

**COURSE STRUCTURE  
AND  
DETAILED SYLLABUS**

**for**

**B.Tech Four Year Degree Course – I - IV year**

**in**

**MECHANICAL ENGINEERING (ME)**

(Applicable for the batches admitted from 2012-2013)



**SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY**  
(An Autonomous Institution approved by UGC and affiliated to JNTUH)  
Yamnampet, Ghatkesar, R.R.District-501 301.

**B.Tech in Mechanical Engineering**  
**COURSE STRUCTURE& SYLLABUS**

**I Year – I Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	121EN01	English-I	3	---	---	3	30	70
2	121MA01	Engineering Mathematics-I	3	2	---	3	30	70
3	121PH01	Engineering Physics-I	3	1	---	3	30	70
4	121CH01	Engineering Chemistry-I	2	1	---	2	30	70
5	121IIT01	Computer Programming	3	1	---	3	30	70
6	121ME01	Engineering Drawing-I	2	---	4	4	30	70
7	121EN71	English Language Lab-I	---	---	2	1	25	50
8	121PH71	Engineering Physics Lab – I	---	---	3/2	1	25	50
9	121CH71	Engineering Chemistry Lab	---	---	3/2	1	25	50
10	121IT71	Computer Programming Lab	---	---	3	2	25	50
11	121ME71	Engineering Workshop - I	---	---	3/2	1	25	50
12	121IT72	IT Workshop - I	---	---	3/2	1	25	50
<b>Total</b>			<b>16</b>	<b>5</b>	<b>15</b>	<b>25</b>	<b>330</b>	<b>720</b>

**I Year – II Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	121EN02	English-II	2	1	----	2	30	70
2	121MA03	Engineering Mathematics-II	3	2	---	3	30	70
3	121CS01	Data Structures and C++	4	1	---	4	30	70
4	121ME02	Engineering Drawing-II	1	---	3	2	30	70
5	121CH02	Engineering Chemistry-II	2	1	---	2	30	70
6	121ME03	Engineering Mechanics	4	1	---	4	30	70
7	121PH03	Applied Physics	3	1	---	3	30	70
8	121EN72	English Language Lab-II	---	---	2	1	25	50
9	121CS71	Data Structures and C++ Lab	---	---	3	2	25	50
10	121ME72	Engineering Workshop-II	---	---	3/2	1	25	50
11	121PH73	Applied Physics Lab	---	---	3/2	1	25	50
<b>Total</b>			<b>19</b>	<b>7</b>	<b>11</b>	<b>25</b>	<b>310</b>	<b>690</b>

**II Year – I Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	121MA05	Engineering Mathematics -III	3	2	---	3	30	70
2	121EC01	Electronics for Mechanical Engineering	3	1	---	3	30	70
3	121ME06	Thermodynamics	4	1	---	4	30	70
4	121ME07	Mechanics of Solids	3	1	---	3	30	70
5	121ME08	Metallurgy & Material Science	3	1	---	3	30	70
6	121EE41	Basic Electrical Engineering	3	2	---	3	30	70
7	121EN74	Effective English Communication and Soft Skills	---	---	2	2	25	50
8	121EE91	Basic Electrical Engineering Lab	---	---	3/2	1	25	50
9	121EC84	Basic Electronics Lab	---	---	3/2	1	25	50
10	121ME73	Metallurgy Lab	---	---	3/2	1	25	50
11	121ME74	Mechanics of Solids Lab	---	---	3/2	1	25	50
<b>Total</b>			<b>19</b>	<b>8</b>	<b>8</b>	<b>25</b>	<b>305</b>	<b>670</b>

**II Year – II Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	121BT06	Environmental Studies	3	1	---	3	30	70
2	121MA09	Probability and Statistics	3	2	---	3	30	70
3	121ME09	Applied Thermodynamics-I	3	1	---	3	30	70
4	121ME10	Manufacturing processes	3	1	---	3	30	70
5	121ME11	Fluid Mechanics & Hydraulic Machinery	3	1	---	3	30	70
6	121ME12	Machine Drawing	1	---	6	3	30	70
7	121EN74	Effective English Communication and Soft Skills	---	---	2	2	25	50
8	121ME75	Comprehensive Viva	---	---	---	1	---	50
9	121ME76	Manufacturing Processes Lab	---	---	3	2	25	50
10	121ME77	Fluid Mechanics & Hydraulic Machinery Lab	---	---	3	2	25	50
<b>Total</b>			<b>16</b>	<b>6</b>	<b>14</b>	<b>25</b>	<b>255</b>	<b>620</b>

**III Year – I Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1		Open Elective-I	3	--	---	3	30	70
2	3B511	Kinematics of Machinery	3	1	---	3	30	70
3	3B512	Metal Cutting & Machine Tools	3	1	---	3	30	70
4	3B513	Applied Thermodynamics-II	3	1	---	3	30	70
5	3B514	Design of Machine Members-I	3	1	---	3	30	70
6	3ZC01	Managerial Economics and Financial Analysis	3	1	---	3	30	70
7	3HC76	Quantitative Aptitude	---	---	2	1	25	50
8	3B578	Group Project	---	---	3	1	25	50
9	3B579	Applied Thermodynamics Lab	---	---	3	2	25	50
10	3B580	Machine Tools Lab	---	---	3	2	25	50
11	3B590	Technical paper writing & seminar-I	---	---	2	1	25	---
<b>Total</b>			<b>18</b>	<b>5</b>	<b>13</b>	<b>25</b>	<b>305</b>	<b>620</b>

**Open Elective – I**

3HC51	Basic Spanish Language	3FC03	Data Base Management Systems
3HC41	Basic French Language	3EC03	Java Programming
3HC46	Basic German Language	3B515	Product design and Service
3FC06	Computer Graphics	3ZC04	Entrepreneurship

**III Year – II Semester**

S.No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	3B515	Metrology & Instrumentation	3	1	---	3	30	70
2		<b>Open elective - II</b>	3	1	---	3	30	70
3	3B617	Design of Machine Members-II	3	1	---	3	30	70
4	3B618	Heat Transfer	3	1	---	3	30	70
5	3B619	CAD/CAM	3	1	---	3	30	70
6	3B620	Dynamics of Machinery	3	1	---	3	30	70
7	3HC77	Logical Reasoning	---	---	2	1	25	50
8	3B681	Comprehensive Viva-voce-II	---	---	---	1	--	50
9	3B682	Heat Transfer Lab	---	---	3	2	25	50
10	3B683	Metrology & Instrumentation Lab	---	---	3	2	25	50
11	3B691	Technical Paper Writing & Seminar-II	---	---	2	1	25	---
<b>Total</b>			<b>18</b>	<b>6</b>	<b>10</b>	<b>25</b>	<b>280</b>	<b>620</b>

**Open Elective – II**

3ZC11	Logistics and Supply chain management
3ZC05	General management and Entrepreneurship
3ZC03	Banking operations, Insurance and Risk Management
3ZC09	Total Quality Management
3ZC07	Fundamentals of Disaster Management

\*\*\* Industry Oriented Min Project will be conducted by all students in summer vacation of III/IV B.Tech, II semester for a period of One month. The report must be submitted in IV/IV B.Tech I-Semester and will have to be

### IV Year – I Semester

S. No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	3B721	Principle of Finite Element Method	4	---	---	4	30	70
2	3B722	Refrigeration & Air Conditioning	4	---	---	4	30	70
3	3B723	Power Plant Engineering	3	1	---	3	30	70
4		<b>Professional Elective-I</b>	3	1	---	3	30	70
5		<b>Professional Elective-II</b>	3	1	---	3	30	70
6	3B724	Operations Research	3	1	---	3	30	70.
7	3GC33	Culture, Values, and Professional Ethics	2	1	---	2	30	70
8	3B784	Project:- Phase-I	---	---	2	1	50	---
9	3B785	Industry Oriented Mini Project	---	---	---	2	25	50
10	3B786	CAD/CAM Lab	---	---	3	2	25	50
11	3B787	Production Drawing Practice Lab	---	---	3	2	25	50
12	3B792	Technical Paper Writing & Seminar-III	---	---	2	1	25	---
<b>Total</b>			<b>22</b>	<b>5</b>	<b>10</b>	<b>30</b>	<b>360</b>	<b>640</b>

#### Professional Elective – I

3B725	Production Planning and Control
3B726	Automobile Engineering
3B727	Non-conventional Sources of Energy
3B728	Jet Propulsion and Rocket Engines

#### Professional Elective – II

3B729	Robotics
3B730	Mechatronics
3B731	Design for Manufacturing
3B732	Rapid Prototyping

### IV Year – II Semester

S. No.	Subject Code	Subject	L	T	P/D	C	Max. Marks	
							INT	EXT
1	3ZC02	Management Science	3	1	---	3	30	70
2		<b>Professional Elective - III</b>	4	---	---	4	30	70
3	3B888	Project:- Phase-II	---	---	15	10	50	150
4	3B889	Comprehensive Viva-voce-III	---	---	---	2	---	50
5	3B893	Technical Paper Writing & Seminar-IV	---	---	2	1	25	---
<b>Total</b>			<b>7</b>	<b>1</b>	<b>17</b>	<b>20</b>	<b>135</b>	<b>340</b>

#### Professional Elective – III

3B733	Automation in Manufacturing
3B734	Computational Fluid Dynamics
3B735	Quality control and Reliability Engineering
3B736	Nano Technology

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering  
English – I  
(Common to all branches)  
(English Language Teaching Through Literature)**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

**UNIT I: NOBLE THOUGHT**

1. **Reading** : The Last Leaf – O. Henry
2. **Writing** : Paragraph writing
3. **Listening** : Listening for sounds
4. **Speaking** : Greeting, taking leave and introducing
5. **Grammar** : Naming words
6. **Vocabulary** : Homonyms, homophones, homographs, synonyms and Antonyms

**UNIT II: BIOGRAPHY**

1. **Reading** : Sri C.V. Raman- Shubashree Desikan
2. **Listening** : Listening for words
3. **Speaking** : Making requests
4. **Grammar** : Naming words specific (Part I)
5. **Vocabulary** : Word Formation

