JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Course structure for B.Tech. (Regular) I year (2009-10) for affiliated Engineering Colleges.

MECHANICAL ENGINEERING (M.E)
(Common for Branches: M.E., C.E, Bio-Tech., Aero.E.)

S.No	Course code	Subject	Th	Tu/Drg./Lab.	Credits
1.	9ABS101	English	2		4
2.	9ABS102	Engineering Physics	2		4
3.	9ABS103	Engineering Chemistry	2		4
4.	9ABS104	Mathematics – I	3	1 - -	6
5.	9A05101	Programming in C and Data Structures	3	1 - -	6
6.	9A03101	Engineering Drawing *		- 6 -	6
7.	9A01101	Engineering Mechanics	3	1 - -	6
8.	9A05102	C Programming & Data Structures Lab		- - 3	4
9.	9A03102	Engineering & I.T. Workshop #		- - 3	4
10.	9ABS106	Engineering Physics and Engineering Chemistry Lab **		- - 3	4
11.	9ABS107	English Language & Communication Skills Lab		- - 3	4
		contact periods/week	15	3 6 12	52
			Total contact periods/week	36	

Th = Theory; Tu = Tutorial; Drg = Drawing & Lab = Laboratory:

* Engineering Drawing will have University External Exam.

** The Students attend the Physics lab and Chemistry lab. in alternate week that is 3/2 per week. The end exam shall be conducted separately and average of the two exams will be recorded by the exam section

\# The Students attend Engineering and IT work shop as a single lab. every week and the end exam is conducted as a single lab. sharing the Maximum marks and time for one task from Engineering workshop and one from IT workshop. The sum of the marks awarded will be recorded

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

MECHANICAL ENGINEERING (M.E.)

B.Tech II - I Semester

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9ABS301	Mathematics -II	4			4
2.	9A01301	Mechanics of Solids	4			4
3.	9A02301	Electrical Engineering and Electronics Engineering	4			4
4.	9A03301	Materials Science and Engineering	4			4
5.	9A03302	Thermodynamics	4			4
6.	9A03303	Machine Drawing		6		4
7.	9A02302	Electrical Engineering Lab / Electronics Engineering Lab			3	2
8.	9A03304	Material Science Lab/ Mechanics of Solids Lab			3	2
		contact periods/week	20	6	6	28
			Total	32		

***NOTE:** In Electrical Engineering and Electronics Engineering two questions from each part should be chosen to answer five questions in the End semester examination.

The Students attend the Electrical Engineering lab and Electronics Engineering lab in alternate week that is 3/2 per week.
The Students attend the Material Science lab and Mechanics of Solids lab in alternate week that is 3/2 per week.
Machine Drawing will be 4 hrs End Exam

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

MECHANICAL ENGINEERING (M.E.)

B.Tech II - II Semester

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9ABS304	Probability and Statistics	4			4
2.	9ABS303	Environmental Science	4			4
3.	9A03401	Kinematics of Machinery	4			4
4.	9A03402	Thermal Engineering -I	4			4
5.	9A01404	Fluid Mechanics and Hydraulic Machinery	4			4
6.	9A03403	Manufacturing Technology	4			4
7.	9A01407	Fluid Mechanics and Hydraulic Machinery Lab			3	2
8.	9A03404	Manufacturing Technology Lab			3	2
		contact periods/week	24		6	28
			Total	30		

JAWAHARLAL NEHRU
TECHNOLOGICAL UNIVERSITY ANANTAPUR

MECHANICAL ENGINEERING (ME)
COURSE STRUCTURE

III B. Tech. – I Semester (ME)

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9AHS401	Managerial Economics and Financial Analysis	4			4
2.	9A03501	Thermal Engineering II	4			4
3.	9A03502	Dynamics of Machinery	4			4
4.	9A03503	Machine tools	4			4
5.	9A03504	Design of Machine Elements-I	4			4
6.	9A03505	Heat Transfer	4			4
7.	9A03506	Heat Transfer Lab			3	2
8.	9A03507	Thermal Engineering Lab			3	2
		contact periods/week	24		6	28
			Total	30		

III B. Tech. – II Semester (ME)

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9A03601	Industrial Management	4			4
2.	9A03602	CAD/CAM	4			4
3.	9A03603	Metrology	4			4
4.	9A03604	Refrigeration and Air Conditioning	4			4
5.	9A03605	Design of Machine Elements-II	4			4
6.	9A03606	Automobile Engineering	4			4
7.	9A03607	Metrology Lab & Machine Tools Lab			3/2 (each)	2
8.	9AHS601	Advanced English Communication Skills Lab			3	2
		contact periods/week	24		6	28

IV B. Tech. – I Semester (ME)

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9A03701	Operations Research	4			4
2.	9A03702	Automation & Robotics	4			4
3.	9A03703	Finite Element Methods	4			4
4.	9A03704	Instrumentation and Control Systems	4			4
5.	9A03705 9A03706 9A03707	**ELECTIVE –I** 1. Entrepreneurship 2. Computational Fluid Dynamics 3. Mechatronics	4			4
6.	9A03708 9A03709 9A03710	**ELECTIVE –II** 1. Modern Manufacturing Methods 2. Tool Design 3. Power Plant Engineering	4			4
7.	9A03711	Instrumentation and Control Systems Lab			3	2
8.	9A03712	CAD/CAM Lab			3	2
		TOTAL	24		6	28

IV B. Tech. – II Semester (ME)

S. No	Course code	Subject	Theory		Lab.	Credits
1.	9A03801	Production & Operations Management	4			4
2.	9A03802	Energy Systems	4			4
3.	9A03803 9A03804 9A03805	**ELECTIVE III** 1. Total Quality Management 2. Mechanical Vibrations 3. Gas Turbines and Jet Propulsion	4			4
4.	9A03806 9A03807 9A03808	**ELECTIVE IV** 1. Geometric Modeling 2. Composite Materials 3. Professional Ethics & Intellectual Property Rights	4			4
5.	9A03809	Seminar				2
6.	9A03810	Project Work				10
		TOTAL	24			28

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Detailed Syllabus

B.Tech. I Year (M.E.) **T P C**
2 0 4

(9ABS101) ENGLISH

1. INTRODUCTION :

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

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The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

2. OBJECTIVES:

a. To improve the language proficiency of the students in English with an emphasis on LSRW skills.
b. To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
c. To develop study skills as well as communication skills in formal and informal situations.

3. SYLLABUS :

Listening Skills:

Objectives

1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress , right intonation in connected speech.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills :

Objectives

1. To make students aware of the role of ability to speak fluent English and its contribution totheir success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions.

(Using exercises from all units of the prescribed text)

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- 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

The students shall be trained in reading skills using the prescribed text for detailed study. They shalll be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as articles from magazines/newspapers

Writing Skills:

Objectives

1. To develop an awareness in the students the skill to write exact and formal writing
2. To equip them with the components of different forms of writing.
   - Writing sentences
   - Use of appropriate vocabulary
   - Paragraph writing
   - Coherence and cohesiveness
   - Narration / description
   - Note Making
   - Formal and informal letter writing
   - 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 are prescribed and divided into Eight Units:

For Detailed study: **ENJOYING EVERYDAY ENGLISH**,
Sangam Books (India) Pvt Ltd, Hyderabad, 2009
For Non-detailed study: **INSPIRING LIVES**,
Maruti Publications, Guntur, 2009

Unit -I

a. Heaven's Gate from **ENJOYING EVERYDAY ENGLISH**
b. Mokshagundam Visvesaraya from **INSPIRING LIVES**

Unit -II

a. Sir C.V.Raman from **ENJOYING EVERYDAY ENGLISH**

b. Mother Teresa from **INSPIRING LIVES**

Unit -III

a. The Connoisseur from **ENJOYING EVERYDAY ENGLISH**

b. Dr. Amartya Kumar Sen from **INSPIRING LIVES**

Unit -IV

a. The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**

b. Gertrude Elion from **INSPIRING LIVES**

Unit -V

a. Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**

b. Vishwanathan Anand from **INSPIRING LIVES**

Unit-VI

a. Odds Against Us from **ENJOYING EVERYDAY ENGLISH**

b. Charlie Chaplin from **INSPIRING LIVES**

Unit – VII

Exercises on

Reading and Writing Skills
Reading Comprehension
Letter writing
Report writing

Unit – VIII

Exercises on Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

Evaluation: The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

REFERENCES:

1. Technical Communication , Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
2. Essential Grammar in Use, (with CD) 3/e, Cambridge University Press, 2009
3. Resumes and Interviews, M.Ashraf Rizvi, Tata – McGraw Hill, 2009
4. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
5. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
6. Developing Communication Skills, 2/e. by Krishna Mohan & Meera Banerji , Macmillan, 2009
7. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
8. Basic Communication Skills For Technology, Andrea J Ruthurford, Pearson Education , Asia.
9. Longman Dictionary of Contemporary English with DVD, Pearson Longman

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B.Tech. I Year (M.E.)	T	P	C
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(9ABS102) ENGINEERING PHYSICS

UNIT I- OPTICS: Interference - Interference in thin films by reflection - Newton's rings - Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit - Diffraction grating - Grating spectrum - polarization - Nicol prism -Theory of circular and elliptical polarized light - Quarter and half wave plates.

UNIT II- CRYSTAL STRUCTURES AND X-RAY DIFFRACTION: Introduction -Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure Simple cubic - Body Centered Cubic – Face Centered Cubic crystals - Miller indices of planes and directions in crystals – Separation between successive (h k l) planes - X-ray diffraction by crystal planes - Bragg's law – Laue and Powder methods.

