

ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

MECHANICAL (PRODUCTION) ENGINEERING

Shon

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 (PRODUCTION) 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	21	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

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COURSE STRUCTURE

II Year		II Semester			
CODE	SUBJECT	T	P	C	
MA05476	Probability & Statistics	4+1*	0	4	
EC05069	Basic Electronics	4+1*	0	4	
MM05392	Metallurgy & Material Science	4+1*	0	4	
CE05239	Environmental Studies	4+1*	0	4	
ME05255	Fluid Mechanics & Heat Transfer	4+1*	0	4	
ME05348	Machine Tools	4+1*	0	4	
MT05394	Metallurgy and Thermal Engineering Lab	0	3	2	
ME05350	Machine Tools Lab	0	3	2	
TOTAL		30	6	28	

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COURSE STRUCTURE

III Year		II Semester			
CODE	SUBJECT	T	P	C	
HS 05311	Industrial Management	4+1*	0	4	
ME05184	Dynamics of Machinery	4+1*	0	4	
ME05165	Design of Machine members - II	4+1*	0	4	
ME05553	Tool Design	4+1*	0	4	
MP05265	Foundry & Welding	4+1*	0	4	
MP05384	Metal Forming	4+1*	0	4	
MP05266	Foundry & Welding Lab	0	3	2	
MP05385	Metal Forming & Instrumentation Lab	0	3	2	
TOTAL		30	6	28	

III Year

I Semester

CODE	SUBJECT	T	P	C	
HS05353	Managerial Economics & Financial Analysis	4+1*	0	4	
EE05323	Instrumentation & Control Systems	4+1*	0	4	
ME05461	Power Plant & Turbo Machinery	4+1*	0	4	
ME05339	Kinematics of Machinery	4+1*	0	4	
ME05164	Design of Machine Members - I	4+1*	0	4	
ME05396	Metrology & Quality Control	4+1	0	4	
ME05261	Fluids & Hydraulic Machines & Heat Transfer Lab	0	3	2	
ME05397	Metrology & Quality Control Lab	0	3	2	
TOTAL		30	6	28	

IV Year

I Semester

CODE	SUBJECT	T	P	C	
ME05436	Operations Research	4+1*	0	4	
ME05108	CAD/CAM	4+1*	0	4	
MC05379	Mechatronics	4+1*	0	4	
MP05492	Production Planning & Control	4+1*	0	4	
ELECTIVE-I		4+1*	0	4	
ME05347	Machine Tool Design	-	-	-	
MP05013	Advanced Metal Casting	-	-	-	
ME05427	Non Conventional Sources of Energy	-	-	-	
ELECTIVE-II		4+1*	0	4	
EE05425	Neural Networks & Fuzzy Logic	-	-	-	
MC05148	Concurrent Engineering	-	-	-	
ME05248	Finite Element Method	-	-	-	
ME05110	CAD/CAM Lab	0	3	2	
ME05491	Production Drawing Practice and Mechatronics Lab	0	3	2	
TOTAL		30	6	28	

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COURSE STRUCTURE

IV Year		II Semester		
CODE	SUBJECT	T	P	C
ME05056	Automobile Engineering	4 +1*	0	4
	ELECTIVE –III	4 +1*	0	4
ME05565	Unconventional Machining Processes	-	-	-
ME05054	Automation in Manufacturing	-	-	-
EI05351	Management Information Systems	-	-	-
	ELECTIVE-IV	4 +1*	0	4
ME05554	Total Quality Management	-	-	-
ME05507	Robotics	-	-	-
CS05137	Computer Graphics	-	-	-
CA05495	Project Work	0	0	12
CA05515	Seminar	0	0	2
CA05315	Industry Oriented Mini Project	0	0	2
TOTAL		15	0	28

Note: T=Theory; P=Practical; * = Tutorial; D=Drawing; C=Credits

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

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I Year B.Tech. MP

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(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 TEXT BOOK 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 :

- To promote the language proficiency of the students with emphasis on improving their LSRW skills.
- To impart training to the students through the syllabus and its theoretical and practical components.
- 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

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**, Renvolucit Mario, Cambridge University Press.

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.Vijayar, 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, Sankaralah, VGS Book Links, Hyderabad.

HYDERABAD

I Year B.Tech. MP

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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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD (A.P.)

I Year B.Tech. MP

T P C
2 0 4**(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, Ozonation. 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 Brakish 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 Spinning. 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- Tropsh 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

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 Balararam 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 basic 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 Curvilinear 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. Bharikati & J.G. Rajasekharappa

REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD (A.P.)

I Year B.Tech. MP

T P C
2+2 0 4**(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.

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(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

- a) Conic Sections including the Rectangular Hyperbola – General method only.
- b) Cycloid, Epicycloid and Hypocycloid
- c) 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 :

1. Engineering Drawing, N.D. Bhat / Charotar

REFERENCES:

1. Engineering Drawing Narayana and Kanniah / Scietech publishers.
2. Engineering Drawing and Graphics, Venugopal / New age.

(ME05228) ENGINEERING PHYSICS 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. Meade'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 marten's 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

(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
- Doring's 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, Blake 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 that evaluates the following algebraic expressions after reading necessary values from the user:
 - a) $ax+b/ax-b$
 - b) $2.5 \log x + \cos 320 + |x^2 - y^2| + v \cdot 2xy$
 - c) $1/\alpha^2$? c) $1/2\Omega\sigma^2$
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 1-100-5.0101-2005.07.5201-3007.510.0 Above 300 10.015.0
 Write a C program using switch and If statements to complete the net amount to be paid by a customer.