**UNIT III: HUMAN INTEREST**

1. **Reading** : The Connoisseur- Nergis Dalal
2. **Writing** : Summarizing
3. **Listening** : Listening for word stress
4. **Speaking** : Apologizing and inviting
5. **Grammar** : Making naming words specific (part 2)
6. **Vocabulary** : Collocations

**UNIT IV: DISASTER MANAGEMENT**

1. **Reading** : The Cuddalore Experience-Anu George
2. **Writing** : Basics of Essay Writing
3. **Listening** : Listening for theme
4. **Speaking** : Congratulating, offering sympathy, condolences

- and making complaints
5. **Grammar** : Tenses

**UNIT V: HUMOUR**

1. **Reading** : The Luncheon – Somerset Maugham
2. **Writing** : Note making
3. **Listening** : Listening for details and taking notes
4. **Speaking** : Interview skills
5. **Grammar** : Adverbials and modal verbs

**UNIT VI: Outlook**

1. **Reading** : Indian Crowds – Nirad C. Choudhary
2. **Writing** : Information transfer
3. **Listening** : Listening to announcements and directions
4. **Speaking** : Making presentations
5. **Grammar** : Conjunctions and prepositions
6. **Vocabulary** : Business vocabulary

**Text Books:**

- **Enjoying Everyday English: A Rama Krishna Rao, Sangam Books, HYD.**

**Reference Books:**

1. **Business Vocabulary In Use -Bill Mascull, Cambridge University Press.**
2. **How to build a better vocabulary –Nurnberg Maxwell & Morris Rosenblum: Grand Central Publishers**
3. **How to read better and faster: Norman Lewis, W.R.Goyal Publishers, New Delhi**

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**CODE: 121MA01 ENGINEERING MATHEMATICS –I**

(Common to all branches except Bio-Technology)

L	T	P/D	C
3	2	0	3

**UNIT-I**

**Sequences and series:** Sequences and series- Convergence and divergence – Comparison test – integral test – Cauchy root test – Ratio test– Raabe’s test – Log test. Mean value theorems – Taylor’s and Maclaurin’s theorems without remainders and Taylor’s series expansions.

**UNIT-II**

**Functions of several variables :**

Functions of several variables, total differentiation, Jacobians and its properties, Maxima and Minima of functions of several variables (two and three variables), Lagrange’s method of multipliers.

**UNIT-III**

**Matrix Theory-I :**

Elementary Transformations, rank of a matrix –Echelon form, normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using Gauss elimination. Linear dependence and independence of vectors.

**UNIT-IV**

**Matrix Theory-II :**

Characteristic roots and vectors of a matrix, properties of Eigen values and Eigen Vectors, Caley-Hamilton theorem and its applications, Diagonalization of a matrix.

**UNIT-V**

**Multiple integrals:**

Double and triple integrals, change of order of integration and change of variables. Length of curves. Area of regions and Volume of solid of revolution

**UNIT-VI**

**Vector Calculus:**

Scalar and vector fields , vector differentiation, level surfaces, directional derivative, gradient of a scalar field, divergence and curl of a vector field, Laplacian operator and related properties. Line and surface integrals, verification of problems on Green’s theorem in plane, Gauss-Divergence theorem, Stoke’s theorem.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, S. R. K. Iyengar and R.K. Jain, Narosa Publishing House, London, 2002.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
3. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill Publishing Company Ltd.

**REFERENCE BOOKS:**

1. A text Book of KREYSZIG’s Engineering Mathematics, Dr. A. Ramakrishna Prasad, Wiley Publications.
2. A text book of Engineering Mathematics, Dr.M. Venkata Krishna, G.Shankar Rao,Galgotia Publications,New Delhi



**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

Code: 121PH01

**Engineering Physics – 1**

(Common to all branches)

L	T	P/D	C
3	1	--	3

**UNIT - I**

**Crystallography and Crystal Structures:** Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, and hcp Structures.

**UNIT-II**

**X-ray Diffraction:** Basic Principles, Bragg's Law, Powder Method, Applications of X-ray Diffraction.

**Defects in Crystals:** Point Defects: Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects- Calculation of concentration, Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger's Vector.

**UNIT- III**

**Elements of Statistical Mechanics:** Phase space, Ensemble, Difference between micro, canonical & grand canonical ensemble, Qualitative explanation of Maxwell - Boltzman Statistics, Bose – Einstein Statistics, and Fermi – Dirac Statistics, Density of states quantitative treatment.

**UNIT-IV**

**Principles of Quantum Mechanics:** Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, G. P. Thomson Experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation -Physical Significance of the Wave Function -Particle in One Dimensional Potential Box.

**UNIT-V**

**Free electron theory of Metals:** Classical free electron theory (Drunde and Lorentz), Electrical conductivity of a metals, Relaxation time, Collision time and mean free path, Success of classical free electron theory, Breakdown of free electron theory, Fermi – Dirac distribution function- variation with temperature, The quantum free electron theory.

**UNIT-VI**

**Band Theory of Solids:** Bloch Theorem, Kronig-Penny Model (Qualitative Treatment), E-K curve, velocity of , point of inflection,  $\bar{e}$  effective mass of an electron and its significance, Origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators.

**Text Books:**

1. Engineering Physics, P K Palanisamy, Sitech Publications

**Reference Books:**

1. Introduction to Solid State Physics, Charles Kittel, John Wiley Publisher
2. Solid State Physics, Neil W. Ashcroft, N. David Mermin,, Thomson Publisher,
3. Statistical Mechanics, Donald Allan McQuarrie, University Science Books Publisher, California
4. Statistical Mechanics, Sathya Prakash, Pragathi Prakashan Publisher
5. Quantum Mechanics by G. Aruldas
6. Applied Physics, M Chandrashekar and P Appla Naidu, VGS Book Links

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121CH01**

**ENGINEERING CHEMISTRY-I**  
(Common to EEE, ME, ECE, CSE, IT, ECM and BT)

L	T	P/D	C
2	1	-	2

**UNIT-I: WATER TECHNOLOGY-I**

Introduction ,Effect of water on Rocks and Minerals, Types of impurities in Water, Hardness of Water- Temporary and permanent hardness. Units and Inter conversion of Units. Estimation of Hardness by EDTA Method. Problems on Temporary and permanent Hardness. Disadvantages of Hard Water. Portable water, Methods of Treatment of Water for Domestic purpose- Sedimentation, Coagulation, Filtration, Disinfection-Chlorination, Ozonization. Reverse osmosis

**UNIT-II: WATER TECHNOLOGY-II**

Water for Industrial purpose –water for steam making-Boiler Troubles-Carry over-Priming and foaming, Boiler Corrosion, Scales and Sludges, Caustic Embrittlement. Water Treatment:-Internal Treatment – colloidal, phosphate Calgon, Carbonate, Sodium aluminate conditioning of Water. External Treatment-Lime soda Process, Zeolite Process, Ion –Exchange Process, -Numerical Problems.

**UNIT III: ELECTROCHEMISTRY**

Conductance-types, Electrolytic conductance-specific, equivalent and molar conductance, ionic conductance, ionic mobilities, Kohlrausch's law and its applications. EMF: Galvanic Cells, types of Electrodes, Reference Electrode (SCE), Redox electrode (Quinhydrone electrode), Ion Selective Electrodes (Glass Electrode) Nernst equation and its applications, Potentiometric titrations, Numerical problems.

**UNIT IV: BATTERIES**

Cell and Battery, Primary and secondary cells, (Ni-Cd cell, Lithium ion cells, lead-Acid cell,). Applications of batteries, Fuel cells – Hydrogen – Oxygen fuel cell, Advantages of fuel cells.

**UNIT V: SCIENCE OF CORROSION**

Definition, Examples – Types of Corrosion: Theories of Corrosion and Mechanism – Dry Corrosion, (Direct Chemical attack), Wet Corrosion, (Electro Chemical Theory) Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion. Factors influencing Corrosion Control of Corrosion – Proper Design. Use of pure metal and metal alloys, Passivity, Cathodic Protection – Sacrificial anode and Impressed Current Modifying the Environment, use of Inhibitors.

**UNIT VI: PROTECTIVE COATING AND METHODS THEIR APPLICATIONS ON METALS**

Surface Preparation: (1) Solvent Cleaning (2) Alkali Cleaning (3) Pickling and Etching (4) Sand Blasting (5) Mechanical Cleaning. Types of protective Coating: Metallic Coatings – Anodic Coatings, Galvanization, Cathodic Coatings – Tinning, Metal Cladding, Electroplating Ex: Chromium Plating, Metal Spraying, Cementation Sharadizing, Colourizing, Chromizing, Chemical Conversion Coating: (1) Phosphate (2) Chromate (3) Anodized Coatings.

Organic Coatings: Paints – Constituents and their functions

**Text Books:**

1. Engineering Chemistry: Dr.M.Tirumala Chary and Dr.E.Laxminarayana, Scitech publications.
2. Engineering Chemistry: P.K. Jain and M.K. Jain, Dhanpathrai Publications – 14<sup>th</sup> Edition

**Reference Books:**

1. Essentials of Physical chemistry; Baul & Tuli; S. Chand Publications.
2. Text of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co, New Delhi (2006)
3. Chemistry of Engineering Materials by CV Agarwal, C.P Murthy, A.Naidu, BS Publications.
4. Engineering Chemistry by R. P. Mani, K. N. Krishna B. Rama Devi Cengage Learning New Delhi (2010).
5. Engineering Chemistry by Shiva Shnakar Tata McGraw Hill (2010).

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

Code: 121IT01

**COMPUTER PROGRAMMING  
(Common to All Branches)**

L	T	P/D	C
3	1	-	3

**UNIT – I**

**Computer fundamentals** – Computer Systems, Computer Hardware, Computer Software, Computer Environments – Personal Computing Environment, Time-sharing Environment, Client/Server Environment, Distributed Computing, Computer Languages – Machine Languages, Symbolic Languages, High-Level Languages, Creating and running programs – Writing and Editing, compiling, linking, and executing programs, System Development – SDLC (Pages 1 – 28 of Text Book 1).

**Problem solving Techniques** – Algorithms, pseudo code, flowcharts – Simple illustrations and domain problems like: Sum of digits of a number, Nature of quadratic equations, Income Tax Problem, Standard Deviation (Pages 1019 – 1032 of Text Book 1).

