

ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

MECHANICAL (MECHATRONICS) ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2005-2006)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KUKATPALLY, HYDERABAD - 500 072.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

B.TECH. MECHANICAL (MECHATRONICS) ENGINEERING

I Year B.Tech.

COURSE STRUCTURE

CODE	SUBJECT	T	P	C
HS05231	English	2+ 1*	0	4
MA05363	Mathematics-I	3 + 1*	0	6
PY05226	Engineering Physics	2 + 1*	0	4
CM05219	Engineering Chemistry	2	0	4
ME05224	Engineering Mechanics	3 + 1*	0	6
CS05141	Computer Programming & Numerical Methods	2 + 2*	0	4
ME05223	Engineering Graphics	0	6	8
ME05228	Engineering Physics Fuels & Lubricants Lab	0	3	4
HS05232	English Language Communication Skills Lab	0	3	4
CS05142	Computer Programming & Numerical Methods Lab	0	6	8
ME05230	Engineering Work Shop Practice	0	3	4
TOTAL		20	20	56

II Year

I Semester

CODE	SUBJECT	T	P	C
MA05364	Mathematics - II	4+1*	0	4
CS05434	OOPS Through JAVA	4 +1*	0	4
CE05375	Mechanics of Solids	4 +1*	0	4
EE05192	Electrical Engineering	4 +1*	0	4
ME05550	Thermal Science	4 +1*	0	4
ME05346	Machine Drawing	0	6	4
CS05338	JAVA Lab	0	3	2
CE05376	Mechanics of Solids and Electrical Engineering Lab	0	3	2
TOTAL		25	12	28

B.TECH. MECHANICAL (MECHATRONICS) ENGINEERING

COURSE STRUCTURE

II Year		II Semester		
CODE	SUBJECT	T	P	C
MA05476	Probability & Statistics	4+1*	0	4
CE05239	Environmental Studies	4+1*	0	4
HS05353	Managerial Economics & Financial Analysis	4+1*	0	4
EC05512	Semi Conductor Devices & Circuits	4+1*	0	4
MM05392	Metallurgy & Material Science	4+1*	0	4
ME05255	Fluid Mechanics & Heat Transfer	4+1*	0	4
EC05513	Semi Conductor Devices & Circuits Lab	0	3	2
MT05394	Metallurgy and Thermal Engineering Lab	0	3	2
TOTAL		30	6	28

III Year		I Semester		
CODE	SUBJECT	T	P	C
HS05311	Industrial Management	4+1*	0	4
ME05248	Finite Element Methods	4+1*	0	4
EE05539	Switching Theory and Logic Design	4+1*	0	4
ME05348	Machine Tools	4+1*	0	4
ME05339	Kinematics of Machinery	4+1*	0	4
MP05493	Production Technology	4+1*	0	4
ME05350	Machine Tools Lab	0	3	2
MP05285	Heat Transfer & Production Technology Lab	0	3	2
TOTAL		30	6	28

B.TECH. MECHANICAL (MECHATRONICS) ENGINEERING

COURSE STRUCTURE

III Year		II Semester		
CODE	SUBJECT	T	P	C
ME05108	CAD/CAM	4+1*	0	4
EE05323	Instrumentation & Control Systems	4+1*	0	4
ME05184	Dynamics of Machinery	4+1*	0	4
ME05474	Principles of Machine Design	4+1*	0	4
EC05342	Linear & Digital I.C Applications	4+1*	0	4
CS05140	Computer organization	4+1*	0	4
ME05110	CAD/CAM Lab	0	3	2
MC05324	Instrumentation & I.C Applications Lab	0	3	2
TOTAL		30	6	28

IV Year		I Semester		
CODE	SUBJECT	T	P	C
ME05436	Operations Research	4+1*	0	4
EE05404	Micro Processors & Micro Controllers	4+1*	0	4
ME05507	Robotics	4+1*	0	4
MC05418	Motion Control Design	4+1*	0	4
	ELECTIVE-I	4+1*	0	4
MC05489	Product Design & Assembly Automation	-	-	-
CS05138	Computer Networks			
ME05427	Non Conventional Sources of Energy			
	ELECTIVE-II	4+1*	0	4
ME05462	Power Plant Engineering			
MC05148	Concurrent Engineering			
ME05012	Advanced Kinematics & Dynamics of Machinery			
EE05405	Micro Processors & Micro Controllers Lab	0	3	2
MC05417	Motion control & Robotics Lab	0	3	2
TOTAL		30	6	28

B.TECH. MECHANICAL (MECHATRONICS) ENGINEERING

COURSE STRUCTURE

IV Year		II Semester		
CODE	SUBJECT	T	P	C
ME05056	Automobile Engineering	4+1*		4
	ELECTIVE –III	4+1*	0	4
ME05054	Automation in Manufacturing			
MP05492	Production Planning & control			
CS05308	Industrial Electronics			
	ELECTIVE-IV	4+1*	0	4
EE05425	Neural Networks & Fuzzy Logic			
CS05362	Mathematical Modelling & Simulation			
HS05233	Entrepreneurship			
CA05495	Project Work			12
CA05515	Seminar		0	2
CA05315	Industry Oriented Mini Project Work		0	2
TOTAL		15		28

**NOTE: All University Examinations
(Theory and Practical) are of 3 hours duration.**

* : Tutorials

T : Theory periods per week

P : Practical /Drawing Periods per week

C : Total Credits for the subject

I Year B.TECH MC

T	P	C
2+1	0	4

(HS 05231) ENGLISH

1. INTRODUCTION :

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks, to encourage them to develop their language skills. The two textbooks identified by the Board of Studies serve the purpose of illustrating the conceptual framework within which the syllabus is to be administered in the classroom. When a textbook is prescribed content is generally paid attention to. However, the stress in this syllabus is on language acquisition and skill development, calling for both the teacher and the taught to go beyond the prescribed texts and innovate exercises and tasks.

2. OBJECTIVES :

1. To promote the language proficiency of the students with emphasis on improving their LSRW skills.
2. To impart training to the students through the syllabus and its theoretical and practical components.
3. To improve communication skills in formal and informal situations.

3. SYLLABUS :

Listening Skills :

- Listening for general content
- Listening to fill up information gaps
- Intensive listening
- Listening for specific information
- Note-taking - guided and unguided
- Post-listening testing

Speaking Skills :

- Oral practice
- Developing confidence
- Introducing oneself/others
- Asking for/ giving information
- Describing objects/offering solutions
- Describing situations
- Role play
- Expressing agreement/disagreement

Reading Comprehension

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

NOTE : The student, through the training imparted to him/her by means of the text-based approach, will be examined in answering questions on an unseen passage.

Writing Skills :

- Writing a sentence
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Interpreting data
- Formal and informal letter writing
- Sending e-mails
- Information transfer
- Editing a passage

4. TEXTBOOKS PRESCRIBED :

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Eight Units, are prescribed:

1. **LEARNING ENGLISH:** A Communicative Approach, Hyderabad: Orient Longman, 2005.(Selected Lessons)
2. **WINGS OF FIRE:** An Autobiography – APJ Abdul Kalam, Abridged version with Exercises, Hyderabad: Universities Press (India) Pvt. Ltd., 2004.

The following lessons from the prescribed texts are recommended for study :

A. STUDY MATERIAL :**Unit – I**

1. **Astronomy** from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
2. Chapters 1-4 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004**

Unit – II

3. **Information Technology** **from** **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
4. Chapters 5-8 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004**

Unit – III

5. **Humour** **from** **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
6. Chapters 9-12 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004**

Unit – IV

7. **Environment** **from** **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
8. Chapters 13-16 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004**

Unit – V

9. **Inspiration** **from** **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
10. Chapters 17-20 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.**

Unit – VI

11. **Human Interest** **from** **LEARNING ENGLISH : A Communicative Approach, Orient Longman, 2005.**
12. Chapters 21-24 **from** **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.**

* Exercises from the lessons not prescribed shall also be used for classroom tasks.

Unit – VII

Reading and Writing Skills
 Reading Comprehension
 Situational dialogues
 Report writing
 Letter writing
 Essay writing
 Information transfer

Unit – VIII

Remedial English

Common errors

Subject-Verb agreement

Use of Articles and Prepositions

Tense and aspect

Vocabulary – Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

TEXT BOOKS:

1. **Effective Technical Communication**, M Ashraf Rizvi, Tata McGraw-Hill Publishing Company Ltd.
2. **Everyday Dialogues in English**, Robert J Dixon, Prentice Hall of India Pvt Ltd., New Delhi.

REFERENCES

1. **Strengthen Your English**, Bhaskaran & Horsburgh, Oxford University Press
2. **English for Technical Communication**, K R Lakshminarayana, SCITECH
3. **Strategies for Engineering Communication**, Susan Stevenson & Steve Whitmore (John Wiley and sons).
4. **English for Engineers: With CD**, Sirish Chaudhary, Vikas Publishing House Pvt. Ltd. With CD.
5. **Basic Communication Skills for Technology**, Andrea J Rutherford, Pearson Education Asia.
6. **Murphy's English Grammar with CD**, Murphy, Cambridge University Press
7. **A Practical Course in English Pronunciation, (with two Audio cassettes)**, Sethi, Sadanand & Jindal , Prentice –Hall of India Pvt Ltd., New Delhi.
8. **English for Professional Students**, by S S Prabhakara Rao.
9. **The Oxford Guide to Writing and Speaking**, John Seely, Oxford.
10. **Grammar Games**, Renvolucris Mario, Cambridge University Press.

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I Year B.TECH MC

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(MA 05363) MATHEMATICS – I**UNIT – I**

Sequences – series – Convergences and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence. Rolle's theorem – Lagrange's Mean Value Theorem – Cauchy's Mean value Theorem – Generalized Mean Value theorem (Taylor's Theorem).

UNIT – II

Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints or without constraints- Radius, Centre and Circle of Curvature – Evolutes and Envelopes.

UNIT – III

Curve tracing – Cartesian , polar and Parametric curves - Applications of integration to lengths , volumes and surface areas in Cartesian and polar coordinates.

UNIT – IV

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories-Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$, $xV(x)$, method of variation of parameters.

UNIT – V

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations.

UNIT – VI

Multiple integrals - double and triple integrals – change of variables – change of order of integration.

UNIT – VII

Vector Calculus: Gradient- Divergence- Curl and their related properties of sums- products- Laplacian

and second order operators. Vector Integration - Line integral – work done – Potential function – area-surface and volume integrals.

UNIT – VIII

Vector integral theorems: Green's theorem- Stoke's and Gauss's Divergence Theorem. Verification of Green's - Stoke's and Gauss's Theorems – Cylindrical, Spherical coordinates-Expressions Grad, div, curl in spherical and cylindrical coordinates.

TEXT BOOKS :

1. A text book of Engineering Mathematics Volume – 1, 2005
T.K.V.Iyengar, B.Krishna Gandhi and others, S.Chand and Company.
2. Engineering Mathematics, B.V.Ramana, Tata McGraw-Hill 2003.

REFERENCES :

1. Engineering Mathematics-I, 2002, P.Nageswara Rao, Y.Narsimhulu, Prabhakara Rao, Deepthi Publishers
2. Engineering Mathematics- I, 2004, Dr.Shahnaz Bathul, Right Publishers.
3. Engineering Mathematics, S.K.V.S. Sri Rama Chary, M.Bhujanga Rao, Shankar, B.S. Publications 2000.
4. Engineering Mathematics-I Rukmangadhachary, Pearson Education.
5. A Text book of Engineering Mathematics, VP Mishra, Galgotia Publications.
6. Engineering Mathematics – I, Sankaraiah, VGS Book Links, Hyderabad.

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(PY05226) ENGINEERING PHYSICS

UNIT – I

INTERFERENCE Introduction - Superposition of waves - Young's double slit experiment - Coherence - Interference in thin films by reflection - Newton's rings.

DIFFRACTION Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction at a single slit & at a double slit - Circular aperture - Diffraction grating - Grating spectrum - Resolving power of a grating - Rayleigh's criterion for resolving power.