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(ME05230) ENGINEERING WORKSHOP PRACTICE

- $$\begin{aligned} 9x+1+2x^2+4x^3 &= 20 \\ x+1+10x^2+4x^3 &= 6 \\ 2x-4x^2+10x^3 &= -15. \end{aligned}$$

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)

II TRADES FOR DEMONSTRATION & EXPOSURE:

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, Sankaralah, 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 Ferdinand L. Singer Longman.

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(EEE05192) ELECTRICAL ENGINEERING

UNIT – I BASIC CONCEPTS

I Units - Ohm's law, series, and parallel circuits, Kirchhoff's 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 Jrwin; Pearson Education.

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(ME05550) THERMAL SCIENCES

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 BOOK :

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
- Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- Title boxes, their size, location and details - common abbreviations and their liberal usage
- 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.
 - Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
 - Keys, cottered joints and knuckle joint.
 - Riveted joints for plates
 - Shaft coupling, spigot and socket pipe joint.
 - 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.
 - Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
 - Other machine parts - Screws/jacks, Machine Vices Plummer block, Tailstock.
 - 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.Kanniah & 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 kenizer 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; Other wise 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) Brinell's 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 Kreyzig, John Wiley and Sons (ASIA) Pvt. Ltd., 2001.
3. Probability and Statistics for Engineers: G.S.S.Bhishma Rao,sitech., Second edition 2005.

(EC05069) BASIC ELECTRONICS**UNIT I****Semiconductor materials and Junction diodes**

Classification of solids, energy levels, intrinsic and extrinsic semiconductor, conduction in metals and semiconductors.

Semiconductor diodes : Diode under forward bias condition, diode under reverse bias condition, current-voltage characteristics of PN junction diode, Diode as a switch, as a rectifier, Half wave rectifier, Full wave rectifier, Rectifier with filters.

UNIT II**BJT and FETs**

Bipolar Junction Transistor structure, principle of operation of npn and pnp transistor, Transistor (BJT) configurations CB, CE, CC. Relation between I_C , I_B and I_E currents – Input and output characteristics of BJT – Junction Field Effect Transistor : Physical structure, principle of operation, current-voltage characteristics, JFET configuration as CS, CD & CG.

UNIT III**SCR and Thyristor**

Principles of operation and characteristics of SCR, Triggering of SCR, Diac and Triac, Thyristor characteristics, phase controlled half and full wave rectification.

UNIT IV**Feedback Amplifiers**

Feedback principles, advantages of negative feedback amplifier, feedback amplifier topologies, analysis, effect of negative feedback on R_i , R_o , A_v and A_i of an amplifier.

UNIT V**Oscillators**

Classification of oscillators, principle of feedback oscillator, Barkhausen's criterion, RC phase shift oscillator, Hartley and Colpitts oscillators.

UNIT VI

Basic Timer Circuits, Applications, welding control, Resistance welding, Energy storage welding.

UNIT VII

Induction and Dielectric heating, Ultrasonic generators and applications, Cathode Ray tube of CRO, simple applications.

UNIT VIII**8085 Microprocessors**

Brief overview of 8085's architecture, A to D and D to A converter circuits and applications.

TEXT BOOKS

1. Electronic Devices and Circuits – J. Millman and C.C. Halkias, TMH, 1998.
2. Industrial Electronics – G.K. Mithal, Khanna Publications, 19th Edn., 2003.

REFERENCES

1. Electronic Devices and Circuits – K. Lal Kishore, B.S. Publications, 2nd edition, 2005.
2. Basic Electronics – Sedha and Mithal, S. Chand & Co.
3. Thyristors and Applications – M. Ram Murthy, East-West Press, 1977.
4. 8085 Microprocessors and Interfacing – R.S. Goankar.

(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 Rothery's rules, intermediate alloy phases, and electron compounds.

UNIT -III

Equilibrium 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 – V

Heat 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.

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, cermets, 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.

(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:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. 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 :

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

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

UNIT - 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.

TEXT BOOK :

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

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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 conduction 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, Kirchhoff, 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 Wiley & Sons
4. Engineering Fluid Mechanics by K.L.Kumar, S.Chand & Co.

(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.

Kinematics schemes of machine tools – Constructional features of speed gearbox 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.Elanchezian and M. Vijayan / Anuradha Agencies Publishers.

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(MT05394) METALLURGY AND THERMAL ENGG 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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(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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(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. Ayrasir: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
 2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

(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 – Bubble 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 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
5. Instrumentation & mech. Measurements by A.K. Tayal , Galgotia Publications.

(ME05461) POWER PLANT AND TURBO MACHINERY**UNIT – I**

Fuels, combustion Equation, Stoichiometry, Exhaust and flue gas analysis, calorific value of fuels

Steam Power Plant : Schematic layout – Rankine cycle- methods to improve cycle performance – Regeneration & Reheating- Combined cycle

UNIT – II

Boilers – Classification – Working principles –Boilers with sketches including H.P. Boilers – Mountings and Accessories – Need for and Working principles – Performance of Boilers-Boiler horse power, equivalent evaporation, efficiency and heat balance – Draught, classification –Natural:- Chimney- height of chimney for given draught and discharge- condition for maximum discharge- efficiency of chimney; Artificial draught- induced and forced.