**UNIT – II**

**Introduction to the C language** – Background, C Programs, Structure of a C Program, Comments, the greeting program, identifiers, constants, variables and keywords.

**Types** – void, integral, and floating-point types. **Variables** – declarations and initialization. Input / Output – Streams, Formatting input and output (Pages 29 – 76 of Text Book 1).

**Expressions** – Primary expressions, post-fix expressions, pre-fix expressions, unary expressions, binary expressions, Precedence and associativity, evaluating expressions, type conversions – implicit type conversion, explicit type conversion, statements – statement type, role of semicolon, statements and defined constants (Pages 94 – 134 of Text Book 1).

**Decision control structures** – Logical data and operators, Two-way selection – if..else, nested if, dangling else, conditional expressions, Multi-way selection – switch statement, else-if (231 – 263 of Text Book 1).

**UNIT – III**

**Repetitive control structures** – Pre-test and post-test loops – initialization and updation, event and counter controlled loops, while, do..while, for, break and continue statements, comma expression (Pages 303 – 348 of Text Book 1).

**Functions** – User-defined functions - Function definition, arguments, return value, prototype, arguments and parameters, inner-function communication. Standard functions – Math functions, Random numbers. Scope – local global (Pages 149 – 199 of Text Book 1).

**Parameter passing** – Call by value and call by reference.

**Recursive functions** – Definition, examples, advantages and disadvantages (Pages 349 – 359 of Text Book 1).

**Macros** – Definition, examples, comparison with functions.

**UNIT – IV**

**Arrays** – Definition and declaration, initialization, accessing elements of in arrays, storing values in arrays, inter-function communication – passing individual elements, passing the whole array, array applications, bubble sort, sequential search. Two dimensional and multidimensional arrays (Pages 459 – 487 and 493, 501 of Text Book 1).

## UNIT – V

**Pointers** – Introduction, pointer constants, pointer values, pointer variables, accessing variables through pointers, pointer declaration and definition, declaration versus redirection, initialization of pointer variables, pointer for inter function communication, pointer to pointers (Pages 557 – 577 of Text Book 1).

**Arrays and pointers** – Pointer arithmetic and arrays, Memory allocation functions – static and dynamic memory allocation, array of pointers (Pages 612 – 633 of Text Book 1).

**Strings** – Input output functions, string handling functions.

## UNIT – VI

**Enumerated, Structure, and Union types** – The type definition (typedef), enumerated types, Structure, Unions (Pages 745 – 786 of Text Book 1).

**Files** – File name, file information table, streams, text and binary streams, stream file processing, system created streams, Standard library I/O functions, file open and close, formatting I/O functions, character I/O functions, Binary I/O, Standard library functions (Pages 393 – 441, 821 – 840 of Text Book 1).

### Text Books:

1. Computer science, a structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.

### References:

1. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education.
2. Let us C by Yashwanth P. Kanetkar 8<sup>th</sup> edition BPB publications.
3. Computer programming for teens by Mary Farrell.

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121ME01      ENGINEERING DRAWING – I  
(Common to all branches)**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
2	---	4	4

**UNIT – I**

**Introduction to Engineering Drawing:** Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning.

**Construction of polygons:** Inscription and superscription of polygons given the diameter of circle.

**Introduction To Scales (Theory Only):** Scales used in Engineering Practice and Concept Of Representative Fraction

**Curves used in Engineering Practice and their Constructions:**

Conic Sections including Rectangular Hyperbola - General method only.

**UNIT – II**

**Drawing of Projections / Views (Orthographic Projection in First Angle Projection Only):** Principles of Orthographic Projections – Conventions – First and Third Angle Projections, Projection of Points, Projection of Lines - inclined to both planes, True lengths, traces.

**UNIT – III**

**Projections of Planes:** Projections of Regular Planes, traces, Oblique planes, Introduction to Auxiliary planes.

**UNIT –IV**

**Projections of Solids:** Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes.

**UNIT –V**

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

**UNIT –VI**

**Intersection of Similar and Dis-similar Solids:** Line method, Cutting plane method, Intersection of Prism Vs Prism, Cylinders Vs Cylinder (Under Similar category) and Cylinder Vs Prism (Under Dis-similar category)

**TEXT BOOKS:**

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kanniah / Scietech publishers.

**REFERENCES:**

1. Engineering Drawing, K.Venugopal/G.Sreekanjana, New Age International Publishers.
2. Engineering Drawing, B.V.R.Gupta, M.Raja Roy/I.K.International Publishing House,

## Syllabus for B. Tech. I Year I semester Mechanical Engineering

**CODE: 121EN71****ENGLISH LANGUAGE LAB – I**

L	T	P/D	C
---	---	2	1

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

**Objectives:**

1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of listening and learning the sounds of English language i.e. phonetics from the computer monitor, thus preparing them for the correct pronunciation and language fluency.
3. To train them to converse effectively in different situations of life.
4. To help the students in producing effective oral presentations, and to enable them for extempore.

**Syllabus:**

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

1. Introduction to the Sounds of English – Vowels, Diphthongs & Consonants.
2. Situational Dialogues/Role Play
3. Oral Presentations-Prepared and Extempore
4. 'Just A Minute' Sessions (JAM)
5. Describing Objects/Situations/People
6. Information Transfer

**Minimum Lab Requirements**

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-vusyak 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:

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

**Suggested Software:**

- \* Pro Power Pronunciation Software
- \* Hi Class system Monitoring Software.
- \* A.P.State Council of Higher Education Software (Foundation Course in communication skills)
- \* Face to Face elementary and Pre –intermediate CDs.
- \* Cambridge Advanced Learners' English Dictionary with CD
- \* Learn to speak English book + CD set. (Set of 4 CDs)
- \* Mastering English (CD).
- \* DOKI English CD

**REFERENCES:**

1. English Conversation Practice by Grant Taylor, Tata Mc.Graw Hill
2. Speaking Effectively, Cambridge University Press
3. A text book of English Phonetics for Indian Students by T. Balasubramanian Mac Millan

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121PH71**

**Engineering Physics Lab – 1  
(Common to All Branches)**

L	T	P/D	C
--	--	3/2	1

1. Calculation of error – Error estimation
2. Determination of wavelength of a given laser Source of light by using diffraction grating
3. To find frequency of tuning fork – Melde’s experiment
4. To find the frequency of ac signal generator – A c Sonometer
5. R C Network
6. L C R series and parallel resonance
7. Determination of rigidity modulus of a given wire – Torsional pendulum
8. Plank’s constant
9. Determination of the acceleration due to gravity by compound pendulum.

**Note:** Any six of the above nine Experiments are to be conducted.

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121CH71      ENGINEERING CHEMISTRY LAB**  
(Common to EEE, ME, ECE, CSE, IT, ECM and BT)

L	T	P	C
-	-	3/2	1

**Minimum any Six of the following Experiments**

1. Estimation of  $\text{MnO}_2$  in Pyrolusite.
2. Estimation of Hardness of water.
3. Estimation of  $\text{Mn}^{+2}$  /  $\text{Cu}^{+2}$  ions by colorimetry.
4. Estimation of acid by conductometric titrations.
5. Estimation of acid by potentiometric titrations.
6. Determination of viscosity.
7. a) Preparation of Aspirin  
b) Preparation of Polymer (Thiokol rubber).
8. Determination of Flash and Fire point of a fuel using Abel's / Pensky – Martin's Apparatus.
9. Determination of Calorific value of a solid fuel by Bomb Colorimeter.
10. Grease n penetration Test.



**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121IT71**

**COMPUTER PROGRAMMING LAB  
(Common to all Branches)**

L	T	P/D	C
-	-	3	2

**Unit I (Cycle 1)**

1. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
2. Write an algorithm to find the largest of three given numbers and draw a flowchart.
3. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
4. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.

**Unit II (Cycle 2)**

1. Write an algorithm, flowchart, and C program for:
  1. Finding the area and circumference of a circle of given radius.
  2. Finding the volume of a sphere of given radius.
  3. Finding the lateral surface area of a right circular cone of given base radius and height.
  4. Finding selling price of an item, given its cost price and profit percent.
  5. Finding the interest on a given principal for a given period of time at a given rate of per year.
2. Write a C program to display all the sizes of data types in C.
3. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.

**Unit II (Cycle 3)**

1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
2. Write a C program for finding the largest of three given numbers.
3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.

**Unit III (Cycle 4)**

1. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
2. Write a C program to compute the sum of:
  - a)  $1+x+x^2+x^3+\dots+x^n$ , given x and n.
  - b)  $1! + 2! + 3! + \dots + n!$ , given n.
  - c)  $1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10! + \dots$  to n terms where the  $n^{\text{th}}$  term becomes less than 0.0001.

**Unit III (Cycle 5)**

1. Write a C program in the menu driven style to perform the operations +, -, \*, /, % between two given integers.
2. Write a C program to find the largest and the least of some numbers given by the user.
3. Write a C program to find the sum of the digits of a positive integer.

**Unit III (Cycle 6)**

1. Write C functions for the following:
  1. A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
  2. A function that takes a real number x and a positive integer n as arguments and returns  $x^n$ .
  3. A function that takes a positive integer n as an argument and returns the  $n^{\text{th}}$  Fibonacci number.
4. Using recursion write C functions for the following:
  1. Factorial of a non-negative integer n.
  2. Number of combinations of n things taken r at a time.

3. Greatest Common Divisor of two integers.
4. Least Common Multiple of two integers.

### Unit III (Cycle 7)

1. Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
2. Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
  - .Larger of two numbers.
  - Smaller of two numbers.
  - Sum of the squares of two numbers.
3. Write a program to generate Pascal's triangle.
4. Write a program to count the number of letters, words, and lines in a given text.

### Unit IV (Cycle 8)

1. Write a program to store the numbers given by the user in an array, and then to find the mean, deviations of the given values from the mean, and variance.
5. Write a C program to initially store user given numbers in an array, display them and then to insert a given number at a given location and to delete a number at a given location.
6. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

### Unit IV (Cycle 9)

1. Write a C program to implement the operations of matrices – addition, subtraction, multiplication.
2. Write a program to find whether a given matrix is symmetric, lower triangular, upper triangular, diagonal, scalar, or unit matrix.