UNIT II

POLARIZATION Introduction - Representation of polarized and unpolarized light - Polarization by reflection - Malus law - Double refraction - Nicol prism - Circular and Elliptical polarization -Quarter wave plate - Half wave plate.

ULTRASONICS Introduction - Production of Ultrasonic waves - Magnetostriction method - Piezo electric method - Detection of Ultrasonics - Properties of Ultrasonics - Use of Ultrasonics for non-destructive testing - Applications of Ultrasonics.

UNIT III

ACOUSTICS OF BUILDINGS Basic requirement of acoustically good hall - Reverberation and time of reverberation – Sabine's formula for reverberation time - Measurement of absorption coefficient of a material - Factors affecting the architectural acoustics and their remedy.

SUPERCONDUCTIVITY General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - Josephson Effect - BCS Theory - Applications of superconductors.

UNIT IV

LASERS Introduction - Characteristics of Lasers - Spontaneous and Stimulated Emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser - Semiconductor Laser - Applications of Lasers in Industry, Scientific and Medical fields.

UNIT V

FIBER OPTICS Introduction - Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Step-Index fiber and transmission of signal in SI fiber - Graded-Index fiber and transmission of signal in GI fiber - Attenuation in optical fibers - Advantages of optical fibers in communication - Application of optical fibers in Medicine and Sensors.

UNIT VI

MAGNETIC PROPERTIES Permeability - Magnetization - Origin of magnetic moment - Classification of magnetic materials - Dia, Para and Ferro magnetism - Hysteresis curve - Soft and Hard magnetic materials - anti-Ferro and Ferri magnetism - Ferrites and their applications.

CRYSTAL STRUCTURES Introduction - Space lattice - Basis - Unit cell - Lattice parameter - Crystal systems - Bravais lattices - Structure and Packing fractions of Simple cubic - Body Centred Cubic - Face Centred Cubic crystals - Structures of Diamond, ZnS, NaCl, CsCl.

UNIT VII

CRYSTAL PLANES & X-RAY DIFFRACTION Directions and Planes in crystals - Miller Indices - Separation between successive [h k l] planes - Diffraction of X-rays by Crystal planes - Bragg's Law - Laue method - Powder method.

UNIT VIII

DEFECTS IN SOLIDS Imperfections in Crystals - Point defects - Schottky and Frenkel defects - Energy for formation of a Vacancy - Equilibrium concentration of Schottky and Frenkel defects - Line defects - Edge and Screw dislocation - Burger's Vectors.

TEXT BOOKS:

1. **Engineering Physics** by R.K.Gaur - S.L. Gupta; Dhanpat Rai and Sons.
2. **Applied Physics** by Dr. M.Chandra Shekar & Dr.P.Appala Naidu; V.G.S. Book links.

REFERENCES :

1. **Engineering Physics** by Dr.M. Arumugam; Anuradha Agencies
2. **Physics Volume 2**, by Halliday, Resnick and Krane; John Wiley & Sons
3. **Engineering Physics** by M.N.Avadhanulu & P.G. Kshirasagar; S.Chand & Company Ltd.
4. **Engineering Physics** by P.V.Naik; Pearson Education
5. **Materials Science and Engineering** by V. Raghavan; Prentice-Hall India
6. **Engineering Physics (Vol.1)** by M.D. Khanna and V. Balaswamy; Vikas Publishing House Pvt. Ltd., New Delhi

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(CM05219) ENGINEERING CHEMISTRY**UNIT I: Water Technology-I:**

Introduction, Sources of Water, Effect of Water on Rocks and Minerals, Types of impurities in Water, Hardness of Water – Temporary and Permanent hardness. Units and Inter conversions of Units. Estimation of hardness by Soap Solution and EDTA Methods. Problems on Temporary and Permanent hardnesses. Analysis of Water - Alkalinity; Chlorides and Dissolved Oxygen. Disadvantages of Hard Water. Methods of Treatment of Water for Domestic Purpose - Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Ozonization. Mineral Water.

UNIT II: Water Technology-II:

Water for Industrial purpose - Water for Steam Making, Boiler Troubles – Carry Over - Priming and Foaming, Boiler Corrosion, Scales and Sludges, Caustic Embrittlement. Water Treatment: - Internal Treatment – Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminate Conditioning of Water. External Treatment - Lime-Soda Process, Zeolite Process, Ion-Exchange Process; - Numerical Problems. Demineralization of Brackish Water - Reverse Osmosis.

UNIT III: Science of Corrosion:

Definition, Examples - Underground, Soil Corrosion, Pitting Corrosion, Stress Corrosion, Season Cracking, Caustic Embrittlement. Types of Corrosion: Theories of Corrosion and Mechanism – Dry Corrosion, (Direct Chemical attack), Wet Corrosion, (Electro Chemical Theory) Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Mechanism of Wet Corrosion – Hydrogen evolution type, Oxygen absorption type. Atmospheric Factors Influencing Corrosion. Control of Corrosion – Proper Design, Use of pure metal and metal alloys, Passivity, Cathodic Protection – Sacrificial anode and Impressed Current. Modifying the Environment, use of Inhibitors.

UNIT IV: Protective Coatings and their applications:

Surface Preparation: (1) Solvent Cleaning (2) Alkali Cleaning (3) Pickling and Etching (4) Sand Blasting (5) Mechanical Cleaning.

Types Of Protective Coatings: Metallic Coatings – Anodic Coating Galvanization, Cathodic Coating – Tinning, Metal Cladding, Electroplating Ex: Chromium Plating, Metal Spraying, Cementation–Sheradizing, Colourizing, Chromizing Chemical Conversion Coatings: (1) Phosphate (2) Chromate (3) Chemical Oxide (4) Anodized Coatings.

Ceramic Protective Materials: (1) Vitreous Enamels (2) Ceramics.

Organic Coatings: (1) Paints – Constituents and their functions (2) Varnishes

(3) Lacquers (4) Enamels (5) Emulsion Paints (6) Distempers.

UNIT V: Polymer Science and Technology:

Polymerization Reactions – Basic concepts. Types of Polymerization – Addition and Condensation Polymerizations. Plastics –Thermosetting and Thermoplastics – Differences. Compounding. Casting and Spining. Molding of Plastics – Compression, Injection, Transfer, and Extrusion molding methods

Composition, Properties and Engineering Uses of the Following: Polyethylene, PVC, Teflon, Bakelite, Nylon, Polymethyl Methacrylate, Urea-Formaldehyde and Silicone Resins.

Rubber – Processing of Natural Rubber, Vulcanization and Compounding. Elastomers – Buna S, Buna N, Thiokol. Polyurethane Rubber; Silicone Rubber.

UNIT VI: Refractories and Insulators:

Refractories – Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material; Insulators – Definition and Classification with Examples; Characteristics of Insulating Materials; Thermal Insulators, Electrical Insulators - Their Characteristics and Engineering Applications.

UNIT VII: Lubricants:

Principles- Metallic friction – Surface Energy, Surface Attraction, Adsorption, Surface Roughness. Types of Lubrication and Mechanism – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure and Temperature Lubrication. Classification of lubricants-Liquid lubricants-Petroleum Oils-Fixed Oils-Additives-Synthetic Lubricants-semisolid lubricants-Calcium base, soda base and Lithium base greases-Solid lubricants-Graphite-Molybdenum disulphide. Properties of Lubricants – Viscosity – Flash and Fire points – Cloud and Pour points – Emulsification – Volatility – Gravity – Colour – Carbon Residue – Oxidation Stability- Aniline-Point-Neutralization number-Saponification number-Mechanical Stability - Selection of lubricants- Cutting tools-Internal combustion engines-Steam engine cylinder-Steam turbines-Gears- Food Industry.

UNIT VIII: Fuels and Combustion:

Definition and Classification.

1. Solid Fuels – Coal and Its Formation – Proximate and Ultimate Analysis of Coal and Significance of the Constituents – Metallurgical Coke.
2. Liquid Fuels – Petroleum – Origin – Extraction – Refining And Cracking – Knocking – Octane and Cetane Numbers – Synthetic Petrol – Bergius Process, Fischer- Tropsch Process.
3. Gaseous Fuels – Analysis of the Gas by Orsat's Apparatus – Calorific Value of Fuels – Bomb Calorimeter – Junker's Gas Calorimeter.
4. Nuclear Fuels, Rocket Fuels, Explosives.

5. Combustion – Problems.

TEXT BOOKS:

1. Textbook of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company, New Delhi (2004).
2. Textbook of Engineering Chemistry by C.V. Agarwal, Andra Naidu and C.P. Murthy - B.S.Publications.

REFERENCES:

1. A Textbook of Engineering Chemistry by S.S. Dara. S.Chand & Co, New Delhi (2004)
2. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
3. A Textbook of Engineering Chemistry by Balaram Pani, Galgotia Publications, New Delhi (2004).
4. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company, New Delhi (2004).
5. Industrial Chemistry by O.P.Veeramani and A.K.Narula, Galgotia Publications, New Delhi (2004).
6. Advanced Engineering Chemistry by Senapati and Mohanty, Laxmi Publications, New Delhi (2002).
7. Engineering Chemistry by R. Gopalan, D. Venkappaya and S.Nagarajan, Vikas Publishing House, New Delhi (2004).

(ME05224) ENGINEERING MECHANICS**UNIT – I**

Introduction to Engg. Mechanics – Basic Concepts

Systems of Forces :

Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Equilibrium of Systems of Forces :

Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces.

UNIT – II

Friction : Types of Friction – Limiting Friction – Laws of Friction – Static and Dynamic Frictions – Motion of Bodies: Wedge, Screw, Screw-jack, and Differential Screw-jack.

UNIT – III

Transmission of Power : Flat Belt Drives : Types of Flat Belt Drives – Length of Belt, Tensions, Tight side, Slack Side, Initial and Centrifugal – Power Transmitted and Condition for Max. Power.

UNIT – IV

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

UNIT – V

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – VI

Kinematics : Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Kinetics : Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VII

Work – Energy Method :

Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion.

Impulse momentum method :

UNIT – VIII

Mechanical Vibrations : Definitions, Concepts – Simple Harmonic Motion – Free vibrations, simple and Compound Pendulums and its Applications –

TEXT BOOKS:

1. Engg. Mechanics / Irving. H. Shames Prentice – Hall.
2. Engg. Mechanics / S.S. Bhargava & J.G. Rajasekhara

REFERENCES:

1. Engineering Mechanics / Ferdinand . L. Singer / Harper – Collins.
2. Engg. Mechanics / Timoshenko & Yound.
3. Engg. Mechanics Umesh Regl / Tayal.
4. Engg. Mechanics / R.V. Kulkarni & R.D. Askhekar
5. Strength of Materials & Applied Mechanics / IB Prasad
6. Text Book in Applied Mechanics / Malhotra, Subramanian, Gahlot and Rathore/ New Age.
7. Engg. Mechanics / KL Kumar / Tata McGraw Hill.
8. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah.

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**(CS05141) COMPUTER PROGRAMMING AND
NUMERICAL METHODS**

UNIT-I:

Algorithm, flowchart, program development steps, basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values, arithmetic, relational and logical operator, increment and decrement operators, conditional operator, bit-wise operators, type conversions, expressions, evaluation, input-output statements, blocks, if and switch statement, while, do-while and for statements, C programs covering all the above aspects.

UNIT-II:

One dimensional & Two dimensional arrays, initialization, string variables-declaration, reading, writing, Basics of functions, String handling function, user-defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, example C programs.

UNIT-III:

Pointer and Arrays: Pointers and addresses, Pointers and Arrays, Pointers And function arguments, Address arithmetic, character pointers and functions, pointers to pointers, multi-dimensional arrays, initialization of pointer arrays, command line arguments, pointers to functions.

UNIT-IV:

Structures: Definition, initializing, assigning values, passing of structures as arguments, Arrays of structures, pointers to structures, self referential structures. Unions and files, C program examples.