UNIT III- PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY: Waves and Particles - de- Broglie's hypothesis – Heisenberg's uncertainty principle - Schroedinger's one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box – Energy levels - Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) – Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands – metals, semi conductors & insulators.

UNIT IV- SEMICONDUCTORS: Intrinsic and extrinsic semiconductors – Law of mass action – Continuity equation – Drift & diffusion - Einstein's relation – Hall effect – Direct & indirect band gap semiconductors – p-n junction - Band diagram of p-n junction diode – Diode Equation-LED, LCD & Photo diode.

UNIT V- MAGNETIC PROPERTIES: Introduction - Origin of magnetic moment – Classification of magnetic materials - Dia, Para , Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials – Magnetic bubbles memory.

DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius-Mossotti equation –Frequency dependence of polarisability (qualitative treatment only) – Ferro electricity- $BaTio_3$.

UNIT VI- SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization – Josephson effects – BCS theory - Applications of superconductors.

LASERS: Introduction – Characteristics of laser - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser – GaAs Laser - Applications of Lasers in Industry, Scientific and Medical fields.

UNIT VII- FIBER OPTICS: Introduction - Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture – Types of Optical fibers and refractive index profiles – Optical fiber communication systems - Application of optical fibers.

UNIT VIII- NANOMATERIALS : Introduction - Basic principles of nano materials – Fabrication of nano materials - ball milling –plasma arching – Chemical vapour deposition method – sol-gel methods – properties of nano materials – carbon nanotubes – properties and applications of carbon nano tubes - Applications of nano materials.

TEXT BOOKS:

1. Engineering Physics by P.K.Palanisamy, Scitech Publications
2. Engineering Physics by V. Rajendran & K.Thyagarajan, Tata McGraw-Hill Publishing Co. Ltd.
3. Engineering Physics by M.R.Srinivasan New Age Publications

REFERENCES:

1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India
2. Solid State Physics by C.Kittel, Wiley India
3. Engineering Physics by Mittal, I.K.International
4. Introduction to Nanoscience & Nano Technology by K.K Chattopadhyay & A.N. Banarjee , Prentice – Hall of India Pvt. Ltd

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B.Tech. I Year (M.E.) **T P C**
2 0 4

(9ABS103) ENGINEERING CHEMISTRY

UNIT I: Water: Sources of Water, Types of impurities in Water, Hardness of Water – Temporary and Permanent hardness. Units. Estimation of hardness by EDTA Method. Analysis of Water - Dissolved Oxygen. Disadvantages of Hard Water. Problems on hardness of water. Methods of Treatment of Water for Domestic Purpose – Sterilisation: Chlorination, Ozonisation.
Water for Industrial purpose - Water for Steam Making, Boiler Troubles – Carry Over (Priming and Foaming), Boiler Corrosion, Scales and Sludge, Caustic Embrittlement. Water Treatment: - Internal Treatment – Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Ion- Exchange Process; Demineralization of Brakish Water – Reverse Osmosis.

UNIT II: **Science of Corrosion:** Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack), Wet Corrosion, Theories of Corrosion and Mechanism, Electro Chemical Theory of Corrosion. Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Oxygen absorption type. Factors Influencing Corrosion. Control of Corrosion – Cathodic Protection – Sacrificial anode and Impressed Current. Uses of Inhibitors. Electro Plating, and Electro less plating (copper and nickel)

UNIT III: **Polymers:** Polymerization Reactions – Basic concepts. Types of Polymerization – Addition and Condensation Polymerization. Plastics –Thermosetting and Thermoplastics. Composition, Properties and Engineering Uses of the Following: Teflon, Bakelite, Nylon. Rubber – Processing of Natural Rubber and Compounding. Elastomers – Buna S, Buna N, Polyurethane Rubber; Silicone Rubber. Conducting Polymers, Synthesis and applications of Polyacetylene and Poly aniline
Liquid Crystals definition, properties, suitable examples and Engineering Applications

UNIT IV: **Chemistry of nano materials:** Nano materials definition, properties and applications;

Explosives and Propellants: Explosives, Classification, precautions during storage, blasting fuses, important explosives. Rocket propellants, classification of propellants**.**

Lubricants : Principles and function of lubricants - Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralisation Number and Mechanical Strength.

UNIT V: Electro Chemistry: Conductance – Equivalent Conductance – Molecular Conductance, Conductometric Titrations – Applications of Conductivity Measurements.

Electrochemical Cells: Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni–Cd cell), Lithium batteries. Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell

Insulators – Definition, Properties and Characteristics of Insulating Materials; Engineering Applications.

UNIT VI: Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams – one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.

UNIT VII: Fuels and Combustion: Definition and Classification of fuels. Solid, liquid & gaseous fuels, Characteristics of a good fuel. Metallurgical Coke – Characteristics & Manufacture (Otto-Halfmann). Petroleum – Refining – Synthetic Petrol. Calorific Value & its determination (Bomb Calorimeter – Junker's Gas Calorimeter). Combustion: Flue gas analysis by Orsat's apparatus.

UNIT VIII: Building Materials: Cement: composition of Portland cement, analysis, setting and hardening of cement (reactions).

Refractories : Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material

TEXT BOOKS:

1. Engineering Chemistry Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, McGraw Hill Higher Education Hyd., 2009
2. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2008)
3. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, 15th edition New Delhi (2008).

REFERENCES:

1. Engineering Chemistry Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Limted, Hyderabad. 2009
2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh-Universities press
3. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.20084. Physical Chemistry - Glasston & Lewis.
4. 5. Engineering Chemistry (Vol.1&2) by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
5. 6. Applied Chemistry: A Text Book for chemistry for Engineers & Technologists, G.D. Gesser, Springer, 2000

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B.Tech. I Year (M.E.) **Th Tu C**
3 1 6

(9ABS104) MATHEMATICS – I

UNIT I– Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications: to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT II– 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 III– Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof). Simple examples of Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

UNIT – IV

Raidus of Curvature – Curve tracing – Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

UNIT V– Multiple integral: – Double and triple integrals – Change of Variables – Change of order of integration.

UNIT VI– 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 – Laplace transform of Periodic function.

UNIT VII– Differentiation and integration of Laplace transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT VIII– Vector Calculus: Gradient – Divergence – Curl and Their properties; Vector integration – Line integral - Potential function – Area , Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (excluding their proof). Verification of Green's–Stoke's and Gauss's Theorems.

TEXT BOOKS:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A Text Book of Engineering Mathematics, C. Sankaraiah, V.G.S. Book Links.
3. A Text Book of Engineering Mathematics-1,E. Rukmangadachari, E. Keshava Reddy, Pearson Education.

REFERENCES:

1. A Text Book of Engineering Mathematics, B.V. Ramana, Tata Mc Graw Hill.
2. A Text Book of Engineering Mathematics, Thomson Book Collection.
3. A Text Book of Advanced Engineering Mathematics – A Computer Approach, N.Bail, M.Goyal & C. Watkins.
4. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

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B.Tech. I Year (M.E.) **Th Tu C**
3 1 6

(9A05101) PROGRAMMING IN C AND DATA STRUCTURES

Unit I- Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method.

Unit II- Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements -break, continue, goto.

Unit III- Functions - Library Functions, Top-Down Design and Structure Charts, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands.
Arrays - Declaring and Referencing Arrays, Array Subscripts, Using For Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.

Unit IV- Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Programming Applications, Pointer to Functions, Command- Line Arguments.
Strings - String Basics, String Library Functions, Longer Strings, String Comparison, Arrays of Pointers, Character operations, String-To-Number and Number-To- String Conversions, Pointers and Strings.

Unit V- Structure and Union – Introduction, Features of Structures, Declaration and Initialization of Structures, Structure within Structure,

Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

Unit VI- Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

Unit VII- Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.
Linked List - Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Unit VIII- Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort. Searching- Linear and Binary Search Methods.

TEXT BOOKS :

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCES :

1. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand
4. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill
5. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

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B.Tech. I Year (M.E.)	T	P	C
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(9A03101) ENGINEERING DRAWING

UNIT I– INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. Curves used in Engineering Practice:
a) Conic Sections including the Rectangular Hyperbola – General method only.
b) Cycloid, Epicycloids and Hypocycloid
c) Involutes.
d) Helices

UNIT II– PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

UNIT III– PROJECTIONS OF PLANES: Projections of regular Plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT IV– PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to one or both planes – Auxiliary Views.

UNIT V– SECTIONS AND DEVELOPMENTS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

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

UNIT VI– ISOMETRIC AND ORTHOGRAPHIC 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 projections of spherical parts.

Conversion of Isometric projections/views to Orthographic Views – Conventions.

UNIT VII– INTERPENETRATION OF RIGHT REGULAR SOLIDS: Projections of curves of Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

UNIT VIII– PERSPECTIVE PROJECTIONS: Perspective View of Plane Figures and Simple Solids.Vanishing Point Method (General Methods only).

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

REFERENCES:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishesrs
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub.
4. Engineering Drawing, Venkata Reddy, B.S.Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year (M.E.)	Th	Tu	C
	3	1	6

(9A01101) ENGINEERING MECHANICS

UNIT I– BASIC CONCEPTS - System of forces– Moment of forces and its Application – Couples and Resultant of Force System
EQUILIBRIUM OF SYSTEM OF FORCES: Free body diagrams – Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

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

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

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

UNIT V– AREA MOMENT OF INERTIA - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures
MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses.(Simple problems only)

UNIT VI– KINEMATICS : Rectilinear and Curve linear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

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

UNIT VIII– MECHANICAL VIBRATIONS: Definitions, Concepts. Simple harmonic motion. Free vibrations. Simple, Compound and Torsional pendulums- Numerical problems

TEXT BOOKS:

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

REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year (M.E.)	T	P	C
	0	3	4

(9A05102) C PROGRAMMING AND DATA STRUCTURES LAB

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise l.

a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 2.

a) Write a C program to calculate the following Sum:

$$Sum=1- x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$

b) Write a C program to find the roots of a quadratic equation.