### Unit V (Cycle 10)

1. Write a function to swap two numbers.
2. Write a function to compute area and circumference of a circle, having area and circumference as pointer arguments and radius as an ordinary argument.

### Unit VI (Cycle 11)

1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
2. Define a structure point. Write a program to find the distance between two points.
3. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.

### Unit VI (Cycle 12)

Write a program to:

1. Create a file by the name given by the user or by command line argument and add the text given by the user to that file.

1. Open the file created above and display the contents of the file.
2. Copy a file into some other file, file names given by the user or by command line arguments.
3. Append a user mentioned file to another file.
4. Reverse the first n characters of a file.

**Syllabus for B. Tech. I Year I semester  
Mechanical Engineering**

**Code: 121ME71      ENGINEERING WORKSHOP – I  
(Common to all branches)**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
---	---	3/2	1

**1. House Wiring**

To connect the Tube Light as per circuit diagram  
To connect the Calling Bell as per circuit diagram

**2. Home Appliances**

Practice of disassembly and assembly of various home appliances (such as Fans, Mixers, Washing machines etc.,

**3. Welding**

Preparation and welding of Lap Joint  
Preparation and welding of Butt Joint

## Syllabus for B. Tech. I Year I semester Mechanical Engineering

Code: 121IT72

### IT WORKSHOP - I

L	T	P/D	C
-	-	3/2	1

**Week1:**

**Introduction to Computer:** Identify the peripherals of a computer, components/peripherals in a CPU & its functions. Introduction to the types of Operating System, Install computer with dual boot operating system (windows, Linux with PowerPoint presentation). Comparison of types of OS in different platform.

**Week 2:** Assembling and Deassembling Praticals

**Week 3:**

**Introduction to Microsoft Windows XP:** Software and data, Components of Desktop, Working with windows

**Week 4:**

**Getting Started with Microsoft Windows XP:** Using the Start Menu, Obainting Help on Windows Changing Setting, Using Applications in Windows, Shutting Down Windows

**Week 5:**

Introduction to Linux Operating system, Linux Commands, DOS commands

**Week 6:**

Install computer applications in Linux and windows.

Software and hardware trouble shoot, personal computer security settings and application software of the system.

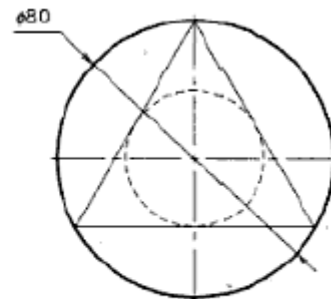
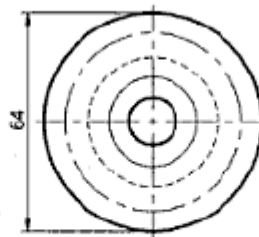
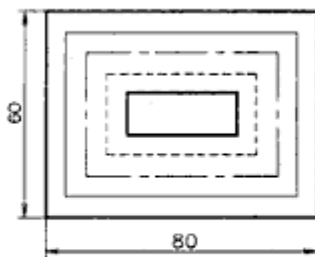
**Cyber Ethics:** Access websites and email, effectively and securely browse (banksites, https webpages) and share the data, categories of websites (.com, .in, .edu, .org).

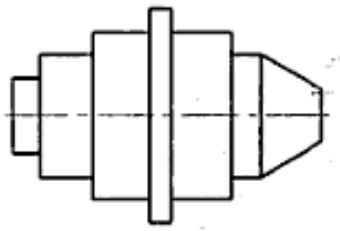
**Week 7: Drafting of 2D Figures:**

Draw commands – Line, Rectangle, Circle, Arc, Polygon, Ellipse, Hatch, text – Various methods of using these commands.

Modify commands – Erase, Move, Rotate, Copy object, Offset, Array, Mirror, Break, Trim, Extend, Stretch, Chamfer, Fllet, Scale etc.,

Dimensioning commands –Dimensioning of lines, arcs

**Simple Exercises on drawing using AUTOCAD:**



Axle.

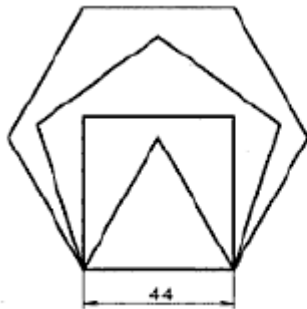


Fig. 25.28 Geometrical shapes.

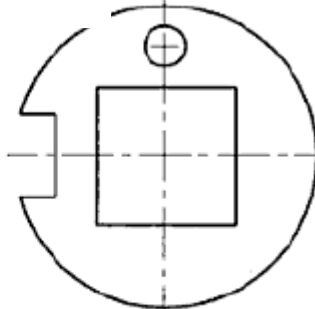
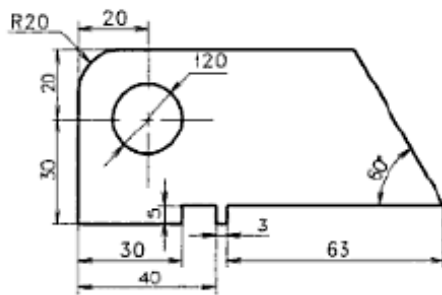
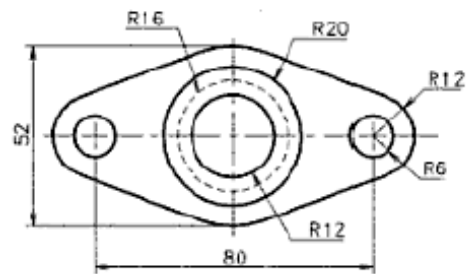


Fig. 25.29 A block washer.



A template.



Gland.

**TEXT BOOK:**

1. "Comdex Information Technology Course Kit" by Vikas Gupta, Dreamtech Press
2. Engineering Drawing with AutoCAD by R.B.Choudary/ Anuradha Publishers.

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

Code: 121EN02

**ENGLISH – II  
(English Language Teaching Through Literature)  
(Common to All Branches)**

L	T	P/D	C
2	1	--	2

**UNIT – I**

- |            |                     |
|------------|---------------------|
| 1. Speech  | : Swami Vivekananda |
| 2. Grammar | : Phrasal Verbs     |

**UNIT – II**

- |                |                                  |
|----------------|----------------------------------|
| 1. Short Story | : Ha' Penny – Alan Paton         |
| 2. Grammar     | : Concord-Subject-Verb Agreement |

**UNIT – III**

- |            |  |
|------------|--|
| 1. Letter  | : Abraham Lincoln's Letter to His Son's Teacher  |
| 2. Grammar | : Sentence Construction-I<br>(Kinds of Sentences-Assertive, Imperative,<br>Interrogative, Exclamatory) |

**UNIT – IV**

- |                |   |
|----------------|---|
| 1. Short Story | : The Only American From Our Village by Arun Joshi                  |
| 2. Grammar     | : Sentence Construction-II<br>(Simple, Compound, Complex sentences) |

**UNIT – V**

- |            |                               |
|------------|-------------------------------|
| 1. Essay   | : 'Of Studies' -Francis Bacon |
| 2. Grammar | : Idioms                      |

**UNIT –VI**

- |                |  |
|----------------|--|
| 1. Speech      | : Polonious Speech –An extract from<br>Shakespeare's <i>Hamlet</i> |
| 2. Short Story | : Luck – Mark Twain  |

**Text Books:**

1. **Inspiring Speeches and Lives**; B. Yadava Raju, Maruthi Publications, Guntur.
2. **Vignettes of Life (A collection of short stories by T. Padma)**, McMillan India Ltd.

**Reference Books:**

1. **Barron's TOEFL**; Barron, Galgotias Publication Pvt. Ltd.
2. **A Modern Approach to Verbal And Non Verbal Reasoning** – R S Aggarwal, S.Chand Publications.

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

**CODE: 121MA03 ENGINEERING MATHEMATICS – II  
(Common to All Branches *except* Bio-Technology)**

L	T	P/D	C
3	2	-	3

**UNIT-I**

**Ordinary Differential Equations Of First Order:** Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications- law of natural growth and decay and Newton’s law of cooling, Orthogonal Trajectories.

**UNIT-II**

**Ordinary Linear Differential Equations Of Higher Order:** Linear differential equations of second and higher orders with constants coefficients – Method of variation of parameters – Systems of linear differential equations with constant coefficients.

**UNIT-III****Partial Differential Equations:**

Partial differential equations : Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear equation – Non-linear (Standard type) equations , Method of separation of variables.

**UNIT-IV****Laplace Transformations:**

Laplace Transformations – Laplace transform, Shifting theorems, Multiplication by powers of t, Division by t, Laplace transform of Unit Step function, Impulse function, and periodic functions.

**Inverse Laplace transforms:**

Inverse Laplace transform, Shifting theorems, Partial fraction method, convolution theorem (without proof), solutions of ordinary differential equations with constant coefficients

**UNIT-V****Z- transforms:**

Z- transforms – Inverse Z- transforms – properties – Damping rule – Shifting rules – Initial and final value theorems – Convolution theorem – Solution of difference equation by Z- transforms

**UNIT-IV**

**Fourier series:** Fourier series – Even and Odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine series.

**Fourier Transforms:**

Fourier transformation, sine and cosine transformations, Finite Fourier transforms, parseval’s identities.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, S. R. K. Iyengar and R.K. Jain, Narosa Publishing House, London, 2002.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
3. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill Publishing Company Ltd.

**REFERENCE BOOKS:**

1. A text Book of KREYSZIG’s Engineering Mathematics, Dr. A. Ramakrishna Prasad, Wiley Publications.
2. A text book of Engineering Mathematics, Dr.M. Venkata Krishna, G.Shankar Rao,Galgotia Publications,New Delhi

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

**Code: 121CS01      DATA STRUCTURES AND C++  
(Common to All Branches)**

L	T	P/D	C
4	1	-	4

**UNIT – I**

Introduction to data structures: Abstract data type(ADT), Stacks and Queues circular queues and their implementation with arrays.Stack applications: infix to post fix conversion, postfix expression evaluation. Applications of queues.

**UNIT – II**

Singly linked lists, doubly linked lists, circular list and their operations, representing stacks and queues with linked lists.

**UNIT – III**

Trees- Binary trees, terminology, representation, traversals  
Graphs- terminology, representation, graph traversals (dfs & bfs).