UNIT-V:

Linear DataStructures: Introduction to DataStructures, representing stacks and queues in C using arrays, Infix, Postfix & Prefix programs, circular queues.

UNIT-VI:

Solution of Algebraic and Transcendental Equations : Introduction - The Bisection Method - The Method of False Position - The Iteration Method - Newton-Raphson Method.

UNIT-VII:

Interpolation: Introduction- Errors in Polynomial Interpolation - Finite differences- Forward Differences-Backward differences -Central differences - Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation - Central difference interpolation Formulae - Gauss' Central Difference Formulae -Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-VIII:

Numerical Differentiation and Integration: The Cubic Spline Method - Trapezoidal rule - Simpson's 1/3 Rule -Simpson's 3/8 Rule- Boole's and Weddle's Rules. Numerical solution of Ordinary Differential equations: Solution by Taylor's series Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods -Predictor-Corrector Methods- Adams-Moulton Method -Milne's Method.

TEXT BOOKS:

1. C And Data structures - P.Padmanabham, BS Publications
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI Pearson Education.

REFERENCES:

1. C & Data Structures, Ashok N.Kamthane, Pearson Education.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson Education
3. C & Data Structures - Prof. P.S.DeshPande, Prof O.G.Kakde, Wiley Dreamtech Pvt. Ltd., NewDelhi.
4. DataStructures Using C - A.S.Tanenbaum, PHI/Pearson education
5. Applied Numerical methods for Engineers using MATLAB and C, Robert J. Schilling, Sandra L. Harries, Thomson.
6. Numerical Methods in C, J.G.Kori, Laxmi publications.
7. Introductory Methods of Numerical Analysis: S.S.Sastry, Prentice Hall of India, Pvt Ltd.

(ME05223) ENGINEERING GRAPHICS**UNIT – I****INTRODUCTION TO ENGINEERING DRAWING :**

Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Scales used in Engineering Practice and Representative Fraction – Construction of Plain, Diagonal and Vernier Scales.

UNIT – II**PLANE GEOMETRIC DRAWING :**

Construction of Polygons – Inscription and Superscription of Polygon given the diameter of the Circles.

Curves used in Engineering Practice and their Constructions

- Conic Sections including the Rectangular Hyperbola – General method only.
- Cycloid, Epicycloid and Hypocycloid
- Involute.

UNIT – III**DRAWING OF PROJECTIONS OR VIEWS****ORTHOGRAPHIC PROJECTION IN FIRST ANGLE PROJECTION ONLY :**

Principles of Orthographic Projections – Conventions – First and Third Angle Projections Projections of Points and Lines inclined to both planes, True lengths, traces -

Projections of Planes regular auxiliary planes and Auxiliary projection inclined to both planes.

UNIT – IV**PROJECTIONS OF SOLIDS**

Projections of Regular Solids inclined to both planes – Auxiliary Views.

Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT – V**DEVELOPMENT AND INTERPENETRATION OF SOLIDS**

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT – VI**ISOMETRIC PROJECTIONS :**

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

UNIT –VII**TRANSFORMATION OF PROJECTIONS :**

Conversion of Isometric Views to Orthographic Views – Conventions :

UNIT – VIII**PERSPECTIVE PROJECTIONS :**

Perspective View : Points, Lines, Plane Figures and Simple Solids ,Vanishing Point Methods(General Method only)

TEXT BOOKS :

- Engineering Drawing, N.D. Bhat / Charotar

REFERENCES:

- Engineering Drawing Narayana and Kannaiah / Scietech publishers.
- Engineering Drawing and Graphics, Venugopal / New age.

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**(ME05228) ENGINEERING PHYSICS AND FUELS
& LUBRICATION LAB**

(A) ENGINEERING PHYSICS LAB:

Any Ten of the following experiments are to be performed during the Academic year.

1. Determination of Refractive Index of the material of a Prism - Spectrometer.
2. Dispersive power of the material of a Prism - Spectrometer.
3. Cauchy's constants - Spectrometer.
4. Determination of wavelength of a source - Diffraction Grating.
5. Determination of thickness of a thin object using parallel fringes.
6. Newton's Rings.
7. Determination of Rigidity modulus of a material in the form of a wire - Torsional pendulum
8. Melde's Experiment - Transverse and Longitudinal modes.
9. Determination of velocity of sound - Volume resonator.
10. Single slit diffraction using Sodium lamp.
11. Double slit diffraction using Sodium lamp.
12. Single slit diffraction using Lasers.
13. Double slit diffraction using Lasers.
14. Time constant of R-C Circuit.
15. L-C-R Circuit.
16. Verification of laws of stretched string - Sonometer.
17. Calculation of Frequency of A.C. mains - Sonometer.
18. Study of Characteristics of LED and LASER sources.
19. Study of Characteristics of p-i-n and avalanche photo diode detectors.
20. Bending losses of fibers.
21. Evaluation of Numerical Aperture of a given fiber.
22. Magnetic field along the axis of a current carrying coil - Stewart and Gee's method.
23. Hall effect.
24. B-H curve.
25. Energy gap of a material of p-n junction.
26. Determination of Young's modulus and Poisson's ratio by Cornu's method
27. Thermo Electric effect – Seebeck effect and Peltier effect.

(B) FUELS AND LUBRICANTS LAB :

1. Determination of Flash and Fire points of Liquid Fuels / Lubricants: Abels apparatus, Pensky martens apparatus
2. Carbon Residue Test: Solid/ Liquid Fuels
3. Determination of Viscosity: Liquid Lubricants & Fuels : Saybolts viscometer, Redwood Viscometer, Engler Viscometer
4. Determination of Calorific Value: Solid/Liquid/Gaseous Fuels : Bomb Calorimeter
5. Grease Penetration Test. : Junker Calorimeter

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(HS 05232) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The language Lab focuses computer-aided multi-media instruction and language acquisition to achieve the following targets :

- To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train them to use language effectively to face interviews, group discussions, public speaking.
- To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

However, depending upon the available infrastructure and budget, the above targets can also be achieved by procuring the minimum required equipment suggested for the establishment of a Conventional Lab the details of which are given below. The lab should cater to the needs of the students to build up their confidence to help them develop leadership qualities through their communicative competence.

SYLLABUS :

The following course content is prescribed for the English Language Laboratory Practice :

1. Introduction to Phonetics.
2. Introduction to Vowels and Consonants and associated Phonetic symbols.
3. Introduction to Accent, Intonation and Rhythm.
4. Situational Dialogues / Role Play.
5. Public Speaking.
6. Debate
7. Group discussions
8. Facing Interviews
9. Resume preparation
10. e-correspondence

Minimum Requirement :

- Computer aided multi media language lab with 30 systems with LAN facility.
- Conventional Language Lab. with audio and video systems, speakers, head phones and a teacher console to accommodate 30 students.

Suggested Software :

- Cambridge Advanced Learners' Dictionary with exercises
- The Rosetta Stone English Library
- Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd
- Learning to Speak English - 4 CDs
- Microsoft Encarta
- Murphy's English Grammar, Cambridge
- Time series of IQ Test, Brain-teasers, Aptitude Test etc.
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

BOOKS SUGGESTED FOR ENGLISH LAB :

1. Developing Communication Skills by Krishna Mohan & Meera Benerji (Macmillan)
2. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
3. Better English Pronunciation by JDO Connor (UBS – Cambridge)
4. Oxford Practice Grammar with Answers, John Eastwood, Oxford
5. Handbook of English Grammar and Usage, Mark Lester and Larry Beason, Tata McGraw-Hill
6. A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
7. Lingua TOEFL CBT Insider, by Dreamtech
8. TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
9. English Skills for Technical Students, WBSCTE with British Council, OL
10. A Handbook of English for Competitive Examinations, by B Shyamala Rao, Blakie Books, Chennai.

DISTRIBUTION AND WEIGHTAGE OF MARKS :**ENGLISH LANGUAGE LABORATORY PRACTICE**

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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(CS05142) COMPUTER PROGRAMMING AND NUMERICAL METHODS LAB

1. Write a C program the evaluates the following algebraic expressions after reading necessary values from the user:
 - a) $ax+b/ax-b$
 - b) $2.5 \log x + \cos 320^\circ + |x^2 - y^2| + v^2xy$
 - c) $1/\alpha? \quad ? \quad c) 1/?\Omega\sigma\Box 2$
2. Write a C program for the following
 - a) Printing three given integers in ascending order
 - b) Sum of $1 + 2 + 3 + \dots + n$
 - c) $1 + x^2/2! + x^2/4! + \dots$ upto ten terms
 - d) $x + x^3/3! + x^5/5! + \dots$ upto 7th digit accuracy
 - e) Read x and compute $Y = 1$ for $x > 0$
 $Y = 0$ for $x = 0$
 $Y = -1$ for $x < 0$
3. Write C program using FOR statement to find the following from a given set of 20 integers.
 - i) Total number of even integers.
 - ii) Total number of odd integers.
 - iii) Sum of all even integers.
 - iv) Sum of all odd integers.
4. Write a C program to obtain the product of two matrices A of size (3X3) and B of size (3X2). The resultant matrix C is to be printed out along with A and B. Assume suitable values for A & B.
5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, /, * and %).
6. Write C procedures to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib). Also write the main program that uses these procedures.
7. A cloth show room has announced the following seasonal discounts on purchase of items.

Purchase Amount	Discount (Percentage)
Mill Cloth	Handloom items
1-100-5.0	101-2005.0
7.5	201-3007.5
10.0	510.0
Above 300	10.0
15.0	

 Write a C program using switch and If statements to complete the net amount to be paid by a customer.

1. Demonstration of power tools – Pneumatic Tools, Electrical Tools
2. Welding - ARC Welding/Gas Welding/Plasma Welding
3. Machine Shop
4. Metal Cutting - Hacksaw, Power Saw, Gas Cutting, Arc Cutting.
5. Metal Cutting (water plasma)

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(MA05364)MATHEMATICS-II**UNIT – I**

Matrices : Elementary row transformations – Rank – Normal form - Echelon form – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

UNIT – II

Eigen values, eigen vectors – properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix. Calculation of powers of matrix – Modal and spectral matrices. Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation - Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary – Eigen values and eigen vectors of complex matrices and their properties.

UNIT-III

Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index - signature - Sylvester law.

UNIT –IV

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT-V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations . Method of separation of variables – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT –VI

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT-VII

z-transform – inverse z-transform - properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equation by z-transforms.

UNIT-VIII

Wave lets – The Haar wavelets – A wavelet expansion - Multiresolution analysis with Haar Wavelets - General construction of wavelets and multiresolution analysis - Shannon wavelets.

TEXT BOOKS:

1. A Text book of Engineering Mathematics Volume – II, 2005
T.K.V.Iyengar, B.Krishna Gandhi and others, S.Chand and Company.
2. Engineering Mathematics, B.V.Ramana, Tata McGraw-Hill 2003.

REFERENCES:

1. Engineering Mathematics–II, 2002, P.Nageswara Rao, Y.Narsimhulu, Prabhakara Rao
2. Engineering Mathematics, S.K.V.S. Sri Rama Chary, M.Bhujanga Rao, Shankar, B.S.Publications 2000.
3. Advanced Engineering Mathematics (eighth edition), Erwin Kreyszig, John Wiley & Sons (ASIA) Pvt. Ltd. 2001.
4. Advanced Engineering Peter V.O'Neil Thomson Brooks/Cole.
5. Advanced Engineering Mathematics, Merle C.Potter, J.L.Goldberg, E.F.Abrufadel, Oxford University Press. Third Edition 2005.
6. Engineering Mathematics – II, 2005, Sankaraiah, VGS Book Links, Hyderabad.

(CS05434) OOPS THROUGH JAVA**UNIT-I:**

Introduction: Creation of Java, importance of Java to internet, byte code, Java buzzwords, OOP Principles, Encapsulation, Inheritance and Polymorphism, data types, variables, declaring variables, dynamic initialization, scope and life time of variables, arrays, operators, control statements, type conversion and casting, compiling and running of simple Java program.