UNIT – III

Steam condensers: Requirements of steam condensing plant – classification of condensers- Jet, Surface condensers– working principles– vacuum efficiency and condenser efficiency – Air leakage- its sources and effects, Air pump- Cooling water requirement.

UNIT – IV

Steam Nozzles : Functions of nozzle, applications & types, flow through nozzles- thermodynamic analysis- velocity of nozzle at exit, Ideal and actual expansion in nozzle, velocity coefficient- condition for maximum discharge- critical pressure ratio, criteria to decide nozzle shape, super saturated flow-its effects, degree of super saturation and degree of under cooling, Wilson line.

UNIT – V

Steam Turbines : Classification – Impulse turbine: mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blading or diagram efficiency – condition for maximum efficiency. De-Laval turbine- its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity variation along the flow – combined velocity diagram for a velocity compounded impulse turbine. Reaction Turbine: Mechanical details – principle of operation- thermodynamic analysis, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency.

UNIT – VI**Dynamic Compressors:**

Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation- velocity diagrams – power requirements; Energy transfer- impeller blade shape-losses & isentropic efficiency, slip factor, power input factor, pressure coefficient and adiabatic coefficient

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage, degree of reaction, work done factor, isentropic efficiency- polytropic efficiency- pressure rise calculations

UNIT – VII

Gas Turbines: Simple gas turbine plant –essential components – classification- constant pressure open and closed cycles– Ideal cycle- actual cycle – regeneration, inter cooling and reheating – effect on power and economy – closed and semi closed cycles – merits and demerits, combustion chambers – requirements of combustion chambers and types.

UNIT – VIII

Jet Propulsion: Principle of Operation – classifications- Turbo jet engines & other Jet Engines— Needs and Demands of Turbo jet – Schematic Diagram- Thermodynamic analysis- Performance Evaluation- Thrust, Thrust Power and Propulsion Efficiency, Thrust Augmentation.

Rockets: Applications – Working Principles – Classifications based on Propellant Type– Solid and Liquid propellant Rocket Engines – Thrust and Effective jet exit velocity, Propulsive Efficiency – Specific Impulse.

TEXT BOOKS:

1. Thermal Engineering / Rajput / Lakshmi Publications
2. Gas Turbines – Ganesan, TMH

REFERENCES:

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
2. Gas Turbines and Propulsive Systems/ P.R. Khajuria & S.P.Dubey /Dhanpat Rai Publications

(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 – from 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 Machines R. 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 Dukupati / New Age
5. The theory of Machines /Shigley/ Oxford.

(ME05164) DESIGN OF MACHINE MEMBERS - I**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 – factor 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 – eccentric loading

UNIT – IV

Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – both of uniform strength, different seals

UNIT – V**KEYS, COTTERS AND KNUCKLE JOINTS :**

Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints-Knuckle joints.

UNIT – VI

SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary & rotary)

UNIT – VII

SHAFT COUPLING : Rigid couplings – Muft, Split muft and Flange couplings. Flexible couplings – Flange coupling (Modified).

UNIT – VIII**Mechanical Springs:**

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

NOTE : Design Data books are not permitted in the Examinations. The design must not only satisfy strength criteria but also rigidity criteria.

TEXT BOOKS :

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

REFERENCES :

1. Design of Machine Elements / V.M. Faïres
2. Machine design / Schaum Series.
3. Machine design – Pandya & shah.

(ME05396) METROLOGY & QUALITY CONTROL**UNIT – I**

Systems of limits and fits : Introduction, normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain ad screwed work.

Liner measurement Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

UNIT – II

MEASUREMENT OF ANGLES AND TAPERS : Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

LIMIT GAUGES : Taylors principle – Design of go and No go gauges, plug ring, snap, gap, taper, profile and position gauges.

OPTICAL MEASURING INSTRUMENTS : Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.

UNIT – III

FLAT SURFACE MEASUREMENT : Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.

SURFACE ROUGHNESS MEASUREMENT : Differences between surface roughness and surface waviness – Numerical assessment of surface finish – CLA, R, R.M.S Values – R_z values, R_z value, Methods of measurement of surface finish – profilograph. Talysurf, ISI symbols for indication of surface finish.

UNIT – IV

MEASUREMENT THROUGH COMPARATORS : Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

SCREW THREAD MEASUREMENT : Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

UNIT - V

Machine Tool Alignment Tests: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools.. Preparation of acceptance charts.

UNIT- VI

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

UNIT – VII

Quality control: Concept of Quality, values of quality, Statistical Quality Control – Mean and Standard Deviation. Process Capability, Capability. Control Charts for variables and Attributes X-, R- charts.

UNIT – VIII

Acceptance Sampling Plan. Single, Double and Sequential Sampling, AQL, LTPD < concept of AOQL and Rectification Plans.

TEXT BOOKS :

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Engineering Metrology / R.K. Jain / Khanna Publishers

REFERENCES :

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson

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(ME05261) FLUIDS AND HYDRAULIC MACHINES

HEAT TRANSFER LAB

1. Impact of jet on vanes
2. Performance test on single stage centrifugal pump
3. Performance test on reciprocating pump
4. Performance and Specific speed test on Pelton wheel (or Turbo Wheel)
5. Performance and specific speed test on Francis Turbine
6. Performance and specific speed test on Kaplan Turbine
7. Performance test on multi stage pump
8. Suitability test on centrifugal pump
9. Drag and Lift Coefficients of an Aerofoil model.

