors , Grating Light Valve (GLV), Optical Switch , Waveguide and Tuning , Shear-Stress Measurement

Unit –VI

Microfluidic Systems: Important Considerations on Microscale Fluid, Properties of Fluids, Analytical Expressions for Liquid Flow in a Channel ,Fluid Actuation Methods, Dielectrophoresis (DEP) , Electrowetting, Electrothermal Flow, Thermocapillary Effect ,Electroosmosis Flow, Optoelectrowetting (OEW), Tuning using Microfluidics , Typical Microfluidic Channel , Microfluid Dispenser , Microneedle Molecular Gate , Micropumps: The Continuous Flow System , Microfluidic Design Considerations

UNIT-VII

CNT and Nanotechnology : Nanotechnology Materials , Fullerenes , Carbon Nanotube (CNT) , Development of CNTs, Applications of CNTs, Remarks on Properties of CNTs, Molecular Machine Components.

Unit –VIII

Simulation Based Micro and Nanosystem Design : The Need of Simulation Tool, FEM, Design Flow using Simulation Tool, Ansoft Designer and HFSS V9.0, DS/MEMS and CA/MEMS, FEMPRO, ANSYS Multiphysics, SUGAR, Atomistic to Continuum Theory, Terminology, Analytical Theory and Computational Modeling , Multiscale Concept, Multiscale Methods, Complexity of Multiscale Systems, Multiphysics-Multiengineering Integration: Important Features of CAD Tool

Text book:

1.Nitaigour Premchand. Mahalik[2007], MEMS, Tata Mc Graw-Hill Publishing company Limited, New Delhi.

Reference books:

1.Tai-Ran Tsu,[2002] MEMS and Microsystems: Design and Manufacture,- Tata Mc Graw-Hill Company Limited, New Delhi

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1. Students will be able to understand working principles of currently available sensors and actuators.
2. Students will be able to use materials for common micro components and devices.
3. Students will be able to choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process.
4. Get the fundamental knowledge on MOENS , micro fluidic systems and nano technology.

QUALITY & RELIABILITY ENGINEERING (QRE)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:
The course aims to develop knowledge in TQM concepts and theory of reliability.

Unit – I
Introduction to T.Q.M : Introduction to Quality; Evolution of and basic approach to Total Quality Management; Leadership concepts; The Seven habits of highly effective people; Role of TQM Leaders; Implementation of TQM; Quality council, core values and concepts, quality statements; strategic planning and communications.
UNIT - II
Customer Satisfaction: Types of Customers-Internal and External; Customer perception of quality; Feedback & brief discussion on Information Collecting Tools.
Unit - III
Employee Involvement: Maslow's hierarchy of needs; Employee Empowerment; Types of Teams, Stages of team development, Common barriers to team progress, Training; Recognition & Reward; Performance Appraisal; Benefits of Employee Involvement.
UNIT - IV
Continuous Process Improvement: Introduction; Juron trilogy; Improvement strategies; P-D-S-A cycle & Problem solving method; Basic concepts of Kaizen and Six sigma quality control, Taguchi methods, Quality circles
Unit - V
Supplier Partnership: Introduction, Partnering, Sourcing, Supplier Selection, Supplier Rating, Relationship Development.
Tools & Techniques of TQM : Pareto diagram, Cause & Effect diagram.
UNIT - VI
Benchmarking: Introduction, Benchmarking process.
Quality Function Deployment: Benefits of QFD, House of Quality.
Total Productive Maintenance: Introduction, Seven steps to TPM.
Unit - VII
Reliability Engineering: Introduction, Failures & failure modes, Causes of failures & Unreliability, Reliability Literature.
Design for Reliability: Designing for higher Reliability, Reliability & Cost.
Component Reliability: MTTF, Time dependent hazard models.
UNIT - VIII
System Reliability: Systems with components- in Series, and in Parallel; Non-Series-Parallel systems.
Redundancy Techniques: Introduction, Component & Unit Redundancy, Weakest link technique.