UNIT-II:

Classes and Objects: Concepts of classes and objects, class fundamentals Declaring objects, assigning object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and constructors, parameter passing – call by value, recursion, nested classes and inner classes, exploring the String class.

UNIT-III:

Inheritance: Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object class.

UNIT-IV:

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-V:

Exception Handling and Multithreading: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes, Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Runnable interface, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

UNIT-VI:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

AWT: Concepts of components, container, panel, window, frame, canvas, Font class, Color class and Graphics.

UNIT-VII:

AWT Controls: Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers – Flow, Border, Grid, Card and Gridbag.

Swing – J Applet, JFrame and J Component, Icons and Labels, Handling threading issues, text fields, buttons – The J Button class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

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

UNIT-VIII:

Networking and Java Library: Basics of Networking, InetAddress, TCP/IP sockets, Data grams, URL, URL connection, String handling, java.util, java. io and java.net packages.

TEXT BOOKS:

1. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, NewDelhi./PHI
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

REFERENCES:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education.
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
4. Beginning in Java 2, Iver Horton, Wrox Publications.

(CE05375) MECHANICS OF SOLIDS**UNIT – I****SIMPLE STRESSES AND STRAINS :**

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

UNIT – II**SHEAR FORCE AND BENDING MOMENT :**

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III**FLEXURAL STRESSES :**

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

UNIT – IV**SHEAR STRESSES :**

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

UNIT – V**ANALYSIS OF PIN-JOINTED PLANE FRAMES :**

Determination of Forces in members of plane, pin-jointed, perfect trusses by (i)

method of joints and (ii) method of sections. Analysis of various types of cantilever and simply – supported trusses.- by method of joints, method of sections and tension coefficient methods.

UNIT – VI**DEFLECTION OF BEAMS :**

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

UNIT – VII**THIN CYLINDERS :**

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

UNIT – VIII

Thick cylinders – lame's equation – cylinders subjected to inside and out side pressures – compound cylinders.

TEXT BOOKS :

1. Strength of materials by Bhaikathi; Lakshmi publications.
2. Strength of Materials -By Jindal, Umesh Publications.

REFERENCES

1. Solid Mechanics, by Popov
2. Analysis of structures by Vazirani and Ratwani.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.
4. Strength of Materials by S.Timshenko
5. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.

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(EE05192) ELECTRICAL ENGINEERING**UNIT – I BASIC CONCEPTS**

I Units - Ohm's law, series, and parallel circuits, Kirchhoffs laws, Star-delta transformation (Simple Problems)– Force on a current carrying conductor in magnetic field– electromagnetic induction, Faraday's law, Lenz's law – Self and mutual inductances.

UNIT – II A.C. CIRCUIT FUNDAMENTALS

Average and rms values of Sinusoidal quantity – representation of alternating quantities by phasors – single phase series and parallel circuits (simple problems)– Series resonance – three phase balanced systems – single and three phase power calculations.

UNIT – III D.C. GENERATORS

Principle of operation of DC machines – emf equation – types of generators – Magnetization and Load characteristics of DC generators

UNIT-IV D.C. MOTORS

Principle of operation of DC Motor, Types of Motors, Back EMF Equation, Characteristics of DC motor, Torque Equation, DC Motor Starter (Three Point starter), Efficiency Calculation, Swinburne's Test and speed control.

UNIT –V TRANSFORMERS

Construction and principle of operation of single phase transformer – emf equation O.C. & S.C. tests – efficiency and regulation

UNIT-VI INDUCTION MOTORS

Principle and operation of three phase induction motors – types of motors, Squirrel cage and slip ring motor – slip torque characteristics.

UNIT-VII ALTERNATORS

Principle and operation of alternators – O.C. & S.C. tests – regulation by synchronous impedance method.

UNIT – VIII ELECTRICAL INSTRUMENTS

Electrical Instruments: Basic principles of indicating instruments – moving coil and moving iron instruments (Ammeters and voltmeters).

TEXT BOOKS :

1. Introduction to Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH
2. Basic Electrical Engineering by T.K. Nagasarkar and M.S.Sukhija, Oxford University Press, 2005

REFERENCES:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath Pearson Education/PHI
2. Essentials of Electrical and Computer Engineering by David V.Kerns, Jr, J.David Irwin; Pearson Education.

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(ME05550) THERMAL SCIENCE**UNIT – I**

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process Work and Heat, Point and Path function.

UNIT II

Zeroth Law of Thermodynamics – Concept of quality of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation. Limitations of the First Law

UNIT – III

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Elementary Treatment of the Third Law of Thermodynamics.

UNIT- IV

Power Cycles : Otto, Diesel, Dual Combustion cycles, – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison with Ideal and Actual Cycles.

UNIT V

Joule and Rankine cycles- Description and representation on P–V and T-S diagram, Thermal Efficiency - Performance , Evaluation – combined cycles

Refrigeration Cycles:

Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

UNIT- VI**I.C. ENGINES:**

Classification – Two & Four Stroke Engines , Working principles, Valve and Port

Timing Diagrams, - Engine systems.

Fuel system: Fuels used , Modes of fuel Admission to engine cylinder, Induction and injection , chemically correct fuel- air ratios. Fuel carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT – VII

S.I. Engines – Mixture requirements, Simple carburetor, Limitations, need of auxiliary systems and their working, problems faced in S.I Engine operation.

C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock. Fuel pump and Injector , Types of Fuel injection systems and their working, Nozzles, Introduction of cooling, Lubrication and super charging systems.

UNIT VIII

Gas Turbine: Introduction , thermodynamic cycles, schematic Layout ,open, closed and semi closed cycles, Parameters of performance and methods of improving performance- Inter cooling Reheating and Regeneration, applications of Gas turbines.

TEXT BOOKS :

1. Thermal Engineering / Rajput / Lakshmi Publications

REFERENCES:

1. Thermal Engineering – R.S. Khurmi & J.S.Gupta / S.Chand Pub.
2. Fundamentals of Classical Thermodynamics – G. Van Wylen & R.E. Sonntag – John Wiley Pub.
3. Engineering Thermodynamics – Jones & Dugan
4. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
5. Thermodynamics – J.P.Holman / McGrawHill
6. An introduction to Thermodynamics / YVC Rao / New Age

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(ME05346) MACHINE DRAWING

I. Machine Drawing Conventions:

Need for drawing conventions – introduction to ISI conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details - common abbreviations and their liberal usage
- e) Types of Drawings – working drawings for machine parts.

II. Drawing of Machine Elements and simple parts

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

- a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cottered joints and knuckle joint.
- c) Rivetted joints for plates
- d) Shaft coupling, spigot and socket pipe joint.
- e) Journal, pivot and collar and foot step bearings.

III. Assembly Drawings:

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

- a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
- b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
- c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE :

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

TEXT BOOK :

1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

REFERENCES:

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing - Rajput

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(CS05338) JAVA LAB

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.
2. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.
3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program to multiply two given matrices.
7. Write a Java Program that reads a line of integers, and then displays each integers, and the sum of all the integers (use string to tokenizer class)
8. Write a Java program that reads on file name from the user then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
9. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.
10. Write a Java program that displays the number of characters, lines and words in a text file.
11. Write a Java program that:
 - a) Implements stack ADT.
 - b) Converts infix expression into Postfix form.

12. Write an applet that displays a simple message.
13. Write an applet that computes the payment of a loan based on the amount of the loan, the interest rate and the number of months. It takes one parameter from the browser: Monthly rate; if true, the interest rate is per month; Otherwise the interest rate is annual.
14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - X % operations. Add a text field to display the result.
15. Write a Java program for handling mouse events.
16. Write a Java program for creating multiple threads
17. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
18. Write a Java program that lets users create Pie charts. Design your own user interface (with swings & AWT)
19. Write a Java program that allows the user to draw lines, rectangles and Ovals.
20. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle.
21. Write a Java program that illustrates how run time polymorphism is achieved.

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**(CE05376) MECHANICS OF SOLIDS AND
ELECTRICAL ENGINEERING LAB**

(A) MECHANICS OF SOLIDS LAB

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

(B) ELECTRICAL ENGINEERING LAB

The following experiments are required to be conducted as compulsory experiments

1. Swinburne's test on D.C. Shunt machine. (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.

In addition to the above four experiments, any one of the experiments from the following list is required to be conducted :

5. Speed control of D.C. Shunt motor by
 - a) Armature Voltage control motor by
 - b) Field flux control method
6. Brake test on D.C Shunt Motor

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(MA05476) PROBABILITY & STATISTICS

UNIT-I

Probability: Sample space and events – Probability – The axioms of probability - Some elementary theorems - Conditional probability – Baye's theorem.

UNIT-II

Random variables – Discrete and continuous – Distribution – Distribution function.

UNIT-III

Distribution - Binomial, poisson and normal distribution – related properties.

UNIT-IV

Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

UNIT-V

Estimation: Point estimation – interval estimation - Bayesian estimation.

UNIT-VI

Test of Hypothesis – Means and proportions – Hypothesis concerning one and two means – Type I and Type II errors. One tail, two-tail tests.

UNIT-VII

Tests of significance – Student's t-test, F-test, χ^2 test. Estimation of proportions.

UNIT –VIII

Curve fitting: The method of least squares – Inferences based on the least squares estimations - Curvilinear regression – multiple regressions – correlation for univariate and bivariate distributions.

TEXT BOOKS:

1. Probability and statistics for engineers: Erwin Miller And John E. Freund. Prentice-Hall of India Pvt. Ltd., Sixth edition.
2. Text book of Probability and Statistics by Dr. Shahnaz Bathul, V.G.S. Publishers 2003.

REFERENCES:

1. Probability, Statistics and Random Processes Dr. K. Murugesan & P. Gurusamy by Anuradha Agencies.
2. Advanced Engineering Mathematics (Eighth edition), Erwin Kreyszig, John Wiley and Sons (ASIA) Pvt. Ltd., 2001.
3. Probability and Statistics for Engineers: G.S.S. Bhishma Rao, sitech., Second edition 2005.

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(CE 05239) ENVIRONMENTAL STUDIES**UNIT - I**

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

UNIT - II

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

UNIT - III

Ecosystems : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - IV

Biodiversity and its conservation : Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - V

Environmental Pollution : Definition, Cause, effects and control measures of :

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

Solid waste Management : Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - VI

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

UNIT - VII

Human Population and the Environment : Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case Studies.

UNIT - VIII

Field work : Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems-pond, river, hill slopes, etc.

TEXTBOOK :

Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

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**(HS05353) MANAGERIAL ECONOMICS AND
FINANCIAL ANALYSIS**

UNIT-I:

Introduction to Managerial Economics: Definition, Nature and Scope Managerial Economics—Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

UNIT-II:

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT -II:

Theory of Production and Cost Analysis : Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs.Variable costs, Explicit costs Vs.Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)-Managerial Significance and limitations of BEA.

UNIT-IV:

Introduction to Markets & Pricing strategies:Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies

UNIT-V:

Business & New Economic Environment:Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario

UNIT-VI:

Capital and Capital Budgeting:Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT-VII:

Introduction to Financial Accounting:Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT-VIII:

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

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(EC05512) SEMICONDUCTOR DEVICES AND CIRCUITS**UNIT I****Electron Dynamics and CRO**

Motion of charged particles in electric and magnetic fields, CRT, CRO.

UNIT II**Junction Diodes**

p-type, n-type semiconductors, p-n junction diode characteristics – breakdown mechanisms – Zener diode.

UNIT III**Rectifiers and Filters**

Half wave Rectifier and Full wave rectifier with and without filters.

UNIT IV**Transistor characteristics**

Bipolar Junction Transistor V-I Characteristics – CE, CB and CC configurations, JFET and MOSFET characteristics, SCR, Photo diode, Photo Transistor, LEDs.

UNIT V**Amplifiers – I**

Significance of biasing, self bias circuits, transistor as an amplifier, CE, CB, CC amplifier circuits.

UNIT VI**Amplifiers – II**

RC coupled amplifier, JFET amplifier circuits Frequency response.