Exercise 3

a) Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

Exercise 4

a) The total distance travelled by vehicle in 't' seconds is given by distance $S = ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2) respectively. Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 5

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices ii) Multiplication of Two Matrices

Exercise 6

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to a given main string from a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

Exercise 7

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

Exercise 8

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Exercise 9

Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:

$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal ? If so, test for them too.

Exercise 10

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

Exercise 11

Write a C program that uses functions to perform the following operations:

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Exercise 12

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

Exercise 13

a) Write a C programme to display the contents of a file.

b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Exercise 14

Write a C program that uses functions to perform the following operations on singly linked list.:

i) Creation ii) Insertion iii) Deletion iv) Traversal

Exercise 15

Write C programs that implement stack (its operations) using

i) Arrays ii) Pointers

Exercise 16

Write C programs that implement Queue (its operations) using

i) Arrays ii) Pointers

Exercise 17

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Exercise 18

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort ii) Selection sort

Exercise 19

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search ii) Binary search

Exercise 20
Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 21
Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Exercise 22
Write C programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

Exercise 23
Write C programs to implement the linear regression and polynomial regression algorithms.

Exercise 24
Write C programs to implement Trapezoidal and Simpson methods.

REFERENCE BOOKS

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
4. Computer Basics and C Programming, V. Rajaraman, PHI Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year (M. E.) **T P C**
0 3 4

(9A03102) ENGINEERING AND I.T. WORKSHOP

ENGINEERING WORKSHOP

Objectives: The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

I.T. WORKSHOP

Objectives:

The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on a working PC (PIV or higher)to disassemble and assemble back to working condition and install**

Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (**It is recommended to use Microsoft office 2007 in place of MS Office 2003)**

PC Hardware

Exercise 1 – Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Exercise 2 – Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

Exercise 3 – Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Exercise 4 – Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Exercise 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective

peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Exercise 6 – Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

OFFICE TOOLS
LaTeX and Word

Exercise 7 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1 : Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Excel

Exercise 8 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

LaTeX and MS/equivalent (FOSS) tool Power Point

Exercise 9 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Exercise 10 - Task 2 : Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Internet & World Wide Web
2 Exercises

Exercise 11 - Task 1: **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

Exercise 12 - Task 2: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

REFERENCES :

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6. IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year (M.E.)	T	P	C
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(9ABS106) ENGINEERING PHYSICS LAB and ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

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

Sl.No.	Name of the Experiment

1. Determination of wavelength of given source – spectrometer – normal incidence method.
2. Dispersive power of the prism – Spectrometer.
3. Determination of wavelength of a laser source - Diffraction Grating.
4. Determination of particle size by using a laser source.
5. Determination of thickness of a thin wire using parallel fringes.
6. Newton's Rings.
7. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
8. Numerical aperture of an optical fiber.
9. Hall effect.
10. B – H Curve.
11. Energy gap of a material of p-n junction
12. Determination of rigidity modulus of a wire material – Torsional pendulum
13. Determination of dielectric constant.
14. Verification of laws of stretched string – Sonometer.
15. Melde's experiment – Transverse & Longitudinal modes.

Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee's apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde's apparatus

ENGINEERING CHEMISTRY LAB

1. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron.
2. Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry.
3. Preparation of Standard EDTA solution and Estimation of Hardness of Water.
4. Preparation of Standard EDTA and Estimation of Copper
5. Determination of Manganese in Steel and Iron in Cement.
6. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conducto metric titration
7. Determination of viscosity of the oils through Redwood viscometer
8. Determination of calorific value of fuel using Bomb calorimeter
9. Estimation of dissolved oxygen
10. Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid)

BOOKS:

1. Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprizes Ltd.
2. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

Equipment Required:

1. Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
2. Analytical balance (keroy) (15 Nos)
3. Calorimeter
4. Bomb Calorimeter
5. Redwood viscometer No.1& No.2
6. Conductometer/ Conductivity bridge
7. Wash bottles, test tube stands, burette stands
8. Gas cylinders with Bunsen burners
9. Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr's salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,

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B.Tech. I Year (M.E.)

T	P	C
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(9ABS107) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

Objectives:

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

SYLLABUS :

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

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues (giving directions etc.)
4. Speaking on the mobiles and telephone conversation

5. Role Play.
6. Oral Presentations- Prepared and Extempore.
7. 'Just A Minute' Sessions (JAM).
8. Describing Objects / Situations / People.
9. Information Transfer
10. Debate

Minimum Requirement:

The English Language Lab shall have two parts:

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

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
a) Speed – 2.8 GHZ
b) RAM – 512 MB Minimum
c) Hard Disk – 80 GB
ii) Headphones of High quality

PRESCRIBED SOFTWARE: GLOBARENA

Suggested Software:

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

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

1. **English Pronouncing Dictionary,** Daniel Jones Current Edition with CD.
2. **Spoken English**, R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
3. **Speaking English Effectively,** Krishna Mohan & NP Singh (Macmillan)
4. **A Practical Course in English Pronunciation**, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. **Body Language- Your Success Mantra , Dr Shalini Verma, S.Chand & Co, 2008**
6. **English Dictionary for Advanced Learners,** (with CD) International edn. Macmillan 2009
7. **A Handbook for Englsih language Laboratories,** E.Sureshkumar, P.Sreehari, Foundation Books, 2009
8. **DELTA's key to the Next Generation TOEFL Test,** 6 audio CDS, New Age International Publishers, 2007

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II-I Sem (M.E) **T P C**
4 0 4

(9ABS301) MATHEMATICS – II

(Common to Civil, Mech. Bio-Tech, Aero.Engg)

UNIT – I

Matrices: Elementary row transformations – Rank – Normal form – Echelon form – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations. Eigen values, Eigen vectors – Properties – Cayley-Hamilton Theorem – Inverse and powers of a matrix by Cayley-Hamilton theorem

UNIT – II

Symmetric, skew – Symmetric, Orthogonal, Hermitian, Skew Hermitian and unitary matrices and their properties - Quadratic forms – Reduction of quadratic forms to canonical form and their nature.

UNIT – III

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

UNIT – IV

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – VI

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

Interpolation: Introduction – Newton's forward and backward interpolation formulae – Lagrange's Interpolation formula.

UNIT – VII

Curve fitting: Fitting a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – VIII

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Method – Predictor-Corrector Method – Milne's Method.

TEXT BOOKS:

1. A Text Book of Engineering Mathematics, Vol–II, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. A Text Book of Engineering Mathematics, C. Sankaraiah, V.G.S. Book Links.
3. A Text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

REFERENCES:

1. A Text Book of Engineering Mathematics, B.V. Raman, Tata Mc Graw Hill.
2. Engineering Mathematics, Sarveswara Rao Keneru, Universities Press.
3. Introduction to Numerical Analysis Using MATLAB – Butt – Firewall Media.
4. Introduction to Numerical Analysis – S.S. Sastry. PH – I

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II-I Sem (M.E) **T P C**
4 0 4

(9A01301) MECHANICS OF SOLIDS

UNIT – I

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains–Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & 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

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

SPRINGS- Introduction- types of Springs – deflection of closed and open coil helical springs under axial pull and axial couple – Springs in series and parallel- carriage or leaf springs

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 & out side pressures – compound cylinders.

TEXT BOOKS :

1. Strength of materials by Bhavikatti, Lakshmi publications.
2. Solid Mechanics, by Popov

REFERENCES :

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

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(9A02301) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING

PART-A-ELECTRICAL ENGINEERING

UNIT - I

ELECTRICAL CIRCUITS: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT - II

DC MACHINES : Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – applications – three point starter.

UNIT - III

TRANSFORMERS : Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

UNIT - IV

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

TEXT BOOKS:

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

REFERENCES:

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

PART-B-ELECTRONICS ENGINEERING

UNIT-V

DIODE AND ITS CHARACTERISTICS:

PN Junction diode, Symbol, V-I characteristics, Diode Applications, Rectifiers-Half Wave, Full Wave and Bridge Rectifiers (Simple Problems).

UNIT-VI

TRANSISTORS

PNP and NPN Junction Transistor, Transistor as an Amplifier, Single Stage CE Amplifier, Frequency Response of CE Amplifier, Concepts of Feedback Amplifier, Necessary conditions for Oscillators, SCR Characteristics and Applications.

UNIT-VII

INDUCTION HEATING: Theory of Induction Heating, Application in Industries.

DIELECTRIC HEATING: Theory of Dielectric heating and its industrial Applications.

ULTASONICS: Generation, Flow Detection and Other Applications.

UNIT-VIII

CATHODE RAY OSCILLOSCOPE

Principles of CRT (Cathode Ray Tube), Deflection Sensitivity, Electrostatic and Magnetic Deflection, Applications of CRO-Voltage, Current and Frequency Measurements.

TEXT BOOKS:

1. Electronic devices and circuits – R.L.Boylestad and Louis Nashelsky, 9th Edition, 2006, PEI/PHI.
2. Industrial Electronics by G.K.Mittal-PHI.
3. Modern Electronic Instrumentation and Measurement Techniques-Albert D.Helfrick, WillamD.Cooper.