Text Books:
1. Dale H. Besterfield [2004], Total Quality Management, Pearson Education, New Delhi.

2. E. Balagurusamy [2002], Reliability Engineering, TMH Publishers, New Delhi.
3. M.Mahajan [2005], Statistical Quality Control, Dhanapat Rai and Sons Publishers, New Delhi.

Reference Books :

1. Douglas C. Montgomery [2004], Introduction to Quality Control, John Wiley and Sons Publishers, New York.
2. N. Logothetis [2003], Managing for Total Quality, From Deming to Taguchi, PHI Publishers, New Delhi.
3. L.S. Srinath [2002], Reliability Engineering, East West Press, New Delhi.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

The candidate will be able to:

1. Describe the importance of quality and reliability

2 Use methods for measuring and improving quality and reliability

Outcomes:

3 Develop quality and reliability programme plans.

RENEWABLE ENERGY SOURCES (RES)
(Professional Elective For IV B.Tech. ME)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 4 **End Exam Duration: 3 hrs**

Objectives:

To familiarize the students with the concept and importance of renewable energy sources.

Unit - I

Introduction and Energy Conservation: Classification of energy sources-Importance of renewable energy sources and energy chain-Principles of energy conservation –Energy conservation opportunities

Unit - II

Fundamentals of Solar Energy: Extra terrestrial and terrestrial radiation- Solar constant and solar radiation geometry-Solar time and day length-Estimation of monthly average daily total radiation on horizontal surface and tilted surface-Measurements of radiation data.

Unit - III

Solar Collecting Devices : Flat plate collector- Losses associated with collector-Method of determination of top loss, side loss and bottom loss coefficient -Performance parameters affecting the collector performance-Efficiency of flat plate collector-selective surfaces- Air collectors- Classification of concentrating collector-Tracking of CPC collector

Solar Thermal Systems: Methods of storing solar energy-Solar water heating-Solar refrigeration system – Solar thermal power generation-Solar distillation-Solar space heating

Unit - IV

Solar Voltaic Systems & Emerging Technology: Basic principle of PV cell-Arrangements of PV cell-classification of PV cell-Principle of magneto hydro dynamics-thermo electric and thermionic conversion**,** Introduction to Fuel cell

Unit - V

Wind Energy : Origin of wind-Application of wind power –Betz limit-Components of Horizontal axis wind turbine-Types of blades- Classification of vertical axis turbine

Unit - VI

Biomass Energy: Photosynthesis process- Biomass conversion technologies- Biogas production - Types of digester- Factors affecting the digester performance

Unit VII

Geothermal Energy: Types of geothermal energy resources-Energy conversion through geothermal energy resources-Environmental consideration

Unit - VIII

Ocean Thermal Energy Conversion: Principle of OTEC- Anderson and Claude cycles

Tidal energy: Introduction- tidal energy conversion methods,

Wave energy : Introduction, conversion methods

Text Book:

1. B.H.Khan [2003], Non-conventional Energy Sources, TMH Publishers, New Delhi.

Reference Books:

1. G.D Rai [1989], Non-conventional Energy Sources, Khanna Publishers, New Delhi.
2. S.Rao and Paulekar [2000], Energy Technology, Khanna Publishers, New Delhi.
3. W.R.Murphy& G.Mckay [2001], Energy Management, Butterworth & Co. Publishers, New Delhi.
4. B.Sreenivasa Reddy & K.Hemachandra Reddy [2007], Thrmal data hand book, IK International Publishers, Bangaloore

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

At the end of the course, the student will be able to

1. To analyze the various renewable energy sources like wind, solar, biomass, Ocean energy, Fuel cells and MHD systems

2.Exposure on biomass gasification and combustion, Theory of flat plate collectors, photo voltaic, thermal applications and limitations of solar energy are also provided.

ADVANCED INFORMATION SYSTEMS (AIS)
(Elective For IV B.Tech. ME)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods: (4L+1T)/week **End Exam Marks: 70**

Credits: 4 **End Exam Duration: 3hrs**

1.Justify the philosophy of object-oriented design and understand the concepts of ISO OSI and TCP/IP protocol stacks, IP addressing, network security issues, client server concepts, World Wide Web, HTTP, FTP, DNS, middleware technologies, web server, and application server.