Any five of the above experiments are to be covered.

(B) 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.

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(ME05397) METROLOGY AND QUALITY CONTROL LAB

1. Measurement of length, height diameters by vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier callipers and checking the chordal addendum and height of spur gear.
4. Machine tool alignment of test on the lathe.
5. Machine tool alignment test on milling machine.
6. Tool makers microscope and its application
7. Angle and taper measurement by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by tool makers Microscope / two wire, there wire method.
10. Surface roughness measurement by Taly Surf.I
11. Mean & Stander Deviation of Turned Components (atleast 30 specimen are to be turned keeping all machining parameters constant)
12. Mean & Stander Deviation of Drilled Components (atleast 30 specimen are to be Drilled keeping all machining parameters constant)
13. Process capability studies of lathe machine using results secured from exercise 11.
14. Process capability studies of drilling machine using results secured from exercise.

(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, Herzberg'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 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, 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. Ravshankar, 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 McGraw-Hill, 2002.

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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 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 Duddipati / 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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(ME05165) DESIGN OF MACHINE MEMBERS –II**UNIT – I**

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 – II**ENGINE PARTS :**

Connecting Rod : Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and Crank shafts, strength and proportions of over hung and center cranks – Crank pins, Crank shafts.

UNIT –III

Pistons, Forces acting on piston – Construction Design and proportions of piston., Cylinder, Cylinder liners,

UNIT – IV

Design of curved beams: introduction, stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C–clamps.

UNIT – V

POWER TRANSMISSIONS SYSTEMS, 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 – VI

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.

UNIT – VII

Design of power screws: design of screw, Square ACME , Buttress, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT – VIII

Machine Tool Elements: Design of beds, slide ways, spindles- material selection, design of strength and rigidity of parts.

NOTE : Design Data Book Permitted

Design of all components should include design for strength and rigidity apart from engineering performance requirements.

TEXT BOOK:

1. Machine Design /P.Kannaiah , scitech publications

REFERENCES :

1. Machine Design / R.N. Norton
2. Machine Design / Sarma and Agarwal
3. Machine Design / V.V. Bhandari
4. Data Books : (i) P.S.G. College of Technology (ii) Mahadevan
5. Mech. Engg. Design / JE Shigley

(ME05553) TOOL DESIGN**UNIT – I**

Cutting tool materials - Cutting tool materials, desired properties. Types, major Constituent, relative characteristics, latest development, ISO : classification. Applications, ceramics, cermets, selection of tools for various metals to be cut, properties.

UNIT - II

Geometry of single point cutting tool. Influence of each geometrical parameters on the cutting tool performance. Factors involved in their selection. Tool signature and geometry in MRS, ORS, NRS. Cutting forms and design features of HSS and carbide tipped tools. Feature of high production cutting tools. Chipbreakers and their types.

UNIT – III

Form tools and multi point cutting tools.

Form tools : Radial and tangentials flat and circular. Form correction and tool holding methods.

Drill Geometry : Variation of rake and clearance angles along tips, effect and geometrical parameters on thrust and torque effect of feed rate on rake and clearance, web thinning. Types of drill points, Grinding of drills.

Milling Cutters : Major types, geometry of peripheral, end land face milling cutters. Profile sharpened and form relieved expression for minimum number and clearance, web thinning. Types of drill points, Grinding of drills.

UNIT - IV

Milling Cutters : Major types, geometry of peripheral, end land face milling cutters. Profile sharpened and form relieved expression for minimum number of teeth. Design features, forces and power estimation. Grinding of milling cutters.

Reamers : Types. Geometry. Reaming allowance. Design features tolerance disposition.

Broaches : Pull and push types. Internal and External broaches geometry and design features. Pull force estimation, Keyway. Splines. Round. Square broaches.

UNIT – V**Press tools for sheet metal working :**

Blanking and piercing. Die set elements. Simple and progressive dies. Estimation of punch load, clearances. Centre of pressures. Strip layout. Methods of reducing punch load.

Bending dies : Spring back and bending allowance estimation of punch load.

UNIT – VI

Metal spinning : Configuration and design features of metal spinning, shear forming and flow forming and flow forming.

Drawing Dies : Punch load blank size. Number of draws. Methods of retaining metal in draw dies. Metal flow during drawing.

Design of metal forming dies for piercing, blanking, bending, drawing, spinning and forging dies, materials and treatments used.

UNIT – VII

Jigs & Fixtures : Design principles and construction features. Locating methods associated with flat Cylindrical internal and external surfaces. Types of locating pins Requirements and choice of locating systems. Redundant location. Tool proofing. Setting blocks. Types of clamping devices and their basic elements. Quick action clamps and nuts. Equalising and multiple clamping pneumatic Hydraulic. Magnetic and vacuum clamping. Types of drill jigs and their classification. Types of jig bushes. Jig feet. Indexing jigs. Economic analysis of Jigs and Fixtures. Economic tool life for minimum cost maximum production and max profit rate.