REFERENCES:

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

Note: In Electrical Engineering ad Electronics Engineering minimum of two questions form each part should be chosen for answering five questions in the end Semester Examination.

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(9A03301) MATERIAL SCIENCE AND ENGINEERING

UNIT – I

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

UNIT - II

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

UNIT -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, and Fe-Fe_3C.

UNIT -IV

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

UNIT – V

Heat treatment of Alloys: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering , Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

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.

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 Carbon – Carbon composites.

TEXT BOOKS :

1. Introduction to Physical Metallurgy, Sidney H. Avener.
2. Essential of Materials Science and Engineering, Donald R.Askeland, Thomson.

REFERENCES :

1. Material Science and Metallurgy, kodgire.
2. Science of Engineering Materials, Agarwal
3. Materials Science and Engineering, William and collister.
4. Elements of Material science, V. Rahghavan
5. Engineering Materials and Their Applications – R. A Flinn and P K Trojan, Jaico Books.
6. Engineering materials and metallurgy, R.K.Rajput, S.Chand.

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(9A03302) THERMODYNAMICS

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, Causes of Irreversibility – Energy in State and in Transition - Types, 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.

UNIT – III

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, 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 – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

UNIT IV

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron

Equation, Constructional use of Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT - V

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State – Compressibility charts – variable specific Heats – Gas Tables.

UNIT – VI

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, specific Heats and Entropy of Mixture of perfect Gases and Vapour.

UNIT - VII

Psychrometry- Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation, Carrier's Equation – Psychrometric chart.

UNIT - VIII

Power Cycles : Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

TEXT BOOKS :

1. Engineering Thermodynamics, PK Nag, TMH, III Edition
2. Basic Engineering Thermodynamics, A. Venkatesh, Orient Longman

REFERENCES :

1. Fundamentals of Thermodynamics – Sonntag, Borgnakke and van wylen, John Wiley & sons (ASIA) Pte Ltd.
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles, TMH
3. Thermodynamics – J.P.Holman, McGrawHill
4. An introduction to Thermodynamics, YVC Rao, New Age
5. Engineering Thermodynamics – Jones & Dugan

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(9A03303) MACHINE DRAWING

I. Machine Drawing Conventions :

Need for drawing conventions – introduction to IS conventions

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

II. Drawing of Machine Elements and simple parts

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

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

III. Assembly Drawings:

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

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

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

TEXT BOOKS :

Machine Drawing – Dhawan, S.Chand Publications

Machine Drawing - K.L.Narayana, P.Kannaiah & K. Venkata Reddy, New Age Publishers

REFERENCES :

Machine Drawing – P.S.Gill.

Machine Drawing – Luzzader

Machine Drawing – Rajput

Textbook of Machine Drawing –K.C.John, 2009, PHI learning

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

All questions are to be answered

Q1 – Questions set on section I & II of the syllabus 2 out of 3 or 2 out of 4 to be answered with a weightage of 4 marks each – 08 marks

Q2– Questions set on Section II of the syllabus 2 out of 3 to be answered with a weightage of 10 marks each – 20 marks

Q3 – Drawing of assembled views of Section III items of Syllabus with a weightage of 42 marks

Note: All answers should be on the drawing sheet only. Answers on the drawing sheet only will valued.

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(9A02302) ELECTRICAL ENGINEERING AND ELECTRONICS ENGINEERING LAB

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

PART - B: Electronics Engineering Lab:

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

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(9A03304) MATERIAL SCIENCE LAB AND MECHANICS OF SOLIDS LAB

(A) MATERIAL SCIENCE LAB :

Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.

Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.

Study of the Micro Structures of Cast Irons.

Study of the Micro Structures of Non-Ferrous alloys.

Study of the Micro structures of Heat treated steels.

Hardeneability of steels by Jominy End Quench Test.

To find out the hardness of various treated and untreated steels.

(B) MECHNICS OF SOLIDS LAB :

Direct tension test been

Bending test on

a) Simple supported beam
b) Cantilever beam

Torsion test

Hardness test

Brinells hardness test
Rockwell hardness test

Test on springs

Compression test on cube

Impact test

Punch shear test

Note: Internal and End examinations evaluation will be done separately and the average will recorded.

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(9ABS401) PROBABILITY AND STATISTICS
(Common to CSE, IT, ECC, CSS)

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 Distributions – Distribution functions.

UNIT – III

Binomial and poison distributions Normal distribution – Related properties.

UNIT – IV

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

UNIT – V

Estimation: Point estimation – Interval estimation – Bayesian estimation

UNIT – VI

Test of Hypothesis – Means – 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, Ψ^2 test, Estimation of proportions.

UNIT – VIII

Queuing Theory: Pure Birth and Death process, M/M/1 model and simple problems.

TEXT BOOKS:

1. Probability & Statistics, T.K.V. Iyengar, B. Krishan Gandhi and Others, S. Chand & Company.
2. Probability & Statistics, Ravindranath, B.S.R. Murthy, I.K. International Pvt. Ltd.
3. Probability & Statistics, Walpore, Myers, Ye 8th edition, - Pearson Education.

REFERENCES:

1. Probability & Statistics, Amold O. Allen, Academic Press.
2. Probability & Statistics, D.K. Murugesan & P. Guru Swamy, Anuradha Publications.
3. Introduction to Probability, Charles M. Grinstead, J. Laurie Snell, University Press.
4. Probability & Statistical inference : Hogg, Tanis, Rao – 7th edition, Pearson education.

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(9ABS303) ENVIRONMENTAL SCIENCE

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:

UNIT – III

ECOSYSTEMS : Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – 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 0 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-soports 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 wates – 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 Proggramme. – 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 – river, hill slopes, etc..

TEXT BOOKS :

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

REFERENCES :

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

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(9A03401) 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 Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT – III

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

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

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

UNIT – IV

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

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

UNIT – V

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

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

UNIT – VI

Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VII

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

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 Pearson Edn.
4. Mechanism and Machine Theory, JS Rao and RV Dukkipati, New Age
5. The theory of Machines, Shiegley, Oxford.
6. Theory of machines – PL. Ballaney, Khanna Publishers.

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(9A03402) THERMAL ENGINEERING - I

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT-II

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT – III

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

UNIT IV

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – V

Testing and Performance : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – VI

COMPRESSORS – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating : Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VII

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors : Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

UNIT-VIII

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

TEXT BOOKS:

1. I.C. Engines / V. Ganesan- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek, Pearson, PHI
3. Thermal Engineering, Rudramoorthy - TMH
4. Thermodynamics & Heat Engines, B. Yadav, Central Book Depot., Allahabad
5. I.C. Engines, Heywood, McGrawHIll.
6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand
7. Thermal engineering data book-B.Srinivasulu Reddy, JK International Pub.

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(9A01404) FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT I

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

UNIT II

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

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

UNIT III

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel-total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter (Ref.4)

UNIT IV

Basics of turbo machinery : Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT V

Hydroelectric power stations : Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT VI

Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency.

UNIT VII

Performance of hydraulic turbines : Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT VIII

Centrifugal pumps : Classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH.

Reciprocating pumps : Working, Discharge, slip, indicator diagrams.

TEXT BOOKS :

1. Hydraulics, fluid mechanics and Hydraulic machinery Modi and Seth.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley ,John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements).

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(9A03403) MANUFATURING TECHNOLOGY

UNIT – I

CASTING: Steps involved in making a casting– Types of patterns - Patterns and Pattern making — Materials used for patterns, pattern allowances and their Construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment.

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

UNIT – III

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

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

UNIT – IV

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

UNIT – V

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

UNIT - VI

Stamping, forming and other cold working processes: Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning.

UNIT- VII

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

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

UNIT - VIII

ADVANCED MANUFACTURING PROCESS: Unconventional machining process: Introduction Classification – mechanical, thermal, chemical and hybrid process. Mechanical: - Ultrasonic machining, Water jet machining: -Abrasive jet machining.

Thermal: - Electro discharge machining. Laser beam machining, Electro beam machining.

Chemical: - Chemical and Electro chemical machining.

Hybrid: - Laser assisted Machining.

Rapid manufacturing: - Introduction – concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

TEXT BOOKS:

1. Manufacturing Technology, P.N. Rao,TMH
2. Manufacturing Technology, Kalpak Jain, Pearson education

REFERENCES:

1. Production Technology, R.K. Jain
2. Process and materials of manufacturing –Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub
6. Rapid Prototyping Principles and Applications, Rafiq Noorani, Wiely Pub.
7. Unconventional Machining Processes, V.K. Jain, Allied Pub.
8. Production Technology, K.L Narayana, I.K. International Pub

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B.Tech. II-II Sem (M.E)	T	P	C
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(9A01407) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Impact of jets on Vanes.
Performance Test on Pelton Wheel.
Performance Test on Francis Turbine.
Performance Test on Kaplan Turbine.
Performance Test on Single Stage Centrifugal Pump.
Performance Test on Multi Stage Centrifugal Pump.
Performance Test on Reciprocating Pump.
Calibration of Venturimeter.
Calibration of Orifice meter.
Determination of friction factor for a given pipe line.
Determination of loss of head due to sudden contraction in a pipeline.
Turbine flow meter.

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

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(9A03404) MANUFACTURINGTECHNOLOGY LAB

Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB :

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

II. WELDING LAB :

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises (Water Plasma Device)

III. MECHANICAL PRESS WORKING :

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

IV. PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

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(9AHS401) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
(Common to BT, CE, ECM, EEE, ME)

UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS

Definition, nature and scope of managerial economics- relation with other disciplines- 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 III :THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Isoquants and Isocosts, MRTS, least cost combination of inputs, Cobb-Douglas 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 AND PRICING POLICIES

Market structures: Types of competition, features of perfect competition, monopoly- monopolistic competition. Price-Output determination under perfect competition and monopoly - Methods of Pricing-cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

UNIT V: BUSINESS ORGANISATIONS AND 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 proposal, 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 financial statements through Liquidity Ratios (Current 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 Ratios and EPS), Du Pont Chart.