**UNIT - IV**

Searching - Linear and binary search methods.  
Sorting - Bubble sort, selection sort, Insertion sort, Quick sort, merge sort.

**UNIT – V**

Introduction to C++ programming-object oriented programming concepts, Structured Vs OOP.  
Classes and objects-class definition, Objects, class scope and accessing members, Constructors-default constructor, parameterized constructor, constructor initialization list, copy constructor. Destructors.

**UNIT – VI**

Static class members, this pointer, friend functions, Dynamic memory management with operators new and delete.Overloading-function overloading, Operator overloading, restrictions on operator overloading, overloading unary and binary operators,templates, inheritance.

**TEXT BOOKS**

- 1.**Data Structure Through C by Yashavant Kanetkar.**
- 2.The complete reference C++ By Herb Schildt.
3. Data Structures, A pseudocode Approach with C by Richard F. Gilberg & Behrouz A. Forouzan.

**REFERENCES**

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. *Data Structures and Algorithms*. Addison Wesley, 1983.
2. Data Structures using c Aaron M.Tenenbaum , Yedidyah Langsam,Moshe J Augenstein.
3. Introduction To Data Structures In C By Kamtane



**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

Code: 121ME02

**ENGINEERING DRAWING – II  
(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
1	---	3	2

**UNIT – I**

**Scales:** Construction of Plain, Diagonal, Comparative, Vernier Scales and Scale of chords.

**UNIT – II**

**Development of Surfaces:** Development of Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their parts.

**UNIT – III**

**Isometric Projections/views:** 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.

Conversion of Orthographic Views to Isometric Views of simple objects.

**UNIT –IV**

**Transformation of Projections:** Conversion of isometric views to orthographic views of simple objects.

**UNIT –V**

**Perspective Projections:** Principle, Perspective elements, Perspective View of Points, Lines, Plane Figures and Simple Solids - Vanishing Point Method, Visual ray method.

**UNIT –VI**

**Introduction to Computer Aided Drafting:** Generation of points, lines, curves, polygons, simple solids, dimensioning.

**TEXT BOOKS:**

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kannaiah / Sciotech publishers.

**REFERENCES:**

1. Engineering graphics with Auto CAD- R.B Choudary / Anuradha Publishes
2. Engineering Drawing, K.Venugopal/G.Sreekanjana, New Age International Publishers.
3. Engineering Drawing, B.V.R.Gupta, M.Raja Roy/I.K.International Publishing House.

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

Code: 121CH02

**ENGINEERING CHEMISTRY-II**  
(Common to EEE, ME, ECE, CSE, IT and ECM)

L	T	P/D	C
2	1	-	2

**UNIT I: PHASE RULE**

Definitions – phase, component, degree of freedom, phase rule equation. Phase diagrams – one component system: Water system. Two component system lead – silver system, heat treatment based on iron carbon phase diagram, hardening, annealing.

**UNIT II: POLYMER TECHNOLOGY**

Polymers, terminology, Polymerization- Types of Polymerization – Addition and Condensation and Co-Polymerization. Plastics – Thermosetting and Thermoplastics – Preparation, Properties and applications of the following:

PVC, Teflon, Bakelite, Nylon 6:6 and Dacron.

Rubber-natural and artificial rubber, Vulcanization of natural rubber, Buna S, Buna N, Thiokol.

Conducting Polymers: Classification, Poly acetylene, polyaniline and their applications.

**UNIT III: SURFACE CHEMISTRY**

Solid surfaces, types of adsorption, Langmuir adsorption isotherm, BET adsorption isotherm. Calculation of surface area of solid & application of adsorption, classification of colloids, Electrical & optical properties of colloids and applications of colloids in industry.

**UNIT IV: CHEMICAL FUELS**

Fuels, classification –Solid fuels – coal – analysis – proximate and ultimate analysis and their significance  
Liquid fuels – primary – petroleum – refining of petroleum –synthetic petrol – Bergius and Fischer Tropesch's process; Gaseous fuels – natural gas, analysis of flue gas by Orsat's method Combustion – problems, Calorific value of fuel – HCV, LCV, determination of calorific value by Junker's gas calorimeter. Combustion cracking knocking

**UNIT V: LUBRICANTS**

Definition and function of lubricants – Types of Lubrication and Mechanism – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary film Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralization Number and Mechanical Strength.

**UNIT-VI: REFRACTORIES AND INSULATORS**

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

**Text Books:**

1. Engineering Chemistry: Dr.M.Tirumala Chary and Dr.E.Laxminarayana, Scitech publications.
2. Engineering Chemistry: P.K. Jain and M.K. Jain, Dhanpathrai Publications – 14<sup>th</sup> Edition

**Reference Books:**

1. Essentials of Physical chemistry; Baul & Tuli; S. Chand Publications.
2. Text of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co, New Delhi(2006)
3. Chemistry of Engineering Materials by CV Agarwal, C.P Murthy, A.Naidu, BS Publications.
4. Engineering Chemistry by R. P. Mani, K. N. Krishna B. Rama Devi Cengage Learning New Delhi (2010).
5. Engineering Chemistry by Shiva Shnakar Tata McGraw Hill (2010).

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

Code: 121ME03

**ENGINEERING MECHANICS**

L	T	P/D	C
4	1	---	4

**UNIT-I****Introduction to Engineering Mechanics** - Basic Concepts**System of Forces:** Coplanar Concurrent Forces - Components in Space - Resultant - Moment of Force and its Application - Couples and Resultant of Force Systems.**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar and Spatial System of forces.**UNIT-II****Friction:** Basic concepts, Types of Friction, cone of friction,**Applications of Friction:** Wedge friction, Screw friction and Belt friction**UNIT-III****Analysis of Pin-Jointed Plane Frames:** Determination of Forces in members of plane, pin jointed, perfect trusses by Method of joints and Method of sections.

Analysis of various types of cantilever and simply supported trusses-by method of joints, method of sections and Tension coefficient methods.

**UNIT-IV****Centroid:** Centroids of simple figures (from basic principles) Centroids of Composite Figures.**Centre of Gravity:** CG of simple bodies (from basis principles), CG of composite bodies, theorems of Pappus.**UNIT-V****Area Moment of Inertia: Definition** - Polar Moment of Inertia, Transfer Theorem, MI of Composite Figures, Product of Inertia, Transfer Formula for Product of Inertia.**Mass Moment of Inertia:** MI of Masses, Transfer Formula for MMI, MMI of composite bodies.**UNIT - VI****Dynamics:** Kinematics of General plane motion, Kinetics of General plane motion, Work - Energy Method applied to plane motion.**TEXT BOOK:**

- 1) Engineering Mechanics by Ferdinand. L.Singer
- 2) Engineering Mechanics by S.S.Bhavikatti J.G.Rajasekharappa.

**REFERENCE BOOKS:**

- 1) Engineering Mechanics by Timoshenko & Young.
- 2) Engineering Mechanics by Meriam and Kraize
- 3) Engineering Mechanics by K.L.Kumar / Tata McGraw Hill.
- 4) Engineering Mechanics by Tayal.

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

Code: 121PH03

APPLIED PHYSICS

L	T	P/D	C
3	1	--	3

**UNIT I**

Undamped, Damped, Forced vibrations and Resonance (quantitative treatment). Equation of motion of wave along string, Physical Pendulum, Torsion pendulum and Compound Pendulum. Ultrasonics, Production of ultrasonics by magnetostriction and piezoelectric effect. Application of ultrasonics.

**UNIT II**

**Interference:** Properties of coherent light, Superposition of waves, Young's double slit experiment, Interference of light by division of Wave front and division of amplitude, Interference in thin films by reflection, Newton's rings.

**UNIT III**

**Diffraction:** Introduction, Diffraction due to single slit, double slit, and multiple slits (Plane diffraction grating theory, Resolving power of a grating.

**Polarization:** Polarized and Un-polarized light, Birefringence Nicol Prism, Wave Plates, Theory of Plane, Circularly and elliptically polarized light.

**UNIT - IV**

**Magnetic Properties:** Electron spin, Relation between electron spin and magnetic moment, Origin of Magnetic Moment, Bohr Magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro Magnetism on the basis of Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials, super conductivity – Meisner's effect.

**UNIT - V**

**Lasers:** Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

**Fiber Optics:** Introduction, Principle of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

**UNIT - VI**

**Nanotechnology:** Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Precipitation, Combustion Methods; Top-down Fabrication: Chemical Vapour Deposition, Thermal evaporation, Characterization (XRD&TEM), carbon nanotubes.

**REFERENCE BOOKS:**

1. Principles of Metallurgy by Krishna Reddy
2. Physics part I by Resnik and Halliday
3. Engineering physics by Gaur and Gupta
4. 5. Solid state physics Neil by W.Ashcroft, N.David Mermin
6. Solid State Physics by S L Singal
7. Engineering physics by P K Palanisamy
8. Nanotechnology: A Gentle Introduction To the Next Big Idea by M Ratner, D Ratner
9. Nanomaterials by A K Bandyopadhyay

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

CODE:121EN72

**ENGLISH LANGUAGE LAB - II**

L	T	P/D	C
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**Introduction**

The introduction of the English Language lab is considered essential at third year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalize context. The proposed course should be an integrated theory and lab course to enable students to use good English and perform the following:

- Gather ideas and information, to organize ideas relevantly and coherently
- Engage in debates
- Participate in group discussions
- Face interviews
- Write project/research reports/technical reports
- Make oral presentations
- Write formal letters
- Transfer information from non-verbal to verbal texts and vice versa
- To communicate effectively in informal and formal situations

**Objectives**

The lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

1. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
2. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English and respond appropriately in different professional contexts.
3. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.
4. To enable the students in equipping themselves in being assertive and convincing, while debating.

**Syllabus**

1. Introduction to Stress and Intonation.
2. Functional English –Starting a conversation-responding appropriately and relevantly-using the right body language-role plays based on different situations
3. Vocabulary building – Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, etymology, analogy, idioms and phrases
4. Reading Comprehension – Reading for facts, guessing meanings from the context, scanning, skimming, inferring meaning and critical reading
5. Debate

**Minimum Lab Requirement:**

The English language lab shall have two parts:

- a. 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.
- b. The Communication Skills lab with movable chairs and audio visual aids with a PA system. A T V, Digital stereo-audio and video system and camcorder etc.