UNIT VII**Feedback amplifiers**

Concept of feedback, advantages of negative feedback, block schematics, circuits.

UNIT VIII**Oscillators**

Principle of oscillator currents – RC, LC type oscillator circuits, RC phase shift, Wein Bridge and Crystal oscillators.

TEXT BOOKS

1. Electronic Devices and Circuits – J. Millman & C.C. Halkias, TMH, 1998.
2. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/ PHI, 9th Ed., 2006.

REFERENCES

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S. Beasley and G.Rico, Pearson Education, 6th Edn., 2004.
2. Principles of Electronic Circuits – S.G. Burns and P.R. Bond, Galgotia Publications, 2nd Edn., 1998.
3. Electronic Devices - K. Satya Prasad
4. Electronic Devices and Circuits –B. Visweswara Rao et al, Pearson Ed.
5. Electronic Devices and Circuits – K. Lal Kishore, B.S. Publications, 2nd edition, 2005

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(MM05392) METALLURGY & MATERIAL SCIENCE**UNIT – I**

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

UNIT - II

Constitution of Alloys : Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT -IIIEquilibrium of Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn and Fe-Fe₃C.**UNIT -IV**

Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – VHeat treatment of Alloys : Effect of alloying elements on Fe-Fe₃C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

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UNIT - VI

Non-ferrous Metals and Alloys : Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – VII

Ceramic materials : Crystalline ceramics, glasses, cermaets, abrasive materials, nonomaterials – definition, properties and applications of the above.

UNIT - VIII

Composite materials : Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

TEXT BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avenner.
2. Material science & Metallurgy / Kodgire

REFERENCES:

1. Science of Engineering Materials / Agarwal
2. Materials Science / Vijendra Singh
3. elements of Material science / V. Rahghavan
4. An introduction to materials science / W.g.vinas & HL Mancini
5. Material science & material / C.D.Yesudian & harris Samuel
6. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.

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(ME05255) FLUID MECHANICS & HEAT TRANSFER

Unit-I

Physical properties of fluids, Measurement of pressure. Introduction to fluid mechanics, static, kinematics and dynamics.

Unit-II

Fluid kinematics: Streamline, path line and streak lines and stream tube, classification of flows, steady, unsteady, uniform, non-uniform, laminar, turbulent. Rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – Stream and velocity potential functions – Flow net analysis.

Unit-III

Fluid Dynamics : Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line. Momentum equation and its applications – Boundary layer along a thin flat plate – Separation of boundary layer – Drag and lift – Flow measurement by pitot tube venturimeter and orifice meter.

Unit-IV

Flow through closed conduit, Reynolds number laminar flow through circular tube, Hydraulic gradient and total energy lines, loss of head due to sudden enlargement and contraction.

Unit-V

Introduction : Modes of heat transfer, Mechanism of heat transfer, Basic laws of heat transfer.

Conduction: Fourier heat conduction equation, general heat condition equation, initial and boundary conditions, conduction through homogeneous slab, cylinder and sphere.

Unit-VI

Convection: Dimensional analysis, Rayleigh and Buckingham methods applied to heat transfer, Non-dimensional members in heat transfer.

Boundary layer concept, concept of stagnant film, Reference temperature for evaluation of fluid properties. Forced convection of laminar flow inside ducts and over bodies. Local and average heat transfer coefficients.

Unit-VII

Radiation: Emission characteristics and laws of Black body radiation. Incident radiation, total and Monochromatic quantities. Laws of black, Wien, Kirchoff, Lambert, Stephan and Boltzman. Heat exchange between two black bodies, concept of shape factor, Emissivity. Heat exchange between grey bodies.

Unit-VIII

Heat Exchangers:

Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods

TEXT BOOKS:

1. Heat Transfer/ PK Nag
2. Fluid Mechanics Hydraulics and Hydraulics Machines Modi & Seth, Standard publications, New Delhi.

REFERENCES:

1. Heat Transfer / Sukatme.
2. Heat Transfer – A Practical Approach – Yunus Cengel, Boles / TMH.
3. Fundamentals of Engineering Thermodynamics / Michael J Moran / John Wiely & Sons
4. Engineering Fluid Mechanics by K.L.Kumar, S.Chand & Co.

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II Year B.TECH MC II-SEM

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(EC05513) SEMICONDUCTOR DEVICES AND CIRCUITS LAB

- 1 Identification, Specifications and Testing of R, L, C Components (colour codes), Potentiometers, Switches (SPDT, DPDT and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification and Specifications of Diodes, BJTs, FETs, SCRs.
- 2 PN Junction Diode Characteristics (Forward bias, Reverse bias)
- 3 Zener Diode Characteristics
- 4 Transistor CE Characteristics (Input and Output)
- 5 Rectifier without Filters (Full wave & Half wave)
- 6 Rectifier with Filters (Full wave & Half wave)
- 7 FET Characteristics
- 8 SCR Characteristics
- 9 CE and CC Amplifiers.
- 10 Feedback Amplifier (Voltage Series/Current series)
- 11 RC Phase Shift Oscillator
- 12 Hartely/Colpitts Oscillator

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(MT05394) METALLURGY AND THERMAL ENGINEERING LAB**(A) METALLURGY LAB**

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

(B) THERMAL ENGG LAB

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test(4 -S Diesel Engines)
3. I.C. Engines Performance Test on 2-S, Petrol
4. Evaluation of Engine friction by conducting Morse on 4-S Multi cylinder Petrol Engine and retardation and motoring test on 4- S diesel engine
5. I.C. Engines Heat Balance.
6. I.C.Engines A/F Ratio and Volumetric Efficiency
7. Performance Test on Variable Compression Ratio Engines, economical speed test.
8. Performance Test on Reciprocating Air – Compressor Unit
9. Dis-assembly / Assembly of Engines.
10. Performance of Air – Conditioning System

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(HS05311) INDUSTRIAL MANAGEMENT**UNIT I :**

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

UNIT II:

Designing Organisational Structures: Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT III:

Plant location, definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach.

Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

UNIT IV:

Work study - Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts-difference between micromotion and memomotion studies.

Work measurement- definition, time study, steps involved-equipment, different methods of performance rating- allowances, standard time calculation.

Work Sampling – definition, steps involved, standard time calculations, differences with time study.

UNIT V:

Materials Management-Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management

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and Stores Records. Purchase management, duties of purchase of manager, associated forms.

UNIT VI :

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

UNIT VII:

Inspection and quality control, types of inspections- Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, \bar{x} and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures.

UNIT VIII:

Introduction to Human Resource Management, Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes.

Marketing, marketing vs selling, marketing mix, product life cycle.

TEXT BOOKS:

1. Ravishankar, Industrial Engineering and Management, Galgotia, 2004.
2. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.

REFERENCES:

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2005.
2. Panner Selvam, Production and Operations Management, PHI, 2004.
3. Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited.
4. Ralph M Barnes, Motion and Time Studies, John Wiley and Sons, 2004.
5. Chase, Jacobs, Aquilano, Operations Management, TMH 10th Edition, 2003.
6. L.S.Srinath, PERT / CPM, affiliate East-West Press, New Delhi, 2000.
7. Gary Dessler, Human Resource Management, Pearson Education Asia, 2002.
8. Phillip Kotler, Marketing Management, Pearson, 2004.
9. Industrial Engineering and Management O.P. Khanna Dhanpat Rai
10. A.R.Aryasri, Management Science for JNTU (B.Tech), Tata Mc Graw-Hill, 2002.

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III Year B.TECH MC I-SEM

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(ME05248) FINITE ELEMENT METHODS

UNIT – I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Boundary conditions. Strain – Displacement relations. Stress – strain relations.

UNIT – II

One Dimensional problems : Finite element modeling coordinates and shape functions. Potential Energy approach : Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

UNIT – III

Analysis of Beams : Element stiffness matrix for two node, two degrees of freedom per node beam element.

UNIT – IV

Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.

UNIT – V

Finite element modelling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements.

Two dimensional four noded isoparametric elements and numerical integration.

UNIT – VI

Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

Dynamic Analysis : Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

UNIT – VII

Finite element – formulation to 3 D problems in stress analysis, convergence requirements,

UNIT – VIII

Mesh generation, Techniques such as semi automatic and fully Automatic Mesh generation Techniques : use of softwares such as ANSYS, CAEFEM, NISA NASTRAN etc. Comparison of commercially available packages.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering / Chandruputla, Ashok and Belegundu / Prentice – Hall

REFERENCES:

- 1 Finite element analysis / C.S.Krishna murthy.
- 2 The Finite Element Methods in Engineering / SS Rao / Pergamon.
- 3 An introduction to Finite Element Method / JN Reddy / Mc Graw Hill
- 4 The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.

(EE05539) SWITCHING THEORY AND LOGIC DESIGN

UNIT I

NUMBER SYSTEMS & CODES

Philosophy of number systems – complement representation of negative numbers- binary arithmetic – binary codes – error detecting and error correcting codes – hamming codes.

UNIT II

BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS

Fundamental postulates of Boolean Algebra-Basic theorems and properties - switching functions—Canonical and Standard forms—Algebraic simplification—digital logic gates, properties of XOR gates –universal gates-Multilevel NAND/NOR realizations.

UNIT III

MINIMIZATION OF SWITCHING FUNCTIONS

Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, simplification rules

UNIT IV

COMBINATIONAL LOGIC DESIGN

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT V

PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC

Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT VI

SEQUENTIAL CIRCUITS - I

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level

mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring and Shift counters, Serial binary adder, sequence detector.

UNIT VII

SEQUENTIAL CIRCUITS - II

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

UNIT VIII

ALGORITHMIC STATE MACHINES

Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. Switching and Logic design – CVS Rao, Pearson, 2005.
2. Switching & Finite Automata theory – Zvi Kohavi, TMH, 2nd Edition.

REFERENCES

1. Introduction to Switching Theory and Logic Design - F.J.Hill, G.R.Petrerson, John Wiley, 2nd edition.
2. Switching Theory and Logic Design – R.P.Jain, TMH Editon, 2003.
3. Digital Design - Morris Mano, PHI, 2nd edition.
4. An Engineering Approach To Digital Design – Fletcher, PHI.
5. Digital Logic – Application and Design – John M. Yarbrough, Thomson Publications, 1997.
6. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.

(ME05348) MACHINE TOOLS

UNIT – I

Elementary treatment of metal cutting theory – Element of cutting process – Geometry of single point tool and angles chip formation and types of chips – built up edge and its effects chip breakers. Mechanics of orthogonal cutting –Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability – Tool materials.
Kinematic schemes of machine tools – Constructional features of speed gear box and feed gear box.

UNIT – II :

Engine lathe – Principle of working, specification of lathe – types of lathe – work holders tool holders – Box tools Taper turning thread turning – for Lathes and attachments.
Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout.
Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes – tool layout and cam design.

UNIT – III :

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

UNIT – IV

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

UNIT – V

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

of indexing – Accessories to milling machines, kinematic scheme of milling cutters – milling cutters – methods of indexing.

UNIT –VI

Grinding machine – Fundamentals – Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine – Tool and cutter grinding machine – special types of grinding machines – Different types of abrasives – bonds specification of a grinding wheel and selection of a grinding wheel Kinematic scheme of grinding machines.

UNIT - VII

Lapping, honing and broaching machines – comparison to grinding – lapping and honing. Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed Units, machining time calculations

UNIT - VIII

Principles of design of Jigs and fixtures and uses. Classification of Jigs & Fixtures – Principles of location and clamping – Types of clamping & work holding devices. Typical examples of jigs and fixtures.

TEXT BOOKS:

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II

REFERENCES:

1. Production Technology by H.M.T. (Hindustan Machine Tools)
2. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.

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(ME05339) KINEMATICS OF MACHINERY

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

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

UNIT-II:

STRAIGHT LINE MOTION MECHANISMS : Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russel – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT – III

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

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

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

UNIT – IV

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

HOOKE'S JOINT : Single and double Hooke's joint – Universal coupling – application – problems.