TEXT BOOKS:

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

REFERENCES

1. Premchand Babu, Madan Mohan:Financial Accounting and Analysis,Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2009.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2009.
5. H.L.Ahuja: Managerial Economics, S.Chand, 3/e, 2009

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B.Tech. III-I Sem (M.E)	**T**	**P**	**C**
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(9A03501) THERMAL ENGINEERING – II

UNIT – I

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

UNIT II

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

UNIT – III

Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio.

Criteria for design of nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line –Shock at the exit.

UNIT – IV

Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine

- its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine. Governing of impulse turbine.

UNIT V

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

UNIT VI

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

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UNIT – VII

Gas Turbines : Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating –Closed and Semi-closed cycles – merits and demerits, Brief concepts about compressors, combustion chambers and turbines of Gas Turbine Plant.

UNIT – VIII

Jet Propulsion : Principle of Operation –Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines –Turbo jet, Turbo prop, Pulse jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods. Introduction to Rocket propulsion.

TEXT BOOKS:

1. Thermal Engineering / R.K. Raj put / Lakshmi Publications
2. Basic and Applied Thermodynamics / P.K. Nag/TMH

REFERENCES:

1. Gas Turbines – V.Ganesan /TMH
2. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
3. Gas Turbines and Propulsive Systems – P.Khajuria & S.P.Dubey - /Dhanpatrai
4. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.
5. Thermal Engineering-M.L.Mathur & Mehta/Jain bros.
6. Thermal Engineering Data Book – B. S. Reddy and K. H. Reddy / I.K. International

Question Paper Pattern: 5 questions to be answered out of 8 questions

Each question should not have more than 3 bits

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III-I Sem (M.E) **T P C**
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(9A03502) 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.

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.

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
Operation.

UNIT – IV

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

UNIT-V

GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with

auxiliary springs. Sensitiveness, isochronism and hunting –effort and power of a governor.

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 – V, multi cylinder, in -line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive force.

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 method, 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 / Khurmi/S.Chand.

REFERENCES:

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

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(9A03503) MACHINE TOOLS

UNIT – I

Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tooland angles chip formation and types of chips – built up edge and its effects, chip breakers. Mechanics ofOrthogonal cutting –Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life,coolants, machinability –economics- Tool materials.

UNIT – II

Engine lathe – Principle of working, specification of lathe – types of lathes – work holders, tool holders – BoxTools, Taper turning, thread turning and attachments for Lathes.

Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout.

Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes– tool layout and cam design.

UNIT – III

Shaping, Slotting and Planning machines – their Principles of working – Principal parts – specification, classification,Operations performed. Kinematic scheme of the shaping slotting and planning 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 and geometry of milling cutters– methods of indexing – Accessories to milling machines.

UNIT –VI

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

UNIT - VII

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

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. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.
2. Manufacturing Technology-Kalpakzian- Pearson

3. Production Technology by H.M.T. (Hindustan Machine Tools).

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(9A03504) DESIGN OF MACHINE ELEMENTS - I

UNIT – I

INTRODUCTION: General considerations of design, design process. Selection of Engineering Materials - properties – Manufacturing considerations in the design. BIS codes of materials. Preferred numbers.

UNIT – II

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. Concept of stiffness in tension, bending, torsion and Combined cases.

UNIT – III

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

UNIT – IV

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

UNIT –V

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

UNIT – VI

COTTERS AND KNUCKLE JOINTS: Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT – VII

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

UNIT – VIII

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

TEXT BOOKS:

1. Machine design / Schaum Series.
2. Machine design – Pandya & shah.

REFERENCES:

1. Machine design- J.E.Shigley
2. Machine design- R S Khurmi and J K Gupta
3. Design Of Machine Elements - M.F.Spotts-PHI
4. Machine Design - Kannaiah/ Scietech.

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

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

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(9A03505) HEAT TRANSFER

UNIT – I

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

Conduction Heat Transfer: Fourier rate equation – General heat conduction equation in Cartesian,
Cylindrical and Spherical coordinates.

UNIT – II

Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – boundary and Initial conditions.

One Dimensional Steady State Heat Conduction: in Homogeneous slabs, hollow cylinders
and spheres – overall heat transfer coefficient – electrical analogy – Critical radius/thickness of insulation-with Variable Thermal conductivity –with internal heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to errors in Temperature measurement.

UNIT III

One Dimensional Transient Heat Conduction: in Systems with negligible internal resistance
– Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Problems on semi-infinite body.

UNIT – IV

Convective Heat Transfer: Dimensional analysis–Buckingham π Theorem and its application for developing semi – empirical non- dimensional correlations for convective heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

UNIT – V

Forced convection: External Flows: Concepts of hydrodynamic and thermal boundary layer and
use of empirical correlations for convective heat transfer for flow over-Flat plates, Cylinders and spheres..
Internal Flows: Division of internal flow through Concepts of Hydrodynamic and Thermal Entry Lengths – Use of empirical relations for convective heat transfer in Horizontal Pipe Flow, annular flow.
Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation.

UNIT VI

Heat Transfer with Phase Change: Boiling: Pool boiling – Regimes, determination of heat transfer coefficient in Nucleate boiling, Critical Heat flux and Film boiling.
Condensation: Film wise and drop wise condensation –Nusselt's Theory of Condensation on a vertical
plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

UNIT VII

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.

UNIT VIII

Radiation Heat Transfer

Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities– laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between gray bodies – radiation shields– electrical analogy for radiation networks.

TEXT BOOKS:

1. Fundamentals of Engg. Heat and Mass Transfer / R.C. Sachdeva / New Age International
2. Fundamentals of Heat and Mass Transfer/M.Thirumaleswar/Pearson Edu.

REFERENCE BOOKS:

1. Heat Transfer – P.K.Nag/ TMH
2. Heat Transfer / Holman .J.P/TMH
3. Heat and Mass Transfer –Cengel- McGraw Hill.
4. Heat and Mass Transfer – R.K. Rajput – S.Chand & Company Ltd.
5. Heat and Mass Transfer-Kondandaraman
6. Fundamentals of Heat Transfer - Incropera & Dewitt / John Wiley Pub.
7. Thermal Engineering Data Book /B.S.Reddy and K.H.Reddy Rev. Edition/I.K.International

NOTE: Thermal Engineering data books are permitted in the examinations.

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

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B.Tech. III-I Sem (M.E)	**T**	**P**	**C**
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(9A03506) HEAT TRANSFER LAB

1. Thermal conductivity of insulating powder material through Concentric Sphere apparatus.
2. Thermal conductivity of insulating material through lagged pipe apparatus
3. Overall heat transfer co-efficient through Composite Slab Apparatus
4. Thermal Conductivity of metal (conductor).
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction
7. Heat transfer coefficient in forced convection.
8. Heat transfer coefficient in natural convection
9. Experiment on Parallel and counter flow heat exchanger.
10. Emissivity of a gray body through Emissivity apparatus.
11. Experiment on Stefan Boltzman Apparatus.
12. Heat transfer in drop and film wise condensation.
13. Experiment on Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.
15. Study of Two – Phase flow.

NOTE: Thermal Engineering data books are permitted in the examinations.

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(9A03507) THERMAL ENGINEERING LAB

1. Valve / Port Timing Diagrams of an I.C. Engines
2. Performance Test on a 4 -Stroke Diesel Engines
3. Performance Test on 2-Stroke Petrol engine
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Engine
5. Retardation and motoring test on 4- stroke engine
6. Heat Balance of an I.C. Engine.
7. Air/Fuel Ratio and Volumetric Efficiency of an I.C. Engines.
8. Performance Test on Variable Compression Ratio Engines, economical speed test.
9. Performance Test on Reciprocating Air – Compressor Unit
9. Study of Boilers
10. Dismantling / Assembly of Engines to identify the parts and their position in an engine.

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(9A03601) INDUSTRIAL MANAGEMENT

UNIT I

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

UNIT II

Designing Organizational Structures : Basic concepts related to Organization - Departmentation and Decentralisation, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less 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 micro-motion and memo-motion 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-Applications.

UNIT V

Materials Management-Objectives, Inventory – functions, types, associated costs, inventory classification techniques. Stores Management and Stores Records. Purchase management, duties of purchase manager, associated forms.

UNIT VI

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

UNIT VII

INSPECTION AND QUALITY CONTROL- types of inspections – Difference between inspection & quality control. Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM- Quality Circles, ISO 9000 series procedures.

UNIT VIII

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. Manufacturing Organization and Management, Amrine/ Pearson, 2nd Edition, 2004.
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III-II Sem (M.E) **T P C**
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(9A03602) CAD / CAM

UNIT – I

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

UNIT – II

Computer Graphics & Drafting: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, Geometric commands , layers, display control commands, editing, dimensioning.

UNIT – III

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

UNIT –IV

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 – V

Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations,

Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT – VI

Types of manufacturing systems: FMS, Material handling systems, computer control systems, JIT, Human labor in manufacturing systems.

UNIT – VII

Computer integrated production planning: Capacity planning**,** shop floor control, MRP-I, MRP-II, CIMS benefits.

UNIT – VIII

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, non-contact inspection methods-optical non-contact inspection methods-non-optical computer aided testing, integration of CAQC with CAD/CAM.