**Suggested Software:**

- ❖ Hi Class system Monitoring Software
- ❖ Globerena English Lab Plus software
- ❖ GRE Computer based test ( booklet + CD)
- ❖ GMAT Computer based test ( booklet + CD)
- ❖ GRE computer based test ( booklet + CD)
- ❖ IELTS preparatory guide CD

**REFERENCES:**

1. Communicate or Collapse: A Handbook of Effective Public Speaking
2. Group Discussions and Interviews by Pushpa Lata & Kumar, Prentice Hall of India
3. Academic Writing – A practical Guide for students by Stephen Bailey, Rontledge Falmer, London and New York, 2004

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

**Code: 121CS71      DATASTRUCTURES AND C++ LAB  
(Common to all Branches)**

L	T	P/D	C
-	-	3	2

1. Write a C program that implement stack and its operations using arrays
2. Write a C program that implement Queue and its operations using arrays.
3. Write a C program that uses Stack operations to perform the following
  - i) Converting infix expression into postfix expression
  - ii) Evaluating the postfix expression
4. Write a C program that uses functions to perform the following operations on singly linked list.:
  - i) Creation ii) Insertion iii) Deletion iv) Traversal
5. Write a C program that uses functions to perform the following operations on doubly linked list.:
  - i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
- 6 Write a C program that uses functions to perform the following:
  - i) Creating a Binary Tree of integers
  - ii) Traversing the above binary tree in preorder, inorder and postorder.
7. 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
8. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
  - i) Bubble sort ii) Quick sort
9. Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
  - i) Insertion sort ii) Merge sort iii) Selection Sort
10. Write a C++ program that prints all real solutions to the quadratic equation  $ax^2+bx+c=0$ .  
Read in a,b,c and use the quadratic formula. If the discriminant  $b^2-4ac$  is negative, display a message stating that there are no real solutions.
11. A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 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.
12. Write a C++ program that checks whether a given string is palindrome or not.

**TEXT BOOKS:**

1. Data Structure through C by Yashavant Kanetkar.
2. The complete reference C++ by Herb Schildt.
3. Data Structures, A pseudocode Approach with C by Richard F. Gilberg & Behrouz A. Forouzan.

**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

**Code: 121ME72      ENGINEERING WORKSHOP – II  
(Common to all branches except CSE & IT)**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
---	---	3/2	1

**1. Fitting**

To make a Step Fitting as per the dimensions  
To make a Half Round Fitting as per the dimensions

**2. Tin Smithy**

Preparation of Funnel  
Preparation of Square box

**3. Smithy**

Fabrication of S - Shape  
Fabrication of Hook shape



**Syllabus for B. Tech. I Year II semester  
Mechanical Engineering**

**Code: 121PH73**

**APPLIED PHYSICS LAB**

L	T	P/D	C
--	--	3/2	1

1. Energy gap of a semiconductor
2. To study the characteristics of a thermistor
3. Characteristics of laser Diode
4. Numerical aperture of optical fiber
5. Bending loss of optical fiber
6. Stewart & Gee's Experiment (Determination of magnetic induction flux density along the axis of a circular coil).
7. Newton's Rings
8. Hall effect
9. Dielectric constant of a given material

**Note:** Any six of the above nine Experiments are to be conducted.

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**CODE: 121MA05 ENGINEERING MATHEMATICS – III  
(Common to All Branches except Bio-Tech)**

L	T	P/D	C
3	2	--	3

**UNIT I****Special Functions:**

Beta, Gamma Functions – properties, Bessel’s Functions and Legendre’s Polynomials - recurrence relations (without proofs), generating function and properties.

**UNIT II****Analytic functions and Complex integration:**

Analytic functions, Cauchy-Riemann equations, Complex integration, Cauchy’s integral theorem, Cauchy’s integral formula,

**UNIT III****Complex power series and residues:**

Taylor’s and Laurent,s series, Cauchy’s residue theorem.

**UNIT IV****Solution of algebraic and transcendental equations and Numerical integration:**

Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method, Trapezoidal rule – Simpson’s 1/3 rule – Simpson’s 3/8 rule, Gaussian quadrature rule.

**UNIT V****Interpolation:**

Introduction-- Finite differences- Forward Differences, Backward differences, Central differences. Newton’s formulae for interpolation – Gauss Central Difference Formulae (without proofs), Lagrange’s Interpolation formula for unevenly spaced points.

**UNIT VI****Numerical solution of Ordinary Differential equations:**

Solution by Taylor’s series – Picard’s Method of successive Approximations – Euler’s Method – Runge-Kutta Methods, Predictor-Corrector Method

**Text Books:**

1. Advanced Engineering Mathematics, S. R. K. Iyengar and R.K. Jain, Narosa Publishing House, London, 2002.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
3. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill Publishing Company Ltd.

**REFERENCE BOOKS:**

1. A text Book of KREYSZIG’s Engineering Mathematics, Dr. A. Ramakrishna Prasad, Wiley Publications.
2. A text book of Engineering Mathematics, Dr.M. Venkata Krishna, G.Shankar Rao,Galgotia Publications,New Delhi

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121EC01 ELECTRONICS FOR MECHANICAL ENGINEERING**

L	T	P/D	C
3	1	---	3

**UNIT-I**

**Basic Electronic Devices & their operations:** Diode, Transistor, Zener diode characteristics, Half-wave, Full-wave rectifiers, D.C. power supplies & Zener voltage regulators, transistor characteristics.

**UNIT-II**

**Other Electronic Devices & their operation:** Operation and characteristics of SCR, UJT and JFET, Simple applications of these devices.

**UNIT-III**

**Operational amplifiers:** characteristics of an ideal op-amp; inverting and non- inverting operation, Analog to Digital Converters, Digital to analog converters, op-amp as a summing amplifiers, subtractor, Analog- to- Digital converter and as Digital- to – Analog converter.

**UNIT-IV**

**Digital circuits** – Boolean algebra, basic digital gates and Flip simple applications of gates in address, decoders and multiplexers. Applications of Flip Flops in Counters, Shift Registers.

**UNIT-V**

**Introduction to Microprocessors and Interfacing:** Instruction Set, Addressing Modes of 8085 Interfacing of sensors and actuators to microprocessors.

**UNIT-VI**

**Introduction to Microcontrollers and Applications:** Instruction Set Addressing models of 8051. Robot Controllers, Automobile Controllers.

**TEXT BOOKS:**

1. Electronic Devices and Circuits: David. A. Bell; PHI, New Delhi, 2004.
2. Electrical and Electronics & Computer Engineering for Scientists and Engineering Second Edition – K.A. Krishnamurthy & M.R.
3. Microprocessors & interfacing, Douglas V. Hall.

**REFERENCE:**

1. Electronics Devices and Circuits by Sanjeev Gupta, Dhanpat Rai Publications
2. Electronics Devices and Circuit Theory by Boylestad' and Nashelsky

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

Code: 121ME06

**THERMODYNAMICS**

L	T	P/D	C
4	1	---	4

**UNIT – I**

**Introduction: Basic Concepts :** System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic view points, 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**

**Zerth 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 and 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 –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, 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 –. Mixtures of perfect Gases – Mole Fraction, Mass fraction 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, sp. Heats and Entropy of Mixture of perfect Gases and Vapour,

**Compressible Fluid flow:** Continuity, Momentum and Energy equations, Velocity of pressure pulse in a fluid, velocity of sound in an ideal gas, Mach Number, Stagnation properties, area-velocity relationships.

**UNIT – VI**

**Power Cycles :** Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson 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. Fundamentals of Thermodynamics – Sonntag, Borgnakke and Van Wylen / John Wiley & Sons (ASIA) Pvt. Ltd.

**REFERENCES:**

1. Engineering Thermodynamics – Jones & Dugan
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 – K. Ramakrishna / Anuradha Publishers.

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

Code: 121ME07

**MECHANICS OF SOLIDS**

L	T	P/D	C
3	1	---	3

**UNIT – I**

**Simple Stresses & Strains:** Elasticity, plasticity – Types of stresses-uniaxial, biaxial & triaxial and 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**

**Principal stresses,** strains, Mohr’s circle and it’s application, Torsion of shafts

**UNIT – III**

**Shear Force and Bending Moment:** Definition of beam, Types of beams, Concept of SF and BM, SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads, Point of Contra flexure – Relation between SF, BM and rate of loading at a section of a beam.

**UNIT – IV**

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

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

**UNIT – V**

**Deflection of Beams:** Bending of Beam 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,- UDL, UVL. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

**UNIT – VI**

**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.

**Thick cylinders:** Lamé’s equation – cylinders subjected to inside & out side pressures – compound cylinders.

**TEXT BOOKS:**

1. Strength of materials by S.Ramamrutham
2. Strength of materials by Bhavikatti, Lakshmi publications.

**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.
6. Solid Mechanics, by Popov

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121ME08 METALLURGY AND MATERIAL SCIENCE**

L	T	P/D	C
3	1	---	3

**UNIT I**

**Solidification of Metals and Binary alloys:** Concepts of nucleation & grain growth; directional-solidification; dendritic growth and equiaxed grain growth. Phase rule, invariant reactions (eutectic, eutectoid, peritectic, peritectoid); Lever rule, cooling-curves of pure metals, binary alloys. Binary Phase diagrams (Aluminum-Silicon and Aluminum-Copper, Copper –Zinc, Copper –Tin, Copper-Nickel).

**Non ferrous Metals & Alloys:** Aluminum based alloys: Cast alloys, Wrought alloys and their applications. Copper based alloys: Brasses, Bronzes and their applications. Magnesium based alloys: Cast alloys, wrought alloys and their applications. Titanium based alloys: aerospace alloys, bio-compatible alloys. Nimonic alloys – their compositions and applications.

Heat treatment of Non-ferrous metals, Age hardening, solution hardening.

**UNIT II**

**Fe-Fe<sub>3</sub>C phase diagram:** and description of phases (Ferrite, Austenite, Cementite, Pearlite, hypo and hyper eutectoid steels; hypo and hyper eutectic cast irons). *Steels:* (low carbon, medium carbon, high carbon, stainless, Hadfield, High speed) steels, their compositions, microstructures and applications. *Cast Irons:* Types of cast irons; compositions, microstructures and applications of (Grey, White, Spheroidal graphite, Malleable) Cast Irons.