UNIT – V

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

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

UNIT – VI

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

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

UNIT – VII

Belt Rope and Chain Drives- Introduction, selection of belt drive- types of belt drives, types of belts- material used belt drives-types of flat belt drives, velocity ratio of belt drives, slip of belt, creep of belt, length of an open belt drive, length of cross belt drive, ratio of driving tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, condition for transmission of maximum power.

UNIT – VIII

GEAR TRAINS : Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear train. Methods of finding train value or velocity ratio – Epicyclic gear trains.

Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

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

REFERENCES :

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkupati / New Age
5. The theory of Machines /Shiegley/ Oxford.

(MP 05493) PRODUCTION TECHNOLOGY

UNIT – I

CASTING : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys.

Risers – Types, function and design, casting design considerations, special casting processes 1.) Centrifugal 2.) Die, 3.) Investment.

Methods of Melting: Crucible melting and cupola operation, steel making processes, special.

UNIT – III

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

B) Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals.

UNIT – IV

Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT – V

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

UNIT - VI

Stamping, forming and other cold working processes : Blanking and piercing –

Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT- VII

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

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

UNIT - VIII

Processing of Plastics: Types of Plastics, Properties, applications and their Processing methods & Equipment (blow & injection modeling)

TEXT BOOKS :

1. Manufacturing Engineering and Technology/Kalpajin S/ Pearson Edu.
2. Manufacturing Technology / P.N. Rao/TMH

REFERENCES :

1. Production Technology / R.K. Jain
2. Metal Casting / TV Ramana Rao / New Age
3. Principles of Metal Castings / Roenthal.
4. Welding Process / Paramar /
5. Production Technology /Sarma P C /
6. Production Engineering – Suresh Dalela & Ravi Shankar / Galgotia Publications Pvt. Ltd.

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(ME05350) MACHINE TOOLS LAB

1. Introduction of general purpose machines – Lathe, Drilling machine, Milling machine, Shaper, Planning machine, slotting machine, Cyl. Grinder, surface grinder. And tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on – lathe machine
4. Drilling and Tapping
5. Shaping and Planning
6. Slotting
7. Milling
8. Cylindrical / Surface Grinding
9. Grinding of Tool angles.
10. Electro Discharge Machining / Ultrasonic Machining.

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**(MP 05285) HEAT TRANSFER AND PRODUCTION
TECHNOLOGY LAB**

(A) HEAT TRANSFER LAB

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection
9. Emissivity apparatus.
10. Stefan Boltzman Apparatus.

(B) PRODUCTION TECHNOLOGY LAB

I. METAL CASTING LAB

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing . - for strengths, and permeability – 1 Exercise
3. Moulding Melting and Casting - 1 Exercise

II WELDING LAB

1. ARC Welding - 2 Exercises
Lap & Butt Joint
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Brazing - 1 Exercises

III MECHANICAL PRESS WORKING

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press : Deep drawing and extrusion operation.
3. Bending and other operations

IV PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

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(ME05108) CAD / CAM

Unit – I

Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

Unit – II

Computer Graphics : Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

Unit – III

Geometric modeling : Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

Unit – IV

Drafting and Modeling systems : Basic geometric commands, layers, display control commands, editing, dimensioning, general facilities of Unigraphics, solid modeling, constraint based modeling.

Unit – V

Numerical control : NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming : fundamentals, manual part programming methods, Computer Aided Part Programming.

Unit – VI

Group Tech : Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

Unit – VII

Material requirement planning, manufacturing resources planning, DNC, AGV, ASRS, Flexible manufacturing systems – FMS equipment, system layouts, FMS control.

Unit – VIII

CIM : Integration, CIM implementation, major functions in CIM, Benefits of CIM, Lean manufacturing, Just-in-time.

TEXT BOOKS:

1. CAD / CAM Principles and Applications – 2nd edition, P.N. Rao, Tata Mc. Grah Hill

REFERENCES :

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
4. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

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(EE05323) INSTRUMENTATION AND CONTROL SYSTEMS

UNIT – I

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

UNIT – II

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

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

UNIT – III

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

UNIT – IV

MEASUREMENT OF LEVEL : Direct method – Indirect methods – capacitive, ultrasonic, magnetic, cryogenic fuel level indicators – Bubbler level indicators.

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

UNIT – V

MEASUREMENT OF SPEED : Mechanical Tachometers – Electrical tachometers – Stroboscope, Non- contact type of tachometer

Measurement of Acceleration and Vibration : Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

UNIT – VI

STRESS STRAIN MEASUREMENTS : Various types of stress and strain

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measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

UNIT – VII

MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter

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

UNIT – VIII

ELEMENTS OF CONTROL SYSTEMS :

Introduction, Importance – Classification – Open and closed systems Servomechanisms – Examples with block diagrams – Temperature, speed and position control systems.

TEXT BOOKS:

1. Measurement Systems: Applications & design by D.S Kumar.
2. Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH

REFERENCES :

1. Instrumentation and Control systems/ S.Bhaskar/ Anuradha Agencies
2. Experimental Methods for Engineers / Holman
3. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
4. Mechanical Measurements / Sirohi and Radhakrishna / New Age
Instrumentation & mech. Measurements by A.K. Tayal ,Galgotia Publications.

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(ME05184) DYNAMICS OF MACHINERY

UNIT – I

PRECESSION : Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.
static and dynamic force analysis of planar mechanisms.

UNIT – II

FRICTION : Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis : lubricated surfaces, boundary friction, film lubrication, clutches.

UNIT –III:

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

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

UNIT – IV

TURNING MOMENT DIAGRAM AND FLY WHEELS : Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

UNIT-V:

GOVERNERS : Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs. Sensitiveness, isochronism and hunting.

UNIT – VI

BALANCING : Balancing of rotating masses Single and multiple – single and different planes.

UNIT –VII:

Balancing of Reciprocating Masses: Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of “V” multi cylinder in line and radial engines for primary

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and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive efforts.

UNIT – VIII

VIBRATION : Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers of oscillation and suspension. Transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method. Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Simple problems on forced damped vibration Vibration Isolation & Transmissibility

TEXT BOOKS:

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Theory of Machines / Jagadish Lal & J.M.Shah / Metropolitan

REFERENCES :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. The Theory of Machines Through Solved Example / JS Rao / New Age
3. Theory of Machines / Shiegly / MGH
4. Theory of Machines / Thomas Bevan / CBS Publishers

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(ME05474) PRINCIPLES OF MACHINE DESIGN

UNIT – I

INTRODUCTION : General considerations in the design of Engineering Materials and their properties – selection –Manufacturing consideration in design. Tolerances and fits –BIS codes of steels.

STRESSES IN MACHINE MEMBERS : Simple stresses – Combined stresses – Torsional and bending stresses – impact stresses – stress strain relation – Various theories of failure – factors of safety – Design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations – Static strength design based on fracture toughness.

UNIT – II

STRENGTH OF MACHINE ELEMENTS : Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman's line – Soderberg's line – Modified goodman's line.

UNIT – III

Rivited and welded joints – Design of joints with initial stresses
Bolted joints – Design of bolts with pre-stresses – both of uniform strength.

UNIT – IV**SHAFTS, KEYS AND COTTERS:**

SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combines bending and axial loads – Shaft sizes – BIS code. Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter.

UNIT – V**Mechanical Springs:**

Stresses and deflections of helical springs – Extension and DMM – I compression springs – Springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs, leaf springs.

UNIT – VI

BEARINGS : Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings – Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.

UNIT – VII

PULLEYS : Transmission of power by Belt and Rope drives , Transmission efficiencies, Belts – Flat and V types – Ropes - pulleys for belt and rope drives, Materials, Chain drives

UNIT – VIII

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

TEXT BOOKS :

1. Dr P. Kannaiah Scitech Publishers
2. Machine Design / Soundararaja Murthy and shanmugam

REFERENCES :

1. Design of Machine Elements / V.M. Faies
2. Machine design / Schaum Series.
3. Mech. Engg. Design / JE Shigley
4. Machine Design / Sarma and Agarwal
5. Machine Design / V.V. Bhandari
6. Machine design – Pandya & shah.

(EC05342) LINEAR AND DIGITAL IC APPLICATIONS

UNIT I

INTEGRATED CIRCUITS

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

UNIT II

OP-AMP APPLICATIONS

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT III

ACTIVE FILTERS & OSCILLATORS

Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT IV

TIMERS & PHASE LOCKED LOOPS

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT V

D-A AND A- D CONVERTERS

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.

DAC and ADC specifications.

UNIT VI

Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL .

UNIT VII

Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's, Complement system. Digital comparator circuits.

UNIT VIII

SEQUENTIAL CIRCUITS

Flip-flops & their conversions. Design of synchronous counters. Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.

Memories: ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

REFERENCES:

1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications –Denton J. Daibey, TMH.
3. Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Ed., 2002.
4. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

(CS05140) COMPUTER ORGANIZATION

UNIT-I:

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

UNIT-II:

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle.

Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer

UNIT-III:

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, design of control unit Hard wired control. Micro programmed control

UNIT-IV:

COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

UNIT-V:

THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT-VI:

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface,

Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-VII:

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT-VIII:

MULTI PROCESSORS: Characteristics or Multiprocessors, Interconnection Structures, Interprocessor Arbitration. Interprocessor Communication and Synchronization Cache Coherence. Shared Memory Multiprocessors.

TEXT BOOKS:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, PHI/Pearson.
2. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Sixth Edition, PHI/ Pearson.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/ Pearson.
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

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(ME05110) CAD / CAM LAB

1. Drafting : Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES.
2. Part Modeling : Generation of various 3D Models through Protrusion, revolve, shell sweep. Creation of various features. Study of parent child relation. Feature based and Boolean based modeling surface and Assembly Modeling. Study of various standard Translators. Design simple components.
3.
 - a. Determination of deflection and stresses in 2D and 3D trusses and beams.
 - b. Determination deflections component and principal and Von-mises stresses in plane stresses in plane stress, plane strain and Axisymmetric components.
 - c. Determination of stresses in 3D and shell structures (at least one example in each case)
 - d. Estimation of natural frequencies and mode shapes, Harmonic response of 2D eam.
 - e. Study state heat transfer Analysis of plane and Axisymmetric components.
4.
 - a) Development of process sheets for various components based on tooling Machines.
 - b) Development of manufacturing defects and tool management systems.
 - c) Study of various post processors used in NC Machines.
 - d) Development of NC code for free from and sculptured surfaces using CAM packages.
 - e) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
 - f) Quality Control and inspection.

Packages :

Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc,

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**(MC05324) INSTRUMENTATION AND
I.C. APPLICATIONS LAB**

Any five experiments from Each Lab

(A) INSTRUMENTATION LAB

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

REFERENCE :

Metallography Laboratory Practice / George / KEHL

(B) IC APPLICATIONS LAB

1. 741 OPAMP Characteristics
2. Adder, Integrator and differentiator using 741 OPAMP
3. Function Generator using 741 OP AMP
4. IC 555 Timer –Astable Operation
5. IC 555 Timer – Monostable Operation
6. Study of Logic Gates
7. Study of Flip-Flops using Ics
8. Half Adder, Full Adder and Subtractor
9. Counters and Shift Registers & 7490 Counter
10. BCD to 7 Segment decoder using IC 7447
11. Voltage Regulator using IC 723
12. D/A Converter
13. A/D Converter
14. Multiplexer and Demultiplexer

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(ME05436) OPERATIONS RESEARCH

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – operation Research models – applications.

ALLOCATION: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy. **Assignment problem** – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem.

SEQUENCING – Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – IV

THEORY OF GAMES: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT – V

WAITING LINES: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

UNIT – VI

INVENTORY: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – VII**DYNAMIC PROGRAMMING:**

Introduction – Bellman's Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

UNIT – VIII

SIMULATION: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath.