TEXT BOOKS:

1. CAD / CAM , A Zimmers & P.Groover/PE/PHI
2. CAD / CAM – Principles and applications / P.N. Rao/TMH

REFERENCES:

1. Automation, Production systems & Computer integrated Manufacturing, Groover,P.E
2. CAD / CAM / CIM , Radhakrishnan and Subramanian, New Age
3. Principles of Computer Aided Design and Manufacturing , Farid Amirouche, Pearson
4. CAD/CAM Theory and Practice, R. Sivasubramaniam, TMH
5. Computer aided design and manufacturing, Lalit Narayan / PHI.

6. Computer aided manufacturing, T.C. Chang / Pearson
7. A text book of CAD/CAM/CSP Rao, Hitech Pub.

Question Paper Pattern : 5 Questions to be answered out of 8 questions.

Each question should not have more than 3 bits

2009-10

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III-II Sem (M.E) **T P C**
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(9A03603) METROLOGY

UNIT – I

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

UNIT – II

LINEAR MEASUREMENT: Length standard, line, end & wavelength standards, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

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

LIMIT GAUGES: Plug, Ring, Snap, Gap, Taper, Profile and Position gauges. Taylor's principle. Design of Go and No Go gauges.

UNIT – III

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

FLATNESS MEASUREMENT: Measurement of flatness of surfaces – straight edges– surface plates – optical flat and auto collimator.

UNIT – IV

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

MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses.

UNIT-V

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

UNIT -VI

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

UNIT- VII

GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement. Measurement of diameter, pitch, pressure angle and tooth thickness.

Coordinate Measuring Machines: Types of CMM and Applications of CMM.

UNIT – VIII

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

TEXT BOOKS:

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

REFERENCES:

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

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(9A03604) REFRIGERATION AND AIR CONDITIONING

UNIT – I

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

UNIT – II

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

UNIT III

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

UNIT IV

Vapor Absorption Refrigeration System – description and working of NH_3 – water system and Li Br –water (Two shell & Four shell) System -Calculation of max COP. Principle of operation of three Fluid absorption system.

UNIT V

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

UNIT – VI

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

UNIT VII

Air Conditioning equipment - humidifiers – dehumidifiers – air filters, fans and blowers.

Heat Pump – Heat sources – different heat pump circuits.

UNIT – VIII

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

TEXT BOOKS:

1. Refrigeration and Air Conditioning / CP Arora / TMH.
2. A Course in Refrigeration and Air conditioning / SC Arora & Domkundwar / Dhanpatrai

REFERENCES:

1. Refrigeration and Air Conditioning / Manohar Prasad / New Age.
2. Principles of Refrigeration - Dossat / Pearson Education.

3. Refrigeration and Air Conditioning-P.L.Ballaney
4. Basic Refrigeration and Air-Conditioning – Ananthanarayanan / TMH

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

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

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(9A03605) DESIGN OF MACHINE ELEMENTS– II

UNIT – I

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

UNIT –II

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

UNIT – III

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 cranks

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: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.

UNIT – VI

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

UNIT – VII

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

UNIT – VIII

DESIGN OF POWER SCREWS: Design of screw, Square ACME, Buttress screws- Efficiency of the screw. Design of nut, compound screw, differential screw, ball screw- possible failures.

TEXT BOOK:

1. Machine Design /V.B.Bhandari/TMH
2. Machine Design – R.S. Khurmi & J.S.Gupta / S.Chand Pub

REFERENCES:

1. Mech. Engg. Design - JE Shigley
2. Data Books : (I) P.S.G. College of Technology (ii) Balaveer Swamy and Mahadevan
3. Machine Design by T.V.Sundaramoorthy & N.Shanmugam
4. Machine Design by Kanniah/ scitech publishers

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(9A03606) AUTOMOBILE ENGINEERING

UNIT – I

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

UNIT – II

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

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

UNIT – III

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and

Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporative cooling – pressure sealed cooling – antifreeze solutions.

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

Unit – IV

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

UNIT – V

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

UNIT – VI

Transmission System: Clutches- Principle- types: cone clutch, single plate clutch, multi plate
clutch, magnetic and centrifugal clutches, fluid fly wheel – gear box- types: sliding mesh,
constant mesh, synchromesh, epi-cyclic, over drive, torque converter.
Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential, rear axles.

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, Pneumatic and vacuum brake systems.

TEXT BOOKS:

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

.

REFERENCE BOOKS:

1. Automobile Engineering , R.K.RAJPUT,Laxmi Pub
2. Automobile Engineering , K.K.Ramalingam/Scitech Pub.
3. Automotive engines , Newton, Steeds & Garret.

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(9A03607) METROLOGY AND MACHINE TOOLS LAB

Section A:

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

Section B:

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

8. Job on Cylindrical Surface Grinding
9. Job on Grinding of Tool angles.

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(9AHS601) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (Common to ECE, E Con E, ECM, EIE, EEE, ME, AE)

1. Introduction

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

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

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

required ability to face computer-based competitive exams such GRE, TOEFL,CAT, GMAT etc.

2. Objectives:

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

3 Syllabus

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

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

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

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

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

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

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

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

4. Minimum Requirements

The English Language Lab shall have two parts:

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

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

System Requirement (Hardware Component):

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

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

Prescribed Software: GLOBARENA

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

1. **Technical writing and professional communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.
2. **Speaking about Science**, A Manual for Creating Clear Presentations **by Scott Morgan and Barrett Whitener, Cambridge University press, 2006**
3. **Books on** TOEFL/GRE/GMAT/CAT/ IELTS **by Barron's/DELTA/Cambridge University Press.**
4. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008
5. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
6. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010
7. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008
8. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008
9. **From Campus To Corporate** by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010
10. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
11. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010
12. **Business Communication** by John X Wang, CRC Press, Special Indian Edition,2008

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(9A03701) 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-Economic interpretation of duality.

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 considered and considered – 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 finite queue length and non finite queue length models– Multichannel – Poisson arrivals – exponential service times with finite queue length and queue length and non finite queue length models.

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. Introduction to operations Research,Taha,PHI
2. Introduction to O.R,Hiller & Libermann (TMH).

REFERENCES :

1. Operations Research ,A.M.Natarajan,P.Balasubramani,A. Tamilarasi,Pearson Education.

2. Operations Research: Methods & Problems , Maurice Saseini, Arhur Yaspan & Lawrence Friedman
3. Operations Research , R.Pannerselvam,PHI Publications.
4. Operations Research , Wagner, PHI Publications.
5. Operation Research ,J.K.Sharma,MacMilan.
6. O.R,Wayne L.Winston,Thomson Brooks,cole
7. Operations Research,R.Veerachari and V. Ravi Kumar,I.K International

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(9A03702) AUTOMATION & ROBOTICS

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

Introduction to Industrial Robots: Classification. Robot configurations, Functional line diagram, Degrees of Freedom. Components, common types of arms, joints, grippers.

UNIT – V

Manipulator Kinematics: Homogeneous transformations as applicable to rotation and translation - D-H notation, Forward and inverse kinematics.

Manipulator Dynamics: Differential transformation, Jacobians . Lagrange – Euler and Newton – Euler formations.

UNIT VI

Trajectory Planning: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion .

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

UNIT VII

Robot actuators and Feed back components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors, comparison. Position sensors – potentiometers, resolvers, encoders – Velocity sensors, Tactile sensors, Proximity 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. Automation , Production systems and CIM,M.P. Groover/Pearson Edu.
2. Industrial Robotics - M.P. Groover, TMH.

REFERENCES:

1. Robotics , Fu K S, McGraw Hill.
2. An Introduction to Robot Technology , P. Coiffet and M. Chaironze , Kogam Page Ltd. 1983 London.
3. Robotic Engineering , Richard D. Klafter, Prentice Hall
4. Robotics, Fundamental Concepts and analysis – Ashitave Ghosal,Oxford Press
5. Robotics and Control , Mittal R K & Nagrath I J , TMH.
6. Introduction to Robotics – John J. Craig,Pearson Edu

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(9A03703) FINITE ELEMENT METHODS

UNIT-I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. 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. Development of Truss Equations: Derivation of stiffness matrix for a beam element in local coordinates, selecting approximation functions for displacement, global stiffness matrix, computation of stress for a bar in x-y Plane, solution of a plane truss, potential energy approach to derive bar element equations, comparison of finite element solution to exact solution for bar, Galerkin's residual method and its use to derive the one-dimensional bar element equation, other residual methods and their applications to a one-dimensional bar problem.

UNIT - III

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

UNIT-IV

Frames, Plane stress and strain equations: Two-dimensional

arbitrarily oriented beam element rigid plane frame examples, grid equations. Basic concepts of plane stress and plane strain, derivation of the constant strain triangular element stiffness matrix and equations, treatment of body and surface forces, explicit expression for the constant strain triangle stiffness matrix, finite element solution of a plane stress problem.

UNIT - V

Development of a linear strain and axisymmetric elements: Introduction, derivation of the linear strain triangular element stiffness matrix and equations, example LST stiffness determination, comparison of elements, derivation of the stiffness matrix, solution of an axisymmetric pressure vessels Isoparametric formulation: Isoparametric formulation of the bar element stiffness matrix, rectangular plane stress element, Isoparametric formulation of the plane element stiffness matrix, evaluation of the stiffness matrix and stress matrix by Gaussian quadrature.