UNIT – VIII

Miscellaneous tools : Cam design for single spindle automatics for simple components. Tool layout Estimation of cycle. Time Gauge design : Taylor's principle. Limit gauges for holes and shafts. Estimation of limits on Go and No Go gauges. Forgoing dies : Draft, parting line Filters. Allowances, sequence in multiple impression forging. Flashing. Trimming.

Plastic Tools : Application of plastic as tooling material viz., for Gauges, surface plates, jigs and fixtures Forming dies.

TEXT BOOKS :

1. Donaldson, Leain and Gould, Tool Design, Tata Mc Graw Hill, New Delhi, 1983.
2. Tool Design – Mehra

REFERENCES :

1. Surendra Kenav and Umesh Chandra, Production Engineering Design (Tool Design) Satyaprakashan, New Delhi 1994.
2. Arniabha Battacharya and Inyong Ham, Design of cutting Tools. Use of Metal Cutting Theory. ASTM publication Michigan USA., 1969.
3. A Bhattacharya, Principles of Metal cutting, New Central Book Agency, Calcutta.

UNIT – I

CASTING : Steps involved in making a casting – Advantage of casting and its applications – Types of Foundry – Foundry layout – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction.

UNIT- II

Moulding Process : Different moulding processes, various methods of moulding – machine moulding – core making and types of cores – sand testing.

UNIT – III

Methods of melting : Crucible melting and cupola operation – Defects in castings – Types of casting processes – Centrifugal casting, die-casting etc. Investment casting, shell moulding etc.

UNIT -IV

Principles of Gating – Requirements – Types of gates, Design of gating system – Riser- Function, types of Riser and Riser design. Solidification of casting – Concept – Solidification of pure metal – Nucleation and grain growth, casting design considerations.

UNIT – V

History and development of welding, basic requirements – classification of welding process – Types of welds and welded joints – characteristics of groove and fillet welds – Design of welded joints.

Welding Process : Arc welding, gas welding, forge welding – Resistance welding, Thermit welding, spot welding.

UNIT – VI

Braze welding- welding of plastics-Adhesive bonding-Economics of Welding, Welding costs – standard time for arc welding, gas welding and oxa-fuel gas cutting standard time and cost calculations.

UNIT – VII

PLASTICS : Classification Raw materials Plastics as engineering materials – Method of processing plastics – Compression moulding, Transfer moulding, Injection moulding Blow moulding – Vacuum forming.

UNIT-VIII

PODER METALLURGY : Basic Process – Methods of producing metal powders – milling – atomisation – Granulation – Reduction – Electrolytic Deposition – Methods of manufacturing sintered parts – Factors determining the use of powder metallurgy – Application of this process.

Sintering Secondary operations – Sizing, Coining and machining.

TEXT BOOKS :

1. Welding Engineering and Technology by Dr. R.S. Parmar
2. Manufacturing Technology – P.N.Rao

REFERENCES :

1. Production Technology by H.M.T.
2. Production Technology by R.K. Jain
3. Welding technology by O.P.Khanna.
4. Principles of Metal Castings by Hiene & Roenthal

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(MP05384) METAL FORMING

UNIT-I

Plasticity – True stress strain diagrams in simple tension – Deviation from Engineering stress – Strain curves. Three dimensional stress system, strain tensor and yield Criteria of metals.

UNIT-II

Fundamentals of metal forming – Classification of forming processes – Cold working – Recovery – Recrystallisation and grain growth, hot working. Strain rate effects – work of plastic deformation.

UNIT-III

Flow stress curves – Super plasticity in materials – Hot working and cold working operation – Relative merits and applications.

UNIT-IV

Sheet metal working: Standard die sets, simple, compound, combination, progressive and transfer dies. Process parameters and estimation of loads in shearing, bending, deep drawing, shear spinning operations. Mechanical and hydraulic presses, relative merits and application – constructional features and operation.

UNIT-V

FORGING: Open die and closed die forging, machine forging, upset forging etc., forging loads, forging die design. Estimation of forging loads for rectangular and cylindrical slugs. Forgeability Tests. Defects in forging, Forging equipment – constructional features and operation.

UNIT-VI

ROLLING: Principles of rolling, Process parameters, Estimation of rolling loads by consideration of stresses. Principles of roll pass design for various product shapes. Principles of ring rolling. Processing maps and their applications in metal working operation. Rolling mills – Their constructional features and operation.

UNIT-VII

EXTRUSION: Classification of extrusion processes, extrusion equipment. Hot extrusion. Deformation and defects in extrusion. Analysis of the extrusion process, Cold extrusion. Extrusion of tubing and production of seamless pipe and tubing.

UNIT-VIII

DRAWING OF RODS, WIRES AND TUBES: Rod and wire drawing, tube drawing processes, Residual stresses in rod, wire and tubes.

TEXT BOOK:

1. G.E Dieter: Mechanical Metallurgy

REFERENCES

1. "An Introduction to the principles of Metal Working" by Geoffrey W. Rowe.
2. "Sheet working of Metals" by Eary and Reads.
3. "Manufacturing Sciences" by Amitabh Ghosh and Mallik.
4. "Manufacturing Technology" by P.N. Rao.