**UNIT III**

**Heat Treatment:** *Steels:* Types of Heat treatments (Annealing, Tempering, Normalizing, Hardening, Spheroidizing); TTT diagram; Effect of cooling rate on the phase-transformations; case-hardening methods (carburizing, Nitriding, carbo-nitriding, cyaniding, shot-peening, Induction Hardening, Flame Hardening)

**UNIT IV**

**An Introduction to Advanced Materials:** *Composites:* Classification, Metal Matrix Composites (MMCs), Cermets, C-C composites, Polymer matrix composites; applications of various composites. Introduction, and applications of SMART Materials Maraging steels and Nanomaterials..

**UNIT-V**

**Mechanical Behavior of Metals:** Concept of single and polycrystals; Dislocation theory and slip phenomenon; Deformation behavior of BCC, FCC and HCP crystal structures. *Theory of strain hardening:* effect of temperature on properties of materials; Dislocation pile-up Frank-Read source of dislocations; Theory of cold-working and hot-working. *Intermediate Annealing:* Introduction, recovery, recrystallization and grain growth; recrystallization temperature, effect of grain size on strength and ductility. *Creep:* Mechanism of creep, creep-curve.

**UNIT VI**

**Fatigue and Theory of Fracture:** S-N curve, types of fatigue loading, effect of mean stress on fatigue. **Types of Fracture:** Brittle & ductile fractures in Tension, Compression and pure Torsion. Fracture surfaces; Fatigue and creep fracture surfaces.

**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. Materials Science and engineering / William and Collister.
3. Elements of Material science / V. Raghavan
4. Engineering Materials-2, An Introduction to Microstructure, Processing and Design – Micheal F Ashby & David R H Jones
5. Mechanical Metallurgy / G.E. Dieter



**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121EE41 BASIC ELECTRICAL ENGINEERING  
(Common to MECH, CSE, IT, BT)**

L	T	P/D	C
3	2	--	3

**Unit – I: Introduction to Electrical Engineering:**

Review of Ohm's Law, Basic circuit components, Kirchhoff's Laws. Types of sources, Source transformation, V- I relationship for passive elements. Series parallel circuits, Star - delta and delta - star transformation. Simple problems.

**Unit – II: Fundamentals of Single phase and three phase AC circuits:**

Sinusoidal representation of voltage & current, basic definitions, R.M.S. and Average values of Sinusoidal currents and voltage, Form factor and Peak factor, Phasor representation of alternating quantities, the J operator and phasor algebra, Analysis of ac circuits with single basic network element, Single phase series circuits.

**Unit – III: D.C Machines:**

Principle of operation of D.C generators, Types of D.C generators, E.M.F equation, Principle of operation of D.C motors, Types of D.C motors, Torque equation, Losses and efficiency calculation in D.C Generators and D.C motors.

**Unit – IV: Transformers:**

Principle of operation, Constructional Details, Ideal Transformer and Practical Transformer, equivalent circuit, Losses, OC and SC Test, Efficiency and Regulation Calculations, Elementary treatment & Simple problems. Three phase transformers, star – delta, delta – star connections.

**Unit – V: Three phase Circuits and three phase induction motors:**

Three phase circuits – phase sequence, Star and delta connection, Relation between line and phase voltages and currents in a balanced system.

Three phase induction motor: Principle of operation, Construction, Types, Problems on slip, rotor frequency, rotor emf and torque.

**Unit – VI: Basic Instruments:**

Introduction, classification of instruments, Operating principles, Essential features of measuring instruments, Permanent Magnet Moving coil (PMMC) instruments, Moving Iron (MI) instruments, Extension of Ammeter and voltmeter ranges.

**Text Books:**

1. Basic electrical Engineering – M.S.Naidu and S.Kamakshiah – TataMcGraw-Hill,2005 edition
2. Basic Electrical Engineering –T.K.Nagesarkar and M.S.Sukhja Oxford University Press.2<sup>nd</sup> edition

**References:**

1. Theory and problems of Basic electrical Engineering- D.P.Kotahari & L.J.Nagrath PHI.
2. Principles of Electrical Engineering - V.K.Mehta, S.Chand Publications.2<sup>nd</sup> edition

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121EN74 Effective English Communication and Soft Skills**

**English – IV**

(Common to all branches)

L	T	P/D	C
0	0	2	2

**Course Description**

This course empowers the students for career opportunities, enhancing professional and personal growth. Effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment.

Soft skills provide students with a strong conceptual and practical framework to build, develop and manage teams. They play an important role in the development of the students' overall personality, thereby enhancing their career prospects. Training in soft skills provides strong practical orientation to the students and helps them in building and improving their skills in communication, the effective use of English, business correspondence, presentations, team building, leadership, time management, group discussions, interviews, and inter-personal skills. This training also helps students in career visioning and planning, effective resume writing and dealing with placement consultants and headhunters.

The training is conducted in a very informal, interesting and interactive manner, which gives ample scope for the students to interact with one other and face a wide variety of issues, topics, and situations that they are likely to come across as entry-level managers.

**Learning Objectives:**

**By the end of the soft skills training program, the students will be able to:**

- Develop effective communication skills (spoken and written).
- Develop effective presentation skills.
- Become adept using electronic communication
- Conduct effective business correspondence and prepare good business reports.
- Become self-confident individuals by mastering inter-personal skills, team management skills and leadership skills.
- Develop all-round personalities with a mature outlook to function effectively in different circumstances.
- Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.

**UNIT-I ELECTRONIC COMMUNICATION**

- E-correspondence
- E-mail etiquette
- E-resume'; online job applications
- Letter of application
- Exercises

**UNIT – II SOFT SKILLS**

- Introduction
- Building attitude – personality traits
- Five aspects of soft skills – communication skills, problem solving skills, leadership skills, work ethics and team work
- Learning soft skills
- Impression management
- Goal setting Time management

**UNIT – III: DEVELOPING POSITIVE ATTITUDE**

- Introduction
- What is positive attitude?
- The power of positive attitude
- Positive thinking- the key to success
- Negative thinking
- Types of negative thinking
- The causes of negative attitude
- Consequences of negative attitude
- How to change negative attitude

**UNIT – IV ETIQUETTE AND MANNERS****ETIQUETTE**

- Introduction
- Modern etiquette
- Benefits of etiquette
- Classification of etiquette
- Telephone Etiquette
- Email Etiquette.

**MANNERS**

- Introduction
- Poor manners noticed in youth – why should good manners be practiced?
- Practicing good manners
- Professional manners
- Social skills (manners)

**UNIT – V INTERVIEW SKILLS**

- Introduction
  - On the day of interview
  - Dress code at interview
  - Job interview
- Why an interview?
- Types of interview
- Dress code for an interview
- Interview etiquette
- Types of questions asked
- Telephonic interview
- Possible reasons for rejecting a candidate
- Preparation before interview – basic tips.

**Textbooks:**

1. Technical Writing: Process and Product by Sharon J Gerson; Fifth edition. Pearson Publishers.
2. Soft Skills: Know Yourself and know the World by Dr.K.Alex - S. Chand Publishing .

**References:**

- 1.Prof. Kevnair's - Fluency Dictionaries
- 2.Kleiser Grenville-Common Errors in English:Aph publishing corporation
- 3.Shaw Harry and Collins- Errors in English Language and ways to correct them.
- 4.Body Language – Your success Mantra by Shalini Verma, S Chand, 2006
- 5.Strategies for Engineering Communication: Stevenson Susan and Steve Whitmore: Wiley, India.
- 6.How to build a better vocabulary – Nurnberg Maxwell & Morris Rosenblum: Grand Central Publishing
- 7.Six weeks to words of power –Funk Wilfred: W.R.Goyal Publishers & Distributors
- 8.Word power made easy – Norman Lewis
- 9.How to read better and faster: Norman Lewis, W.R.Goyal Publishers, New Delhi
- 10.Effective Technical Communication –Ashraf Rizvi

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121EE91 BASIC ELECTRICAL ENGINEERING LAB  
(Common to MECH, CSE, IT)**

L	T	P/D	C
-	-	3/2	1

1. OC & SC tests on Single – Phase transformer (Predetermination of efficiency and regulation at given power factors).
2. Brake test on 3-phase induction motor (performance characteristics).
3. Speed control of DC shunt motor by
  - a) Armature Voltage Control
  - b) Field flux control method
4. Brake test on DC shunt motor
5. Swinburn's test on DC shunt machine
6. Load test on 1- phase transformer

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code:121EC84**

**BASIC ELECTRONICS LAB**  
(Common to CSE, IT, Mech)

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
-	-	3/2	1

1. Transistor CE Characteristics (Input and Output)
2. Full wave Rectifier with and without filters.
3. CE Amplifiers.
4. RC Phase Shift Oscillator
5. Class A Power Amplifier
6. Micro Processor

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121ME73**

**METALLURGY LAB**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
---	----	3/2	1

1. Metallographic Preparation and microstructural study of pure metals (Fe, Cu, Al)
2. Metallographic Preparation and microstructural study of mild steel, low-carbon steel and high carbon steel
3. Microstructural study of Cast Iron
4. Microstructural study of Heat treated Steels
5. Jominy End quench test (hardness of the samples to be tested in “Mechanics of Solid Lab)
6. Melting of aluminum ( or its alloy) and casting in sand molds, chilled sand molds and steel molds, and microstructural study of the samples ( Hardness study of the samples will be done in “ Mechanics of Solids Lab )

**Syllabus for B. Tech. II Year I semester  
Mechanical Engineering**

**Code: 121ME74      MECHANICS OF SOLIDS LAB**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
---	----	3/2	1

1. Direct Tension Test
2. Bending Test on simply supported and cantilever beams
3. Torsion Test
4. Brinell and Rockwell hardness tests (of samples obtained from Jominy End quench Test & samples of various treated and untreated steels obtained from Metallurgy Lab)
5. Test on Springs
6. Compression Test on Cube
7. Impact Test



**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

Code: 121BT06

**ENVIRONMENTAL STUDIES  
(Common to all branches)**

L	T	P/D	C
3	1	-	3

**UNIT I: ECOSYSTEMS**

Ecosystem definition, concept, Structure and Function, food chain and food web, Ecological pyramids, Biogeochemical cycles, Ecological niche and succession, Classification (Forest, Grassland, Desert, Pond, River, Marine, Estuarine, Wetlands), ecosystem value, services and carrying capacity.