UNIT -VI

Heat and Mass Transfer analysis: Derivation of the basic differential equation, heat transfer with convection, typical units thermal conductivities, K: and heat transfer coefficients, h, one-dimensional finite element formulation using a variational method, two-dimensional finite element formulation, line or point sources, one-dimensional heat transfer with mass transport, finite element formulation of heat transfer with mass transport by Galerkin's method, flow chart and examples of a heat transfer program

UNIT - VII

Fluid flow and thermal stress analysis: Derivation of the basic differential equations, one-dimensional finite element formulation, two-dimensional finite element formulation, flow chart and examples of a fluid flow program. Formulation of the

thermal stress problem and examples.

UNIT-VIII

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

TEXT BOOK:

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

REFERENCES :

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

Question Paper Pattern: 5 questions to be answered out of 8 questions

Each question should not have more than 3 bits.

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(9A03704) 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 - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators.

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

UNIT - V

MEASUREMENT OF SPEED: Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer .

Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

UNIT - VI

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

UNIT - VII

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

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

UNIT - VIII

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

speed & position control systems

TEXT BOOKS:

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

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

REFERENCES:

1. Instrumentation, measurement & analysis , B.C.Nakra & KKChoudhary, TMH

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

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

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

5. Instrumentation & mech. Measurements , AK. Tayal ,Galgotia Publications

6. Mechanical Measurements , Sawhani

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(9A03705) ENTREPRENEURSHIP

(Elective-I)

UNIT 1: Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

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

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

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

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

UNIT VI: Choosing location and layout, Issues related to Selection of layout.

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

UNIT VIII: Global aspects of Enterprenership.

Text Books:

1Entrepreneurship, Robert Hisrich, & Michael Peters, TMH, 5th Edition

2. Entrepreneurship, Dollinger, Pearson, 4/e 2004.

REFERENCES:

1. Dynamics of Entrepreneurial Development and management, Vasant Desai, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Entrepreneurial Management, . Robert J.Calvin:, TMH, 2004.
4. The Entrepreneurial Connection, Gurmeet Naroola TMH, 2001.
5. Indian Economy. Dutt & Sundaram S. Chand, 2005.
6. Essential of Entrepreneurship and small businessmanagement, Thomas W. Zimmerer & Norman M. Scarborough, PHI, 4/e, 2005.
7. Industrial Relations & Labour Laws, Srivastava, Vikas, 2005.
8. Industrial Law, ND Kapoor, Sultan Chand & Sons, 2005

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem (M.E)	**T**	**P**	**C**
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(9A03706) COMPUTATIONAL FLUID DYNAMICS (ELECTIVE – I)

UNIT-I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

UNIT - VI

Review of Equations Governing Fluid Flow and Heat Transfer: Introduction, conservation of mass, Newton's second law of

motion, expanded forms of Navier-stokes equations, conservation of energy
principle, special forms of the Navier-stokes equations.

UNIT - VII

Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function - Vorticity formulation.

UNIT -VIII

Finite Volume Method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, Upwind interpolation, Linear interpolation and Quadratic interpolation

TEXT BOOK:

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

REFERENCES:

1. Computational Fluid Flow and Heat Transfer, Niyogi, Pearson Publications
2. Fundamentals of Computational Fluid Dynamics, Tapan K. Sengupta, Universities Press.

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B.Tech. IV-I Sem (M.E) **T P C**
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(9A03707) MECHATRONICS
(ELECTIVE – I)

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

UNIT – II **SIGNAL CONDITIONING : I**ntroduction – 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 Isoation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable 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 ,

PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – VI MICROCONTROLLERS OVERVIEW: 8051 Microcontroller , micro processor structure - DigitalInterfacing - 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 -Applications.

UNIT – VIII PROGRAMMABLE MOTION CONTROLLERS: Introduction - System Transfer Function - Laplacetransform 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 , W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics,M.D.Singh,J.G.Joshi,PHI.

REFERENCES :

1. Mechatronics Source Book , Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics , N. Shanmugam , Anuradha Agencies Publisers.
3. Mechatronics System Design , Devdas shetty,Richard,Thomson.

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(9A03708) MODERN MANUFACTURING METHODS (ELECTIVE – II)

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

UNIT – 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 **Electron Beam Machining:** Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes.
Laser Beam Machining: General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-VII **Plasma Machining:** Principle, metal removal mechanism, process parameters, accuracy and surface finish , applications .
Chemical Machining: Fundamentals of chemical machining- Principle- maskants –etchants- advantages and applications.

UNIT – VIII Magnetic abrasive finishing, Abrasive flow finishing, Electrostream drilling, Shaped tube electrolytic machining.
Rapid Prototyping: Classification – Stereo lithography, Selective Laser Sintering, applications.

TEXT BOOKS:

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

REFERENCES:

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

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B.Tech. IV-I Sem (M.E)	**T**	**P**	**C**
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(9A03709) TOOL DESIGN (ELECTIVE-II)

UNIT-I

Tooling materials and heat treatment: Properties of materials, ferrous, nonferrous, non metallic, tooling materials, heat treating, Limits, tolerances; and FITS, Gauges and gauge design coated tools, ceramic tools.

UNIT -II

Design of single point cutting tools: Single point, cutting tools-various systems of specifications, geometry and their inter, relation, theories of formation of chip and their effect, design of broach.

UNIT - III

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

UNIT -IV

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

UNIT-V

Design of sheet metal blanking and piercing: Fundamentals of die

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

UNIT-VI

Design of sheet metal bending, forming and drawings die: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies.

UNIT -VII

Tool life and tool wear: theories of tool wear-adhesion, abrasive and diffusion wear mechanisms forms of wear, tool life criteria and Mach inability index, tool wear criterion, measurement of tool wear.

UNIT-VIII

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

TEXT BOOKS:

1. Tool Design, Donaldson, Lecain and Goold,Tata McGraw Hill.
2. Principles of Metal cutting, A Bhattacharya, New Central Book Agency, Calcutta

REFERENCES:

1. Production Engineering Design (Tool Design) , Surendra Kenav and Umesh 'Chandra, Satyaprakashan, New Delhi 1994..
2. Design of cutting Tools. Use of Metal Cutting Theory. ASTME publication Michigan USA, 1969.
Amitabha Battacharya and In1yong Ham.

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B.Tech. IV-I Sem (M.E)	**T**	**P**	**C**
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(9A03710) POWER PLANT ENGINEERING (ELECTIVE - II)

UNIT – I

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

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

UNIT II

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

UNIT – III

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

UNIT IV

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

UNIT – V

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

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

UNIT VI

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

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

UNIT – VII

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

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

UNIT – VIII

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

Pollution control.

TEXT BOOK :

1. A Text Book of Power Plant Engineering , Rajput , Laxmi Publications
2. Power Plant Engineering, P.C.Sharma , S.K.Kataria Pub

REFERENCES :

1. Power Plant Engineering, P.K.Nag, II Edition ,TMH.
2. Power plant Engineering, Ramalingam, Scietech Publishers
3. A Course in Power Plant Engineering, Arora and S. Domkundwar.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem (M.E) **T P C**
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(9A03711) INSTRUMENTATION & CONTROL SYSTEMS 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.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.
12. Study of anemometer

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(9A03712) 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 of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.

c). Determination of stresses in 3D and shell structures (at least one example in each case)

d). Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.

e). Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a). Development of process sheets for various components based on tooling Machines.

b). Development of manufacturing and tool management systems.

c). Study of various post processors used in NC Machines.

d). Development of NC code for free form and sculptured surfaces using CAM packages.

e). Machining of simple components on NC lathe and Mill by transferring NC Code / from a
CAM package. Through RS 232.
f) Quality Control and inspection.

Any Six Software Packages from the following:

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

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(9A03801) PRODUCTION AND OPERATIONS MANAGEMENT

UNIT – I

Functions of production planning & controls operations & productivity, productivity measurement, goods and services, Design of goods and services: selection, generating new products, product development, issues in product design.

UNIT – II

Forecasting – Importance of forecasting – Types of forecasting, their uses – General Principles of forecasting – Forecasting techniques – qualitative methods and quantitive methods – accuracy of forecasting methods.

UNIT – III

Factors affecting facilities location, mathematical models for facilities, location, Types of facilities- layout: product layout, process layout, group technology layout, Assembly line balancing, computerised layout: ALDEP, CRAFT, CORELAP.

UNIT – IV

Strategies for aggregates planning, aggregate planning using O.R. Models, Chase planning, Expediting, controlling aspects.

UNIT – V

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

UNIT – VI

Scheduling Policies – Techniques, flow shop and job shop Scheduling techniques.

UNIT – VII

MRP, –lot sizing techniques in MRP, introduction to ERP, LOB (Line of Balance).

UNIT – VIII

Lean Management, philosophy and creation of lean enterprise, JIT concepts-Kanban System-Elements of total quality management, Six Sigma Quality Control.

TEXT BOOKS :

1. Modern Production , Operations Management , Baffa & Rakesh Sarin.
2. Operation Management by B. Mahadevan,Pearson Edu.
3. Operation and O.M by Adam & Ebert- PHI Pub.,

REFERENCES :

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice , Martin K. Starr and David W. Miller.
3. Production Control A Quantitative Approach , John E. Biegel.
4. Production Control , Moore.
5. Operations Management , Joseph Monks.
6. Operation Management by Jay Heizar & Read new Pearson
7. Elements of Production Planning and Control , Samuel Eilon.

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(9A03802) ENERGY SYSTEMS

UNIT – I

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

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 technique, 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, and their economics.

UNIT-VIII

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

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

REFERENCES :

1. Renewable Energy Sources, Twidell & Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith & J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth & John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern
6. Non-Conventional Energy Systems, K Mittal , Wheeler.