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0 3 2**(MP05266) FOUNDRY AND WELDING LAB****Foundry Lab :**

1. Pattern design and making for a given casting drawing.
2. Measuring properties of sand
 - (i) Green shear strength
 - (ii) Green compressor test
 - (iii) Dry shear strength
 - (iv) Dry compressor strength
 - (v) Green hardness number
 - (vi) Permeability test
 - (vii) Green fines number
3. Preparation of moulds using green sand
4. Melting of metals
5. Casting of given part.

Welding Lab :

1. Arc welding (Lap and butt joints – two exercises)
2. Spot welding
3. TIG welding
4. Plasma welding / Brazing
5. Process parameters in welding, heat effected zone and mechanical properties of weld joint.
6. Arc, Gas and Plasma cutting.

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0 3 2**(MP05385) METAL FORMING AND INSTRUMENTATION LAB**

1. Drawing of true stress and true strain diagrams from tensile test.
2. Blanking & Piercing operation and study of simple press tool.
3. Forces in blanking and piercing operations.
4. Design and drawing of a simple press tool for a certain size of blank or hole.
5. Design of deep drawing dies.
6. Design of extrusion dies.
7. Design of forging dies.
8. Design of Rolls.

INSTRUMENTATION LAB

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.

REFERENCE :

1. Metallography Laboratory Practice / George / KEHL

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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 BOOK :

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, Arthur Yaspian and Lawrence Friedman
3. Operations Research / R.Pannarselvam,PHI Publications.
4. Operations Research / Wagner/ PHI Publications.
5. Operation Research /J.K.Sharma/MacMillan.
6. Introduction to O.R/Hiller & Libermann (TMH).
7. O.R/Wayne L.Winston/Thomson Brooks/cole
8. Introduction to O.R /Taha/PHI

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. Graw 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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T P C
4+1 0 4**(MC05379) MECHATRONICS****Unit – I INTRODUCTION**

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

Unit – II SIGNAL CONDITIONING

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

Unit – III PRECISION MECHANICAL SYSTEMS

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

Unit – IV ELECTRONIC INTERFACE SUBSYSTEMS

TTL, CMOS interfacing - Sensor interfacing - Actuator interfacing – solenoids, motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers, over current sensing, resettable fuses, thermal dissipation - Power Supply - Bipolar transistors / mosfets

Unit – V ELECTROMECHANICAL DRIVES

Relays and Solenoids - Stepper Motors - DC brushed motors - DC brushless motors - DC servo motors - 4-quadrant servo drives, PWMs - Pulse Width Modulation - Variable Frequency Drives, Vector Drives - Drive System load calculation

Unit – VI MICROCONTROLLERS OVERVIEW

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

Unit – VII PROGRAMMABLE LOGIC CONTROLLERS

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

Unit – VIII PROGRAMMABLE MOTION CONTROLLERS

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

TEXT BOOKS :

- 1) Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.

REFERENCES :

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shannugam / Anuradha Agencies Publishers.

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(MP05492) PRODUCTION PLANNING AND CONTROL

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 Elton.
2. Modern Production / Operations Management / Bafra & 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.

(ME05347) MACHINE TOOL DESIGN

(Elective-I)

UNIT – I Introduction to Machine tool Drives and Mechanisms –

General Principles of Machine Tool Design: Working and Auxiliary Motions in Machine Tools. Parameters Defining Working Motions of a Machine Tool. Machine Tool Drives. Hydraulic Transmission and its Elements. Mechanical Transmission and its Elements. Techno-Economical Prerequisites for Undertaking the Design of New Machine Tool. General Requirements of Machine Tool Design. Engineering Design Process Applied to Machine Tools. Layout of Machine Tool.

UNIT – II Regulation of Speed and Feed Rates:

Aim of speed and feed rate regulation. Stepped regulation of Speed: Design of speed box. – Design of Feed Box – Machine Tool Drives using Multiple Speed Motions – Special Cases of Gear Box Design – General Recommendations for Developing the Gearing Diagram – Stepless Regulation of Speed and Feed Rates.

UNIT-III Design of Machine Tool Structures:

Function of Machine Tool Structures and their requirements – Design criteria for machine tool structures – Materials of machines Tools structures – Static and Dynamic stiffness – Profiles of machine tool structure – Basic Design procedures of machine tool structures – Design of Beds – Design of Columns – Design of Housings – Design of Bases and Tables – Design of Cross Rails, Arms, Saddles and carriages – Design of Rams – Model Technique in design in machine tool structures.

UNIT-IV Design of Guideways and Power Screws:

Functions and types of Guideways – Design of Slideways – Design criteria and calculations for slideways – Guideways operative under liquid friction conditions – Design of Aerostatic slideways – Design of Anti-Friction Guideways – Combination Guideways – Protecting devices for slideways – Design of power screws.

UNIT-V Design of Spindles and Spindle Supports :

Functions of Spindle Unit and requirements – Materials of Spindles – Effect of machine tool compliance on machining accuracy - Design calculations of spindles – Anti friction bearing – Sliding bearings.

UNIT-VI Dynamics of Machine tools

Machine tool elastic system-cutting process closed-loop system – general procedure for assessing dynamic stability of EES –cutting process closed-loop system – Dynamic characteristics of elements and systems - Dynamic characteristics of the equivalent elastic systems - Dynamic characteristics of the cutting process – Stability analysis – Forced vibrations of machine tools.

UNIT – VII Control systems in machine tools :

Functions, requirements and classification – Control systems for changing speeds and Feeds – Control systems for executing forming and Auxiliary motions – Manual control system – Automatic control systems – Adaptive control system.