REFERENCES:

1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
2. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
3. Operations Research / R.Pannarselvam,PHI Publications.
4. Operations Research / Wagner/ PHI Publications.
5. Operation Research /J.K.Sharma/MacMilan.
6. Introduction to O.R/Hiller & Libermann (TMH).
7. O.R/Wayne L.Winston/Thomson Brooks/cole
8. Introduction to O.R /Taha/PHI

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(EE05404) MICROPROCESSORS AND MICRO CONTROLLERS**UNIT-I: 8086 ARCHITECTURE:**

Functional Diagram, Register Organization, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams.

UNIT-II: ASSEMBLY LANGUAGE PROGRAMMING OF 8086

Assembly Directives, Macro's, Simple Programs using Assembler, Implementation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features, String Manipulation, Procedures.

UNIT-III: I/O INTERFACE

Parallel data transfer scheme, Programmed I/O, Interrupt Driven I/O, 8255 PPI, Various modes of operations and interface of I/O devices to 8086, A/D, D/A Converter Interfacing, Stepper Motor Interfacing.

UNIT-IV: INTERFACING WITH ADVANCED DEVICES.

8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control), Memory Interface using RAMS, EPROMS and EEPROMS.

UNIT-V: COMMUNICATION INTERFACE

Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tools, MDS.

UNIT-VI: INTRODUCTION TO MICRO CONTROLLERS

Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming.

UNIT-VII: 8051 INTERRUPTS COMMUNICATION

Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming.

UNIT- VIII: INTERFACING AND INDUSTRIAL APPLICATIONS

Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:

1. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
2. Kenneth J Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.

REFERENCES:

1. Ajay V. Deshmukh, "Microcontrollers – theory applications", Tata McGraw-Hill Companies – 2005.
2. D.V.Hall, "Micro Processor and Interfacing", Tata McGraw-Hill.
3. Ray and BulChandi, "Advanced Micro Processors", Tata McGraw-Hill.

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(ME05507) ROBOTICS

UNIT – I

Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

UNIT – IV

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V

Differential transformation and manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

UNIT VI

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT VII

Robot actuators and Feed back components:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback

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components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT VIII

Robot Application in Manufacturing:

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics / Fu K S/ McGraw Hill.

REFERENCES:

1. Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.
3. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science
6. Introduction to Robotics / John J Craig / Pearson Edu.
7. Robot Dynamics And Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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(MC05418) MOTION CONTROL DESIGN**UNIT-I:**

Introduction to motion control, Electric motors, Pneumatics, Hydraulics

Unit – II

Transmission mechanics – linear – lead screw, timing belt, conveyor – Rotary – gearing – spur gears, planetary transmission, harmonic transmission.

Unit – III

Motors – DC servo motors with encoded feedback – Brushless DC servo motors with hall effect sensor, encoder feedback stepper motors – full step, half step, microstep AC induction motors – gearheads.

Unit – IV

Electric drives – various drive modes – position, velocity, torque, bipolar, MOSFET, IGBT drives – Over current protection – electronic commutation with hall effect sensor feedback vector drives.

Unit – V

Control system in Motion control : programmable motion control, closed loop PID control – feedforward control – velocity, acceleration – fundamental concept for adaptive control and fuzzy logic.

Unit – VI

Interpolation techniques / functionalities in multi-axis motion control : Creation mechanism : Point to point, linear, circular, Jointed mechanism : Forward kinematics, Inverse kinematics, programmability and functionality of a servo motion controller.

UNIT – VII INDUSTRIAL HYDRAULICS

Merits of Fluid power and its utility for increase in productivity, symbolic representation of hydraulic element – Hydraulic control valves – Hydraulic accessories – various pumps used in hydraulic system – Hydraulic fluids – Hydraulic circuits and servo control systems.

UNIT – VIII INDUSTRIAL PNEUMATICS :

Symbolic representations of Pneumatic elements – Compressor and air installation – Pneumatic circuits using Pneumatic cylinders and other elements – Applications to fluidics – Biselectors.

TEXT BOOKS :

1. Principles of Machine Tools – Sen & Bhattacharya
2. Manuals on Mechatronics – CITD, Hyderabad.

REFERENCES:

1. Designing of Intelligent Machines, Open University, London 1995.
2. Introduction to Mechatronics and Measurement Systems.
3. Mechatronics – W. Bolton, Addison Wesley Longmont Ltd. 1999.
4. Control Sensors and Actuators – C.W.Desukva Prentice Hall, 1989.

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(MC05489) PRODUCT DESIGN AND ASSEMBLY AUTOMATION

(Elective – I)

UNIT –I**AUTOMATIC FEEDING AND ORIENTING DEVICES :** Vibrator feeders : Mechanics of vibratory conveying, estimating the mean conveying velocity, load sensitivity, solutions to load sensitivity, spiral elevators, balanced feeders.**UNIT – II**

Orientation of typical orienting system, effect of active orienting devices on feed rate, analysis of orienting systems, performance of an orienting device, natural resting aspects, of parts for automatic handling, analysis of a typical orienting system, out-of-bowl tooling. Mechanical feeders. Reciprocating -tube hopper feeder; magazines:

UNIT-III**ASSEMBLY ADVANTAGES:** Development of the assemble process, choice of assemble method assemble advantages social effects of automation.**UNIT-IV****AUTOMATIC ASSEMBLY TRANSFER SYSTEMS :** Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.**UNIT-V****PRODUCT DESIGN FOR HIGHSPEED AUTOMATIC ASSEMBLY AND ROBOT****ASSEMBLY :** Introduction, design of parts for: high speed, feeding and orienting, example, additional feeding difficulties, high speed automatic insertion, example, analysis of an assembly, general rules for product design for automation, design of parts for feeding and orienting, summary of design rules for high speed automatic assembly, product for robot assembly.**UNIT-VI:****DESIGN OF MANUAL ASSEMBLY:** Design for assembly fits in the design process,

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general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

UNIT-VII

Avoiding jams during assembly, reducing risk assembly problems, effects of holding down, manual assembly data base and design data sheets, application of the DFA methodology and general design guidelines.

UNIT-VIII:

PERFORMANCE AND ECONOMICS OF ASSEMBLY SYSTEMS :

Indexing machines, free transfer machines, basis for economic comparisons of automation equipment, comparison of indexing and free - transfer machines' economics of robot assembly.

FEASIBILITY STUDY FOR ASSEMBLY AUTOMATION : Machine

design factors to reduce machine downtime due to defective parts. Visibility study.

TEXT BOOK:

1. Geoffrey Boothroyd, "Assembly Automation and Product Design", Marcel Dekker Inc., NY, 1992.

REFERENCES:

1. Geoffrey Boothroyd, "Hand Book of Product Design" Marcel and Dekken, N.Y. 1990.
2. A Delbainbre "Computer Aided Assembly London, 1992.

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(CS05138) COMPUTER NETWORKS (Elective-I)

UNIT –I:

Introduction: OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT-II:

Physical Layer: Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT-III:

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM.

UNIT-IV:

Medium Access sub layer: ALOHA, MAC addresses, Carrier sense multiple access. IEEE 802.X Standard Ethernet, wireless LANs. Bridges,

UNIT-V:

Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing.

UNIT –VI:

Dynamic routing – Broadcast routing. Rotary for mobility. Congestion, Control Algorithms – General Principles – of Congestion prevention policies. Internet Working: The Network layer in the internet and in the ATM Networks.

UNIT –VII:

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

UNIT –VIII

Application Layer – Network Security, Domain Name System, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. PHI/Pearson Education.
2. Data Communications and Networking — Behrouz A. Forouzan.. third Edition TMH.

REFERENCES:

1. An Engineering approach to Computer Networks – S. Keshav, 2nd Edition, Pearson Education.
2. Understanding Communications and Networks, W.A.Shay, Thomson

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(ME05427) NON-CONVENTIONAL SOURCES OF ENERGY

(Elective – I)

UNIT – I

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

UNIT – II

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

UNIT - III

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/cooling techniques, solar distillation and drying, Photovoltaic energy conversion.

UNIT – IV

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

UNIT - V

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

UNIT – VI

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

UNIT - VII

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

UNIT – VIII

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

TEXT BOOKS:

1. Renewable Energy Resources / Tiwari and Ghosal / Narosa
2. Non- conventional Energy Sources / G.D. Rai

REFERENCES:

1. Renewable Energy Sources / Twidell & Weir
2. Solar Energy / Sukhatme
3. Solar Power Engineering / B.S. Magal Frank Kreith & J.F. Kreith
4. Principles of Solar Energy / Frank Krieth & John F Kreider
5. Non-Conventional Energy / Ashok V Desai / Wiley Eastern
6. Non-Conventional Energy Systems / K Mittal / Wheeler
7. Renewable Energy Technologies / Ramesh & Kumar / Narosa
8. Energy Technology – S Rao and B B Parulakar

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(ME05462) POWER PLANT ENGINEERING

(Elective – II)

UNIT – I:

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

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

UNIT II:

STEAM POWER PLANT:

COMBUSTION PROCESS: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT – III

INTERNAL COMBUSTION ENGINE PLANT:

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

UNIT IV:

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

UNIT – V

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

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

UNIT VI:

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar- Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy

DIRECT ENERGY CONVERSION: Solar energy Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – VII

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

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

UNIT – VIII

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve.

Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises.

Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

TEXT BOOKS:

1. A Text Book of Power Plant Engineering / Rajput / Laxmi Publications

REFERENCES:

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub
3. A Course in Power Plant Engineering: / Arora and S. Domkundwar.
4. Power station Engineering – ElWakil / McHill.
5. An Introduction to Power Plant Technology / G.D. Rai.
6. Power Plant Engineering – K.K Ramalingam / Scitech Publications (India) Pvt Ltd.

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**(MC05148) CONCURRENT ENGINEERING
(ELECTIVE – II)**

UNIT – I

Introduction : Development of Concurrent Engineering. The mean and activity concepts and principles. Examples.

UNIT – II :

Concurrent Engineering Tools and Technologies : Changes in to Technologies, Tasks, Talents and times into well managed resources product developments.

UNIT – III :

Research in Engineering design and manufacturing : Theory applications using the concurrent Engineering concepts and Principles.

UNIT-IV

Simultaneous design and all related processes of a product.

UNIT – V :

The mission and vision of C.E. : Computer optimized manufacturing (COM). The next generation of computer integrated manufacturing (CIM).

UNIT-VI

Global competitiveness and development of high quality product. Offline reliability

UNIT – VII

Managing the concurrent Engineering: Contemporary Issues a modern Tools and methods. Use of Computers and decision making. Reengineering concepts

UNIT-VIII

Automated Quality Control Application of CMM, Basic concepts, Zero defect, 6 sigma concept, Tolerancing, Examples, DFMA, Rapid Prototyping

TEXT BOOKS:

1. Concurrent Engineering: Tools and Technologies for Mechanic Systems Design – Edward, J. Haug.

REFERENCES :

1. Research in Engineering Design : Theory, applications, and concurrent engineering : Vol. 7, No. 1, 1995.
2. Managing Concurrent Engineering. – Jon Turino.

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**(ME05012) ADVANCED KINEMATICS AND
DYNAMICS OF MACHINERY**

(Elective – II)

UNIT-I:

Geometry of motion-Grublers Criterion for plain and spatial mechanisms- Grashoff's law for planar and spatial mechanisms, Kutn Batch criterion for planar and spatial mechanisms

UNIT – II

Velocity and acceleration analysis, use of computers in analysis. Velocity and accelerations analysis of complex mechanisms. Auxiliary point method, Goodman's analysis.

UNIT-III:

Coupler curves, Robert's Chebychev spacing method. Cognate linkages. Path curvature- Polodes- Euler Savary equation -Bobiller and Hartman's Construction- Equivalent mechanisms.

UNIT- IV:

Space mechanisms and mobility equations: Positional problems. Vector analysis of velocity and accelerations,

UNIT-V:

Theorem of angular velocities and accelerations –computer aided analysis.

UNIT-VI:

Static force analysis of plane and spatial mechanisms: Inertia forces and torques. Dynamic force analysis, application of computer animation and simulation of motion studies.