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(9A03803) TOTAL QUALITY MANAGEMENT
(Elective – III)

UNIT – I

TQM – overview , concepts, elements – History-Quality management philosophies-Juran, Deming, Crosby , Feigenbaum, Ishikawa– Stages of Evolution– continuous improvement – objectives – internal and external customers.

UNIT – II

Quality standards – Need of standardization - Institutions – bodies of standardization,
ISO 9000 series – ISO 14000 series – other contemporary standards – ISO certification process-Third party audit.

UNIT – III

Process management- Quality measurement systems (QMS) – developing and implementing QMS – nonconformance database- TQM tools & techniques- 7 QC tools- 7 New QC tools.

UNIT - IV

Problem Solving techniques - 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-Types- Advantages & limitations of benchmarking – Taguchi Analysis – loss function - Taguchi design of experiments. Poka-yoke, Kaizen, Deming cycle.

UNIT – VII

Value improvement elements – value improvement assault – supplier teaming. Business process reengineering & elements of Supply chain management.

UNIT – VIII

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

TEXT BOOKS:

1. Total Quality Management, Joseph & Susan Berg
2. Total Quality Management, Besterfield, Pearson.

REFERENCE BOOKS:

1. Quality management, Howard Giltow-TMH
2. Quality management, Evans.
3. Quality management, Bedi

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(9A03804) MECHANICAL VIBRATIONS

(Elective – III)

UNIT-I

INTRODUCTION: Importance and scope ,definition and terminology, simple harmonic motion, combination of simple harmonic motions, Fourier analysis.

UNIT-II

SINGLE DEGREE FREEDOM SYSTEMS-I:
Undamped free vibration: Classical method, Energy method, phase plane method, equivalent systems, torsional systems.

UNIT-III

SINGLE DEGREE FREEDOM SYSTEMS-II:
Damped free vibration: Viscous damping, under damping, critical damping, coulomb damping, equivalent damping coefficient

UNIT-IV

SINGLE DEGREE FREEDOM SYSTEMS WITH FORCED VIBRATIONS:
Steady state forced vibration, sources of excitation, impressed harmonic force, impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping, General theory of seismic instruments, accelerometer and vibrometer, methods of vibration control, excitation reduction at source, system modification.

UNIT-V

TWO DEGREE FREEDOM SYSTEMS: Natural frequencies and modes of vibration by classical method of spring-mass system, forced vibration, dynamic vibration absorber

UNIT-VI

MULTI DEGREE FREEDOM SYSTEMS: Influence co-efficient method, damped mass and distributed mass systems, stodola method, Holzer's method, newtons iteration method, orthogonality of mode shapes.

UNIT-VII

VIBRATION IN CINTINUOUS SYSTEMS: Longitudinal vibration of bars, torsional vibrations of circular rods or shafts, lateral vibrations of beams and shafts.

UNIT-VIII

Whirling of shafts critical speed of shafts, Rayleigh's upper bound approximation, Dunkerley's lower bound approximation, critical speed of shafts with damping.

TEXT BOOK:

1. Mechanical Vibrations, G.K.Grover
2. Theory and practice of mechanical Vibrations, J.S.Rao and K.Gupta

REFERENCE BOOKS:

1. Vibration Theory and Applications, W.T.Thomson
2. Vibration problems in Engineering,Timeoshenko and Young

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(9A03805) GAS TURBINES AND JET PROPULSION
(Elective – III)

UNIT-I

Gas Turbine Operating Cycles: Simple open cycle gas turbine or air standard Brayton cycle, Actual Brayton cycle, the cycle air flow rate, the cycle work ratio, optimum pressure ratio or maximum cycle thermal efficiency, means of improving the efficiency and the specific out put of simple cycle.

UNIT-II

Gas Turbines; gas turbine applications, gas turbine advantages & disadvantages, energy flow & back work, deviation from ideal cycle, gas turbine with regeneration, thermal efficiency of gas turbine with & without regenerator, gas turbine engines, inter-cooling & reheating, turbojet engine, turbofan engine, turboprop engine.

UNIT-III

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

UNIT-IV

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

UNIT-V

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

UNIT-VI

Rocket Engines: Need for, applications- basic principle of operation and parameters of performance – classification, solid and liquid propellant rocket engines, advantages, domains of application – propellants – comparison of propulsion systems.

UNIT-VII

Rocket Technology: Flight mechanics, application thrust profiles, acceleration- staging of rockets, need for – feed systems, injectors and expansion nozzles – rocket transfer and ablative cooling.

UNIT-VIII

Testing & instrumentation - need for Cryogenics – advanced propulsion systems, elementary treatment of Electrical nuclear and plasma Arc Propulsion.

TEXT BOOKS:

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

REFERENCES BOOK:

1. Gas turbines , cohen , Rogers & Sarvana Muttoo , Addision Wiley & longman
2. Thermodynamics of propulsion, Hill & Paterson.
3. Rocket Propulsion , Sutton.
4. Element of Gas Turbines propulsion , Jack D Matingly, MGH

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(9A03806) GEOMETRIC MODELLING (ELECTIVE-IV)

UNIT- I

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

UNIT- II

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

UNIT- III

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

UNIT- IV

2-D viewing: The viewing pipe0line,viewing coordinat4 reference frame, window to view –port-co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus – beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT- V

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B- spline

curve, Bezier and B- spline surfaces, Basic illumination models, shading algorithms.

UNIT- VI

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

UNIT- VII

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

UNIT- VIII

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

TEXT BOOKS:

1. Mathematical Elememts for computer graphics,David 1 Rodgers,TMH
2. "Computer Graphics and Automation, M.C. Trivedi, Jaico Pub. Pearson Education

REFERENCES:

1. CAD/CAM Theory , Ibrahim Zeid,TMH
2. Computer Graphics second edition, Zhigand xiang,Roy Plastock, Schaum's outlines, Tata Mc-Graw Hill edition.
3. Computer Graphics, Steven Harrington,TMH
4. Principles of computer Graphics, Shalini Govil, PHI, 2005, Springer.
5. Computer Graphics Principles & Practice, C.Foley,Vandom,Fesner,Hughes,Pearson Pub. 2/e
6. Computer Graphics C version , Donald Hearn and M.Pauline Baker, Pearson,PHI

Question Paper Pattern: 5 Questions to be answered out of 8 questions.

Each question should not have more than 3 bits.

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B.Tech. IV-II Sem (M.E)	**T**	**P**	**C**
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(9A03807) COMPOSITE MATERIALS

(ELECTIVE – IV)

Unit-I

Introduction to Composite Materials: Introduction, Classification: Polymer Matrix Composites. Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber. Reinforced Composites and nature-made composites, and applications

Unit-II

Reinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and boron carbide. fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosets, Metal matrix and ceramic composites.

Unit-III

Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

Unit-IV

Macromechanical Analysis of a Lamina: Introduction ,Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.

Unit-V

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina. Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure. Envelopes, Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina

Unit-VI

Micromechanical Analysis of a Lamina: Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi Empirical Models ,Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

UNIT-VII

Macromechanical Analysis of Laminates: Introduction, Laminate Code, Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate , Hygrothermal Effects in a Laminate, Warpage of Laminates

UNIT-VIII

Failure Analysis and Design of Laminates: Introduction , Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite, Other Mechanical Design Issues

Text Books:

1. Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford University Press, 1994.
2. Mechanics of Composite Materials, R. M. Jones, Mc Graw

Hill Company, New York, 1975.

References:

1. Analysis and performance of fibre Composites, B. D. Agarwal and L. J. Broutman Wiley- Interscience, New York, 1980.
2. Mechanics of Composite Materials, Second Edition (Mechanical Engineering)- Autar K. Kaw, Publisher: CRC
3. Finite Element Analysis of Composite Materials, Ever J. Barbero , CRC Press, 2007.
4. Analysis of Laminated Composite Structures, L. R. Calcote, Van Nostrand Rainfold, New York, 1969.
5. Mechanics of Composite Materials and Structures, Madhujit Mukhopadhyay, University Press, 2009.
6. Composite Materials Science and Engineering, Krishan K. Chawla, Springer, 2009

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B.Tech. IV-II Sem (M.E)	**T**	**P**	**C**
	4	**0**	**4**

(9A03808) PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS (ELECTIVE-IV)

UNIT I NATURE AND SCOPE OF ENGINEERING ETHICS

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

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION

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

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY

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

UNIT IV GLOBAL ISSUES

Multinational corporations- Environmental ethics- Computer ethics and Weapons developments

UNIT V INTRODUCTION TO INTELLECTUAL PROPERTY

Meaning and Types of Intellectual Property, Intellectual Property Law Basics, Agencies responsible for intellectual property

registration, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT VI FOUNDATIONS OF TRADEMARKS

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

UNIT VII FOUNDATIONS OF COPYRIGHTS LAW

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

UNIT VIII FOUNDATIONS OF PATENT LAW

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

TEXT BOOKS:

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

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

REFERENCES:

1. Human values and Professional Ethics, Jayashree Suresh & B.S. Raghavan, S. Chand, 2009.

2. Engineering Ethics, Govindarajan, Natarajan and Senthilkumar, PHI, 2009.

3. A Text Book on Professional ethics and Human values, Nagarajan, New Age International, 2009.

4. Engineering Ethics, Charles & Fleddermann, Pearson, 2009.

5. Practical Approach to Intellectual Property rights, Rachana Singh Puri and Arvind Viswanathan, I.K. International Publishing House, New Delhi. 2010.

6. Business Ethics and Professional Values, A.B.Rao, Excel, 2009.