UNIT-VIII Numerical control of machine tools : Fundamental concepts, classification and structure of numerical control systems – Manual part programming – Computer Added part programming. Various elements of a CNC machines – Drives used and their selection.

TEXT BOOKS :

1. Mehta N.K. Machine Tool Design, TMIL.
2. Sen G.S. & Bhattacharya, Principles of Machine Tools, New Central Book Agency, Calcutta – 1986.

REFERENCES :

1. Acherkan N, Machine Tool Design, Vol. 2 & 3 Mir publishers, Moscow, 1968.
2. Basu S.K., Design of Machine Tools, Allied Publisher, 1989
3. Koenigs Berger & Tlustý, Design of Machine Tools, Pergaman Press 1970
4. Russe W. Henke, Introductionto Fluid Power Circuits and systems, Addison Wesley, 1970

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(MP05013) ADVANCED METAL CASTING

(ELECTIVE – 1)

UNIT – I : Special types of cupolas – Hot blast cupola, water cooled – their construction and operations. Different types of Refractories – general requirements – Raw materials – Characteristics and application.

UNIT – II : Furnace classification – Open hearth, Electric arc induction furnace – steel converts – construction and operation special treatments of melts.

UNIT – III : Production of Ferrous castings – Gray iron, malleable iron casting Production of Ferrous castings –

UNIT – IV : Production of Non-Ferrous Casting – Aluminum, Copper and Magnesium base alloy castings.

UNIT – V : GATING AND CASTING DESIGN : Types and design of gating systems – Design and positioning of risers – gating ratio use of padding and chills – solidification of castings.

UNIT – VI : FINISHING OPERATIONS: Fetting, cleaning, finishing, Heat-treatment of castings, Salvaging of defective castings.

UNIT – VII : SPECIAL CASTING TECHNIQUES : Die castings – Permanent mould casting, CO₂, process shell moulding machines – melting and processing.

UNIT – VIII : Material handling equipment, defects in castings, Analysis of casting defects – Inspection and testing procedures (Destructive and NDT), Quality control & Quality Assurances

TEXT BOOKS

1. Principles of Metal Casting – Acme , Ioper and Rosenthal.
2. Metal Casting Principles and Practice T V Ramana Rao New age international (p) Ltd.

REFERENCES:

1. Foundry Engg. – Tawler, Flummings and Wultt.
2. Introduction of Foundry Technology – Ekey and Winter.
3. Foundry Technology – Lal and Khanna.

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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, farada'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 Kreith & 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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T P C
4+1 0 4**(EE05425) NEURAL NETWORKS & FUZZY LOGIC**

(Elective-II)

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 BOOK:

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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(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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(ME05248) FINITE ELEMENT METHOD

(Elective – II)

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 3D 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 BOOK :

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 / Me 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.

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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 beam.
 - 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, ISA, CAEFEM, Gibbs CAM, Master CAM etc,

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(ME05491) PRODUCTION DRAWING PRACTICE
AND MECHATRONICS LAB

Unit – I

Conventional representation of Materials – conventional representation of parts – screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

Unit – II Limits and Fits

Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

Unit – III Form and Positional Tolerances

Introduction and indication of the tolerances of form and position on drawings, deformation of runout and total runout and their indication.

Unit – IV Surface roughness and its indication

Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

Unit – V

Heat treatment and surface treatment symbols used on drawings.

Unit – VI Detailed / Pant drawings

Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

Mechatronics Laboratory (Experiments) (ME 4131) 3/2

(B) MECHATRONICS LAB

- Position, Velocity and Torque Control of DC Servo Motor using actual Programmable Motion Controller and XY position table.

- Point to Point Control, Linear and Circular Interpolation using actual Programmable Motion Controller and XY Position table and its simulation.
- Programmable Logic Controller programming in ladder Logic and Functional Block Diagram (FBD), interfacing of actual PLC with non servo motor, sensors using actual PLC and Simulation of the same.
- Interfacing of sensors, electro pneumatics and DC servo motors using actual Programmable Motion Controller and Programmable Logic Controller along with its simulation.
- 3D Robotic Simulation / Virtual Lab for Operation of 5 Axis + gripper, pick and place Robot, in manual mode (Teach pendant) and thru programming (Point to Point, Linear and Circular Interpolation)
- Building Circuits of Pneumatic and Electropneumatic circuits, Hydraulics and Electro Hydraulics circuits for automated systems using cross section simulation of the components.

(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, re boring, 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 toe in, 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.

(ME05565) UN-CONVENTIONAL MACHINING PROCESSES**(Elective – III)****UNIT – I**

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

UNIT II

Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT – III

Abrasive jet machining, Water jet machining and abrasive water jet machine : Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT - IV

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

UNIT - V

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

UNIT – VI

Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes –General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-VII

Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.
Chemical machining-principle- maskants –etchants- applications.

UNIT – VIII

Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining

TEXT BOOKS:

1. Advanced machining processes/ VK Jain/ Allied publishers

REFERENCES :

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

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HYDERABAD (A.P.)

IV Year B.Tech. MP II-SEM

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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 automation.

UNIT – II

Automated flow lines : Methods or 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 Proto typing.