Objectives:

2.An ability to learn the different elements of User Interface Design, what makes a good interface design.

Unit - I

Object Oriented Concepts:

Introduction, Programming Techniques, Introduction to Object Oriented Concepts, concept of Structured Procedural Programming, objects and its constituents,

Unit - II

Data Abstraction, Classification, Encapsulation and information hiding, Data Access Specifies, UML Notations of a class.

Unit - III

Inheritance, advantages of inheritance, Generalization and Specialization, forms of generalization, Multiple and Multilevel Inheritance, abstract classes, Polymorphism and binding, Implementation of OOC through C++.

Unit - IV

Introduction to computer Networks:

Introduction, ISO – OSI 7 layered Architecture , Internetworking, IP Addressing, Assigning and Resolving IP Addresses, Network Security, Client Server Concepts.

Unit - V

Introduction to Web Technology:

World Wide Web (WWW) and Hyper Text Transfer Protocol (HTTP), file transfer protocol (FTP), Domine Name Server(DNS), Web Security, Mobile Web Application

Unit - VI

Web Based Applications and Technologies, Case Study, Middleware Technologies, SQL Oriented Data Access, RPC, Transaction Processing Monitor

Unit - VII

Web Server, Application Server Case Study -Introduction to Web Server /App Server and Load Balancing Load Balanced Web/ App Servers Configuration

Unit - VIII

User Interface Design:

Introduction to User Interface- its evolution, The process of User Interface Design, Elements of User Interface Design, Good Versus Bad User Interface Design, UID Principle, Tips and Techniques of designing a UID, Reports

TEXT BOOK:

1. Campus Connect Foundation Programme – Computer Hardware and System Software Concepts, Programming Fundamentals- Vol. – 1, INFOSYS**.**
2. Campus Connect Foundation Programme – Relational Database management System, Client Server Concepts, Introduction to Web Technologies - Vol. – 2, INFOSYS
3. Campus Connect Foundation Programme – Object Oriented Concepts – System Development Methodology, User Interface Design - Vol. – 3, INFOSYS
4. E.BALAGURUSWAMY [2008], Object Oriented programming with C++.
5. Data Communications & Computer Networking, by Forouzan, Tata McGrawHill,

REFERENCE BOOKS:

1. M.P. Bhave and S.A. Patekar [2008], Object Oriented Programming with C++, Pearson Education.

2 Herbert Schildt [2007], Teach Yourself C++, TMH.

3. Herbert Schildt [2007], The Complete Reference C++.
4. Robert Lafore [2008], Object Oriented Programming in Turbo C++.

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

1.Able to use object oriented programming languages effectively and understand the major functions of each layer of the OSI and TCP/IP Protocol suites, Network security issues and client server concepts.

2.Graduates are able to learn the techniques to design a good User Interface.

INTRODUCTION TO AIRCRAFT INDUSTRY AND AIRCRAFT SYSTEMS(IAIAS)
(Elective For IV B.Tech. ME)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods: (4L+1T)/week **End Exam Marks: 70**

Credits: 4 **End Exam Duration: 3hrs**

Objectives:

The student gets the working principle of air craft components and their control.

Unit - I

Aircraft industry overview: Evolution and History of Flight, Types Of Aerospace Industry, Key Players in Aerospace Industry, Aerospace Manufacturing, Industry Supply Chain, Prime contractors, Tier 1 Suppliers, Key challenges in Industry Supply Chain, OEM Supply Chain Strategies, Mergers and Acquisitions, Aerospace Industry Trends, Advances in Engineering/CAD/CAM/CAE Tools and Materials technology, Global and Indian Aircraft Scenario

Unit - II

Introduction to Aircrafts: Basic components of an Aircraft, Structural members, Aircraft Axis System, Aircraft Motions, Control surfaces and High lift Devices.
Types of Aircrafts - Lighter than Air/Heavier than Air Aircrafts Conventional Design Configurations based on Power Plant Location, Wing vertical location, intake location, Tail Unit Arrangements, Landing Gear Arrangements. Unconventional Configurations-Biplane, Variable Sweep, Canard Layout, Twin Boom Layouts, Span loaders, Blended Body Wing Layout, STOL and STOVL Aircraft, Stealth Aircraft. Advantages and disadvantages of these Configurations.