UNIT-VII:

Dynamic Motion Analysis: Quinn's energy distribution method, the equivalent mass and force method. The rate of change of energy method, dynamic motion simulation.

UNIT-VIII:

Synthesis of linkages: Two position synthesis. Properties of rotapole, Chebychev spacing. Optimization of the transmission angles. The overlay method; Three-position synthesis; point position reduction; synthesis of dwell mechanisms; synthesis using complex numbers and matrices, Freudenstein equation. Computer aided kinematic synthesis.

TEXT BOOKS:

1. Kinematics and Dynamics and design of machinery, Waldron, Wiley Publishers.
2. Shigley : J.E. Kinematic Analysis of mechanism, McGraw 111.

REFERENCES :

1. Hirschcom : J.K.. Kinematics and Dynamics of Plane Mechanisms Mc.Graw Hill.
2. Holowenko, A.R. Dynamics of machinery, John Wiley & Sons.

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(EE05405) MICROPROCESSORS AND MICROCONTROLLERS LAB**I . Microprocessor 8086:**

Introduction to MASM/TASM.

Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.

By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

Modular Program: Procedure, Near and Far implementation, Recursion.

Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing

8259 – Interrupt Controller.

8279 – Keyboard Display.

8255 – PPI.

8251 – USART.

III. Micro controller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

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(MC05417) MOTION CONTROL ROBOTICS LABORATORY

MOTION CONTROL ROBOTICS LAB

1. Study of the following equipment :
 - a. Study of different types of drives
 - b. Relief Valve
 - c. Flow Control Valves
 - d. Directional Control Valves
2. Circuits for reciprocating motion of a single acting and double acting pneumatic cylinders.
3. Circuits for rotary & reciprocating motion of hydraulic cylinder.
4. Circuits for speed control of a (a) double acting pneumatic cylinder. (b) Double acting hydraulic Cylinder.
5. Circuits for semi automatic and automatic operation of a double acting cylinder.
6. Circuits for sequencing motion of two pneumatic cylinder (a) by cascading (b) by using a sequence valve (c) by using a microprocessor
7. Circuits for deceleration motion of hydraulic cylinder.
8. Circuits for Measurement of pressure of air/oil in fluid power system.
9. Circuits for Measurement of flow rate in a fluid power system.

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(ME05056) AUTOMOBILE ENGINEERING

UNIT – I

Introduction : Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft..

UNIT – II

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

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

UNIT – III

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

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

Unit – IV : Emission from Automobiles – Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection.

UNIT – V

Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – VI

Transmission System : Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter.

Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – VII

Steering System : Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – VIII

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

Braking System : Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS:

1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kripal Sing.
2. Automotive Mechanics / G.B.S. Narang

REFERENCES :

1. Automotive Engineering / Newton Steeds & Garrett
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.

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(ME05054) AUTOMATION IN MANUFACTURING

(ELECTIVE – III)

UNIT – I

Introduction Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.

UNIT – II

Automated flow lines : Methods of work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – III

Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – IV

Assembly system and line balancing : Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – V

Automated material handling : Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

UNIT -VI

Automated storage systems, Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – VII

Adaptive control systems : Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

UNIT – VIII

Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Prototyping.

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing / M.P. Groover./ Pearson Edu.

REFERENCES :

1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

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**(MP05492) PRODUCTION PLANNING AND CONTROL
(Elective – III)**

UNIT – I

Introduction : Definition – Objectives of production Planning and Control – Functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

UNIT – II

Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

UNIT – III

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P-Systems and Q-Systems

UNIT – IV

Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT – V

Routing – Definition – Routing procedure – Route sheets – Bill of material – Factors affecting routing procedure. Schedule – definition – Difference with loading

UNIT – VI

Scheduling Policies – Techniques, Standard scheduling methods,

UNIT – VII

Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

UNIT – VIII

Dispatching – Activities of dispatcher – Dispatching procedure – followup – definition – Reason for existence of functions – types of followup, applications of computer in production planning and control.

TEXT BOOKS:

1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production / Operations Management / Baffa & Rakesh Sarin.

REFERENCES :

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
3. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.
4. Production Control A Quantitative Approach / John E. Biegel.
5. Production Control / Moore.
6. Operations Management / Joseph Monks.

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**(CS05308) INDUSTRIAL ELECTRONICS
(Elective – III)**

UNIT I**DC AMPLIFIERS:**

Need for DC amplifiers, DC amplifiers—Drift, Causes, Darlington Emitter Follower, Cascode amplifier, Stabilization, Differential amplifiers—Chopper stabilization, Operational Amplifiers, Ideal specifications of Operational Amplifiers, Instrumentation Amplifiers.

UNIT II**REGULATED POWER SUPPLIES:**

Block diagram, Principle of voltage regulation, Series and Shunt type Linear Voltage Regulators, Protection Techniques— Short Circuit, Over voltage and Thermal Protection.

UNIT III**SWITCHED MODE & IC REGULATORS :**

Switched Mode voltage regulator, Comparison of Linear and Switched Mode Voltage Regulators, Servo Voltage Stabilizer, monolithic voltage regulators Fixed and Adjustable IC Voltage regulators, 3-terminal Voltage regulators—Current boosting

UNIT IV**SCR AND THYRISTOR:**

Principles of operation and characteristics of SCR, Triggering of Thyristors, Commutation Techniques of Thyristors—Classes A, B, C, D, E and F, Ratings of SCR.

UNIT V**APPLICATIONS OF SCR IN POWER CONTROL:**

Static circuit breaker, Protection of SCR, Inverters—Classification, Single Phase inverters, Converters – single phase Half wave and Full wave.

UNIT VI**DIAC, TRIAC AND THYRISTOR APPLICATIONS:**

Chopper circuits – Principle, methods and Configurations, Diac and Triac,
Triacs – Triggering modes, Firing Circuits, Commutation.

UNIT VII**INDUSTRIAL APPLICATIONS - I**

Industrial timers -Classification, types, Electronic Timers – Classification, RC and Digital timers, Time base Generators.
Electric Welding – Classification, types and methods of Resistance and ARC welding, Electronic DC Motor Control.

UNIT VIII**INDUSTRIAL APPLICATIONS - II**

High Frequency heating – principle, merits, applications, High frequency Source for Induction heating.
Dielectric Heating – principle, material properties, Electrodes and their Coupling to RF generator, Thermal losses and Applications.
Ultrasonics – Generation and Applications.

TEXT BOOKS:

1. Industrial and Power Electronics – G.K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.
2. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.

REFERENCES :

1. Electronic Devices and circuits – Theodore.H.Bogart, Pearson Education, 6th Edn., 2003.
2. Thyristors and applications – M. Rammurthy, East-West Press, 1977.
3. Integrated Circuits and Semiconductor Devices – Deboo and Burroughs, ISE.

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**(EE05425) NEURAL NETWORKS & FUZZY LOGIC
(Elective-IV)**

Unit – I: Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit- II: Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

Unit–III: Single Layer Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

Unit- IV: Multilayer Feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Unit V: Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Unit – VI: Classical & Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT VII: Fuzzy Logic System Components

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT VIII: Applications

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zurada, Jaico Publishing House, 1997.

REFERENCES:

1. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. Yadaiah and S. Bapi Raju, Pearson Education
2. Neural Networks – James A Freeman and Davis Skapura, Pearson, 2002.
3. Neural Networks – Simon Hykins , Pearson Education
4. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
5. Neural Networks and Fuzzy Logic System by Bork Kosk, PHI Publications.

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(CS05362) MATHEMATICAL MODELING & SIMULATION

(Elective – IV)

Unit – I:

Art of Modeling, Types of models, mathematical models – solution methods – analytical, Numerical and Heuristic. L.P.P. – Formulation – Graphical Method, simplex method, dual simplex method and application.

Unit – II:

Transportation models – Assignment models, Integer programming, Non-linear programming.

Unit – III:

Deterministic Inventory models – General Inventory model, Static E.O.Q. Models, Dynamic Inventory model, Probabilistic Inventory models, continuous Review models, single period model and multiple period model.

Unit – IV:

Selective Inventory control – ABC, VED, FSN Analysis. Inventory systems – Fixed order quantity system, two bin system, periodic review systems, Optional Replenishment system and M R P.

Unit – V:

Queuing Theory – Basic Structure of Queuing Models, Role of Exponential Distribution, Birth-and-Death Process, Queuing Models Based on the Birth-and-Death Process, Queuing Models involving Non-exponential Distributions, Priority-Discipline Queuing Models and Queuing Networks. Applications of Queuing Theory – Decision Making, Formulation of Waiting – Cost Function and Decision Models.

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Unit – VI:

CPM and PERT – Network Representation, Critical path calculation, construction of Time schedule.

Unit – VII:

Simulation – Introduction, General principles, Random-Number Generation, Random-Variate Generation, Simulation Software.

Unit – VIII:

Input modeling, verification and validation of simulation models, Output Analysis for a single model, Comparison and Evaluation of Alternative System Designs, Simulation of Computer Systems.

TEXT BOOKS:

- 1) Introduction to Operations Research, Frederick S Hiller and Gerald J Lieberman, 7th Edition, Tata McGrawHill, 2001 (Chapters 17 and 18 for Unit-III).
- 2) Discrete-Event System Simulation, Jerry Banks, John S Carson II, Barry L. Nelson and David M. Nicol, 3rd edition, PHI/Pearson Education (Chapters 1,3,4,7 and 8 for Unit-IV; Chapters 9,10,11,12 and 14 for Unit-V).

REFERENCES:

- 1) Operation Research – S.K.Jain and D. M. Mehta, Galgotia.
- 2) Introductory Operations Research: Theory & Applications, Kasana, Springer.
- 3) Operations Research – An Introduction, 7th edition, Prentice-Hall of India, 1999 (Chapter 1 to 5 for Unit-I and Chapters 11 and 16 for Unit II, Section 6.7 for Unit-IV).

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(HS05233) ENTREPRENEURSHIP

(Elective - IV)

Unit I Introduction to Entrepreneurship:

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

Unit II Creating and Starting the venture:

Sources of new ideas, methods of generating ideas, creating problem solving, product planning and development process.

Unit III The Business Plan:

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

Unit IV Financing and Managing the new venture :

Sources of capital, Record keeping, recruitment, motivating and leading teams, financial controls. Marketing and sales controls. E-commerce and entrepreneurship, Internet advertising.

Unit V New venture Expansion Strategies and Issues:

Features and evaluation of Joint ventures, acquisitions, mergers, franchising. Public issues, rights issues, bonus issues and stock splits.

Unit VI Institutional support to entrepreneurs:

Role of Directorate of Industries, District Industries Centres (DICs), Industrial Development Corporation (IDC), State Financial Corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi and Village Industries Commission (KVIC), Technical Consultancy Organisation (TCO), Small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI)

Unit VII Production and Marketing Management:

Thrust areas of production management, Selection of production Techniques, Plant utilization and maintenance, Designing the work place, Inventory control , material handling and quality control.

Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing.

Unit VIII

Labour legislation, Salient Provisions under Indian Factories Act, Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and Payment of Bonus Act.

This course replaces the course offered in earlier years as '*Entrepreneurship & Management*'.

TEXT BOOKS:

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

REFERENCES:

1. Vasant Desai: Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship, HBR Paper Back, 1999.
3. Robert J. Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The entrepreneurial Connection, TMH, 2001.
5. Bolton & Thompson: Entrepreneurs—Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal: Indian Economy, Wishwa Prakashan 2005.
7. Dutt & Sundaram: Indian Economy, S. Chand, 2005
8. Srivastava: Industrial Relations & Labour Laws, Vikas, 2005.
9. Aruna Kaulgud: Entrepreneurship Management by, Vikas publishing house, 2003.
10. Thomas W. Zimmerer & Norman M. Scarborough: Essential of Entrepreneurship and small business management, PHI, 4/e, 2005.
11. Mary Coulter: Entrepreneurship in Action, PHI, 2/e, 2005.
12. Kaplan: Patterns of Entrepreneurship, Wiley, 2005.
13. ND Kapoor: Industrial Law, Sultan Chand & Sons, 2005.