TEXT BOOK :

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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(EI05351) MANAGEMENT INFORMATION SYSTEMS

(Elective – III)

Unit I :

Information systems in the enterprise : Why information systems, perspectives on information systems, contemporary approaches to information systems, four major types of systems in organizations-transaction processing systems, management information systems, decision support systems, executive support systems.

Unit II

Systems from a functional perspective- Sales and Marketing Systems, Manufacturing and Production Systems, Financial and Accounting Systems, Human Resources Systems. Integrating functions and business processes.

Unit III

The Digital Firm, Electronic Business and Electronic Commerce : Internet technology and the digital firm, categories of electronic commerce, customer centered retailing, business-to-business electronic commerce, commerce payments, electronic business, management opportunities, challenges and solutions.

Unit IV

The wireless revolution: business value of wireless networking, wireless transmission media and devices, cellular network standards and generations, wireless computer networks and internet access, M-commerce and Mobile computing, wireless technology in the enterprise.

Unit V

Security and control : system vulnerability and abuse, business value of security and control, establishing a management framework for security and control, technologies and tools for security and control.

Unit VI

Enterprise Applications and Business Process Systems : What are enterprise systems, How enterprise systems work, supply chain management systems, customer relationship management systems, enterprise integration trends.

Unit VII

Redesigning the organizations with information systems : systems as planned organizational change, business process reengineering and process improvement, overview of system development, alternative systems building approaches – traditional systems life cycle, prototyping, end-user development, application software package and outsourcing.

Unit VIII

Managing change and international information systems : The importance of change management in information systems success and failure, managing implementation, the growth of international systems, organizing international information systems, managing global systems, technology issues and opportunities for global value chains.

TEXT BOOK:

1. Kenneth. C. Laudon, Jane P. Laudon & VM Prasad: Management Information Systems, 9/e, Pearson Education, 2005.

REFERENCES :

1. Henry C.Lucas, Jr. Information Technology-Strategic Decision Making for Managers, John Wiley & Sons, Inc, 2005.
2. James A. O'Brien, Introduction to Information Systems, TMH, New Delhi, 2002.
3. Steven Alter, Information Systems, Pearson Education, Fourth Edition, 2004.
4. Effy Oz, Management Information Systems, Third Edition, Thomson, 2002.
5. W S Jawadekar, Management Information Systems, TMH, Second Edition, 2002.
6. Turban, Rainer, Potter, Information Technology, John Wiley & Sons, Inc, 2003.

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IV Year B.Tech. MP II-SEM

T P C
4+1 0 4**(ME05554) TOTAL QUALITY MANAGEMENT**

(Elective – IV)

UNIT – I

TQM – overview – History – Stages of Evolution - elements – definitions – continuous improvement – objectives – internal and external customers.

UNIT – II

Quality standards – Need of standardisation - Institutions – bodies of standardisation, ISO 9000 series – ISO 14000 series – other contemporary standards.

UNIT – III

Quality measurement systems (QMS) – developing and implementing QMS – non conformance database.

UNIT - IV

Problem Solving - Problem Solving process – corrective action – order of precedence – system failure analysis approach – flow chart – fault tree analysis – failure mode assessment and assignment matrix – organizing failure mode analysis – pedigree analysis.

UNIT – V

Quality circles – organization – focus team approach – statistical process control – process chart – Ishikawa diagram – preparing and using control charts.

UNIT VI

Quality Function Development (QFD) – elements of QFD – benchmarking – Taguchi Analysis – loss function - Taguchi design of experiments.

UNIT – VII

Value improvement elements – value improvement assessment – supplier teaming.

UNIT – VIII

Six sigma approach – application of six sigma approach to various industrial situations.

TEXT BOOK :

1. Total Quality Management – Joseph and Susan Berk.
2. Quality management by –Howard Gilrow-TMH

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IV Year B.Tech. MP II-SEM

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(ME05507) ROBOTICS

(Elective – IV)

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 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. Chaitonze / Kogam Page Ltd. 1983 London.
4. Robotic Engineering / Richard D. Klatner, 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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IV Year B.Tech. MP II-SEM	T P C
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(CS05137) COMPUTER GRAPHICS
(Elective-IV)

UNIT-I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices(p.nos 22-91 of text book-1).

UNIT-II

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms, attributes of line (p.nos 103-130,137-150,164-172 of text book-1, p.nos. 72-99 of text book-2).

UNIT-III

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems (p.nos 204-227 of text book-1).

UNIT-IV

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm(p.nos 237-250,257-262 of text book -1, p.nos. 111-126 of text book-2).

UNIT-V

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods. (p.nos 324-332,340-343, 347-365, 515-531, 542-547 of text book-1, p.nos 473-529,721-739 of text book-2).

UNIT-VI

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

3-D viewing : Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping (p.nos 427-445, 452-483 of text book -1).

UNIT-VII

Visible surface detection methods : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods, ray casting (p.nos 489-508 of text book -1, Chapter 15 of text book-2).

UNIT-VIII

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. (p.nos 604-617 of text book -1, chapter 21 of text book-2)

TEXT BOOKS :

1. "Computer Graphics C version", Donald Hearn and M.Pauline Baker, Pearson prentice Hall.

2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

REFERENCES:

1. "Computer Graphics Second edition", Zhigang xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition.
2. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
3. Principles of Computer Graphics – Shalini Govil and Pai Springer, 2004