Unit - III

Mechanical Systems: Types of Aircraft Systems. Mechanical Systems. Electrical and Electronic Systems. Auxiliary systems.
Mechanical Systems: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems, Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit.

Unit - IV

Electrical systems: Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System**,**

Unit - V

Basic Principles of Flight: Significance of speed of Sound, Air speed and Ground Speed, Properties of Atmosphere, Bernoulli's Equation, Forces on the airplane, Airflow over wing section, Pressure Distribution over a wing section, Generation of Lift, Drag, Pitching moments, Types of Drag, Lift curve, Drag Curve, Lift/Drag Ratio Curve, Factors affecting Lift and Drag, Center of Pressure and its effects.

Unit - VI

Aerofoil: Aerofoil Nomenclature, Types of Aerofoil, Wing Section- Aerodynamic Center, Aspect Ratio, Effects of lift, Drag, speed, Air density on drag,

Unit - VII

Stability and Control: Degree of Stability- Lateral, Longitudinal and Directional Stability and controls of Aircraft. Effects of Flaps and Slats on Lift Coefficients, Control Tabs,

Stalling, Landing, Gliding Turning, Speed of Sound, Mach Numbers, Shock Waves, Mach Waves, Mach Angles, Sonic and Supersonic Flight and its effects.

Unit - VIII

Aircraft Performance and Maneuvers: Power Curves, Maximum and minimum speeds of horizontal flight, Effects of Changes of Engine Power, Effects of Altitude on Power Curves, Forces acting on a Aeroplane during a Turn, Loads during a Turn, Correct and incorrect Angles of Bank, Aerobatics, Inverted Maneuvers, Maneuverability

References:

1. Flight without Formulae by A.C Kermode, Pearson Education,10th Edition
2. Mechanics of Flight by A.C Kermode, Pearson Education,5th Edition
3. Fundamentals Of Flight, Shevell, Pearson Education, 2nd Edition
4. Introduction to Flight by Dave Anderson
5. . Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration by Ian moir, Allan Seabridge

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

The student gains

1.An introduction to how an aircraft flies and operates

2 Knowledge of mechanical and electrical systems used in air craft systems.

3. Knowledge of air craft performance and its control.

DESIGN OF AIRCRAFT STRUCTURES(DAS)
(Elective For IV B.Tech. ME)

Scheme : 2010 **Internal Assessment : 30**

Contact Periods: (4L+1T)/week **End Exam Marks: 70**

Credits: 4 **End Exam Duration: 3hrs**

Objectives:

To study the students procedure of air craft design, its manufacturing process and its analysis

To study the students procedure of air craft design, its manufacturing process and its analysis

Unit - I

Overview of the Aircraft Design Process: Introduction- Phases of Aircraft Design, Aircraft Conceptual Design Process, Conceptual Stage, Preliminary Design, Detailed Design, Design Methodologies.

Fundamentals of Structural Analysis: Review of Hooke's Law, Principal stresses, Equilibrium and Compatibility, Determinate Structures, St Venant's Principle, Conservation of Energy, Stress Transformation, Stress Strain Relations.

Unit - II

Introduction to Aircraft Structures: Types of Structural members of Fuselage and wing section Ribs, Spars, Frames, Stringers, Longeron, Splices, Sectional Properties of structural members and their loads, Types of structural joints, Type of Loads on structural joints.

Aircraft Loads: Aerodynamic Loads, Inertial Loads, Loads due to engine, Actuator Loads, Maneuver Loads, VN diagrams, Gust Loads, Ground Loads, Ground conditions, Miscellaneous Loads.

Unit - III

Aircraft Materials and Manufacturing processes: Material selection criteria, Aluminum Alloys, Titanium Alloys, Steel Alloys, Magnesium Alloys, copper Alloys, Nimonic Alloys, Non Metallic Materials, Composite Materials, Use of Advanced materials Smart materials, Manufacturing of A/C structural members, Overview of Types of manufacturing processes for Composites, Sheet metal Fabrication ,Machining, Welding, Superplastic Forming And Diffusion Bonding.

Unit - IV

Structural Analysis of Aircraft Structures: Theory of Plates- Analysis of plates for bending, stresses due to bending, Plate deflection under different end conditions, Strain energy due to bending of circular, rectangular plates, Plate buckling, Compression buckling, shear buckling, Buckling due to in plane bending moments, Analysis of stiffened panels in buckling, Rectangular plate buckling, Analysis of Stiffened panels in Post buckling, Post buckling under shear.

Unit - V

Theory of Shells: Analysis of Shell Panels for Buckling, Compression loading, Shear Loading / Shell Shear Factor, Circumferential Buckling Stress.

Unit - VI

Theory of Beams: Symmetric Beams in Pure Bending, Deflection of beams, Unsymmetrical Beams in Bending, Plastic Bending of beams, Shear Stresses due to Bending in Thin Walled Beams, Bending of Open Section Beams, Bending of Closed Section Beams, Shear Stresses due to Torsion in Thin Walled Beams.

Unit - VII

Theory of Torsion: Shafts of Non-Circular Sections, Torsion in Closed Section Beams, Torsion in Open Section Beams, Multi Cell Sections.

Unit - VIII

Airworthiness and Aircraft Certification: Definition, Airworthiness Regulations, Regulatory Bodies, Type certification, General Requirements, Requirements Related to Aircraft Design Covers, Performance and Flight Requirements, Airframe Requirements, Landing Requirements, Fatigue and Failsafe requirements, Emergency Provisions, Emergency Landing requirements

Aircraft Structural Repair: Types of Structural damage, Nonconformance, Rework, Repair, Allowable damage Limit, Repairable Damage Limit, Overview of ADL Analysis, Types of Repair, Repair Considerations and best practices

References :

1. Aircraft Design-A Conceptual Approach by Daniel P.Raymer, AIAA education series,6th Edition
2. Airframe Structural Design by Michael Niu, Conmilit Press, 1988,2nd Edition
3. Airframe Stress Analysis and Sizing by Michael Niu, Conmilit Press, 1999,3rd Edition
4. The Elements of Aircraft Preliminary Design – Roger D. Schaufele, Aries Publications, 2000
5. Aircraft Structural Maintenance by Dale Hurst, Avotek publishers, 2nd Edition, 2006
6. Aircraft Maintenance & Repair by Frank Delp, Michael J. Kroes & William A. Watkins, Glencoe &McGraw-Hill,6th Edition,1993
7. An Introduction to Aircraft Certification; A Guide to Understanding Jaa, Easa and FAA by Filippo De Florio, Butterworth-Heinemann

Note: The question paper shall consist of **EIGHT** questions with **ONE** question in each unit. The student shall answer any **FIVE** questions.

Outcomes:

Students familiarize in

1.Design of air craft structures with various loads

2. Structures analysis of air craft structures.

3. Repair of aircraft structures.

PROJECT WORK
(For IV B.Tech. ME – II Semester)

Scheme: 2010 **Internal Assessment: 30**
Contact Periods : (3L+1T) / Week **End Exam Marks: 70**
Credits: 10

Objectives:
To expose the students to the industry working environment and to do a project work in Mechanical Engineering field.

Outcomes:
Hardware/ Numerical/ Theoretical research and development work is to be allotted. A maximum number of four to six students may be involved in each project. However the contribution of the individuals in the project should be clearly brought out. The combined project report is to be submitted as per the college regulations. A seminar has to be presented on the allotted topic. All the students involved in the project will be examined for their contribution.