**UNIT II: NATURAL RESOURCES**

Definition, classification, Forest resources-use and over-exploitation, deforestation, Energy resources-energy demand, renewable and non-renewable energy resources, alternate energy resources, Case studies. Food Resources-World Food problems, effects of modern agriculture, fertilizer-pesticide problems, Mineral resources : Use and exploitation environmental effects of extracting and using mineral resources, case studies.

**UNIT III: ENVIRONMENTAL COMPONENTS**

Atmosphere- Definition, layers, state (weather and climate) acid rain, green house effect, ozone layer depletion, Global warming, Kyoto protocol, Montreal protocol, Carbon trading, Hydrosphere-Definition, Types (surface and groundwater), distribution, Water conservation, use and over-exploitation, floods, drought, dams-benefits and problems, conflicts over water, Lithosphere- Chemical composition of the earth (core, mantle, crust), mineral resources-environmental effects of mining, Rocks and soils, Plate tectonics

**UNIT IV: BIO DIVERSITY AND ITS CONSERVATION**

Introduction, Definition, Genetic species and Eco system diversity, Value of bio diversity, Hot spots, Threats to bio diversity, Conservation strategies: Insitu and Exsitu conservation, Biological Diversity Act 2002,

**UNIT V: ENVIRONMENTAL POLLUTION AND CONTROL**

Air pollution: Definition, causes, effects and Control measures, Environment Protection Act, Air (Prevention and Control of Pollution) Act, 1981, Case study: Bhopal Gas Tragedy, Water Pollution- Definition, types, characteristics of domestic and industrial effluents – Water quality parameters, Drinking water treatment and standards, Waste water treatment, Case studies: Mercury pollution-Minamata Bay diseases; Definition, causes, effects and Control measures: Soil Pollution, Noise Pollution and Marine Pollution, Waste Management- Solid Waste, Hazardous waste and E-waste management.

**UNIT VI: SUSTAINABLE DEVELOPMENT**

Concept of Sustainable development, Threats to sustainability-population explosion, urbanization, over-exploitation of resources, Strategies for Sustainable development- Wasteland reclamation, Role of IT (Remote sensing and GIS) in environmental management, green technologies, Environmental Impact Assessment-overview

**TEXT BOOKS:**

1. INTRODUCTION TO ENVIRONMENTAL SCIENCE –by Dr.Y.Anjaneyulu, B.S.Publications 2004.
2. ENVIRONMENTAL STUDIES by Erach bharucha 2005, University grants commission, University press.
3. ENVIRONMENTAL SCIENCES-A NEW APPROACH by Purohit, shammi and Agarwal, Agrobios (India) 2004.
4. ENVIRONMENTAL SCIENCES-A Text book for Undergraduate by Dr. K.Mukkanti, S. Chand & Company Ltd., 2010.

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**CODE: (121MA07) PROBABILITY AND STATISTICS  
(Common to All Branches)**

L	T	P/D	C
3	2	--	3

**UNIT I****Probability:**

Sample spaces and Events – Counting, Probability, The Axioms of probability, some Elementary Theorems, Conditional probability – Baye’s Theorem .

**UNIT II****Probability Distributions:**

Random variable – Discrete and continuous, Distribution function, Expectation and Probability distributions - Binomial, Poisson and normal distributions – related properties.

**UNIT III****Sampling Distributions:**

Populations and samples, Sampling distribution of the Mean (known ) and Sampling distribution of the mean (unknown), proportions, sums and differences . Applications of central Limit Theorem. Estimation, Point estimation, Interval estimation and Bayesian estimation

**UNIT IV****Inferences Concerning Means and Proportions :**

Tests of Hypotheses, type –I and type-II errors, , Hypotheses concerning means and proportions for large size samples

**UNIT V**

Test of significance-Student t-test, F-tests,  $\chi^2$  test, test for goodness of fit, independence of attributes.

**UNIT VI****Linear Programming:**

Introduction, Formulation of LPP, Graphical method, Simplex method.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics, S. R. K. Iyengar and R.K. Jain, Narosa Publishing House, London, 2002.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
3. Engineering Mathematics, B. V. Ramana, Tata McGraw Hill Publishing Company Ltd.
4. Probability and Statistics for Engineers: Miller and John E. Freund, PHI Publishers, 6<sup>th</sup> Edition.

**REFERENCE BOOKS:**

1. Fundamentals of Mathematical Statistics: Gupta and Kapoor – S. Chand and Co.
2. Probability and Statistics for Engineers- Walpole and Meyer.
- 3, Probability and Statistics ,Dr.M. Venkata Krishna, B.S Publications

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME09      APPLIED THERMODYNAMICS – I**

L	T	P/D	C
3	1	---	3

**UNIT – I**

**Actual Cycles and their Analysis:** Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down - 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, Multipoint fuel Injection, 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.

**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 – IV**

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

**UNIT – V**

**Compressors** – Classification –positive displacement and roto-dynamic machinery – power absorbing machines, fan such as blower and compressor – reciprocating and rotary types.

**Reciprocating:** Principles of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

**UNIT VI**

**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 input calculations.

**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. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad

3. I.C. Engines / Heywood /McGraw Hill.
4. IC Engines/ Ramalingam/ Scitech publishers
5. Heat Engineering / Vasandhani & K.L.Kumar /Metropolitan
5. "A Treatise on Turbo Machines", G.Gopalakrishnan, & D.Prithviraj, Scitech Publications (India) Pvt. Limited (2002.)

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME10      MANUFACTURING PROCESSES**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
3	1	---	3

**UNIT – I**

**Casting:** History of castings, Steps involved in making a casting, Casting terms, Sand mould making procedure, Moulding materials, Moulding sand composition, Testing sand properties, Sand casting, CO<sub>2</sub> moulding, Shell moulding — Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

**UNIT – II**

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

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

**Methods of Melting:** Crucible melting and cupola operation,  
Fettling of casting and casting defects,  
Advantages and limitations and applications of casting processes

**UNIT – III**

**Metal Forming Process:** Nature of plastic deformation, hot working and cold working

**Rolling:** Rolling fundamentals, Theory of rolling, types of Rolling mills and products, Forces in rolling and power requirements

**UNIT – IV**

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

**Extrusion:** Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion

**UNIT- V**

**Sheet Metal Operations:** Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – coining – Hot and cold spinning, stretch forming, Embossing and coining – Types of presses and press tools. Forces and power requirement in the above operations

**Plastics:** Processing of Plastics: blow moulding, transfer moulding, compression moulding and injection moulding

**UNIT - VI**

**Metal Fabrication Process:** Introduction to fabrication process, classification

**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 welding. Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding

**Cutting of Metals:** Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

**TEXT BOOKS:**

1. Manufacturing Technology / P.N. Rao/TMH
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson Education

**REFERENCES:**

1. Principles of Metal Castings / Rosenthal/Mc Graw Hill Professional
2. Production Technology / R.K. Jain/Khanna Publishers
3. Welding Engineering and Technology / RS Parmar / Khanna Publishers
4. Production Technology /Sharma P C/Chand Publishers

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME11 FLUID MECHANICS AND HYDRAULIC  
MACHINERY**

L	T	P/D	C
3	1	---	3

**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: pitot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter

**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, Layout of hydroelectric power plant.

**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 V**

**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.

**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, Hydraulic Ram.

**UNIT VI**

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

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

**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 Durgaiyah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Hydraulic Machines Including Fluidics PB by Jagdish Lal Metropolitan Book Co. Pvt. Ltd. , 1994.

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

Code: 121ME12

**MACHINE DRAWING**

L	T	P/D	C
1	---	6	3

**Unit I : Machine Drawing Conventions**

- a) Sectional views: section planes and drawing of sections, Types of sectional views – Full sectional view, half sectional view, auxiliary sectional views, Parts not usually sectioned  
 b) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

**Unit II : Drawing of simple machine parts**

- Selection of Views, additional views for the following machine parts with easy drawing proportions.  
 a) Popular forms of Screw threads like V, Metric, BSW, Buttress, Square, ACME, Worm nuts like square and hexagonal headed, Bolts like square and hexagonal headed, eye bolt, foundation bolts, stud bolts, set screws, washers  
 b) Keys, cotters & joints and knuckle joint.

**Unit III: Drawing of machine elements**

- Selection of Views, additional views for the following machine elements and parts with easy drawing proportions  
 Shaft coupling: Flange, Split-Muff, Flexible couplings, Claw, Oldham's and Universal Coupling  
 Riveted joints for plates.

**Unit IV: Assembly Drawings of Engine parts**

- Stuffing box, Cross head, Eccentric, Connecting rod - Drawings of assembled views for the part drawings using conventions and easy drawing proportions.

**Unit V: Assembly Drawings of Machine parts**

- Screws jack, Tailstock, Machine Vice, Plummer block, foot step bearing - Drawings of assembled views for the part drawings using conventions and easy drawing proportions.

**Unit VI : Assembly Drawings of Valves and Detailed drawings**

- Steam stop valve, spring loaded safety valve, feed check valve and air cock - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

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

**TEXT BOOKS:**

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

**REFERENCES:**

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput
4. Machine Drawing – ND Bhat



**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121EN74 Effective English Communication and Soft Skills  
(Common to All Branches)**

L	T	P/D	C
-	-	2	2

**Course Description**

This course empowers the students for career opportunities, enhancing professional and personal growth. Effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment.

Soft skills provide students with a strong conceptual and practical framework to build, develop and manage teams. They play an important role in the development of the students' overall personality, thereby enhancing their career prospects. Training in soft skills provides strong practical orientation to the students and helps them in building and improving their skills in communication, the effective use of English, business correspondence, presentations, team building, leadership, time management, group discussions, interviews, and inter-personal skills. This training also helps students in career visioning and planning, effective resume writing and dealing with placement consultants and headhunters.

The training is conducted in a very informal, interesting and interactive manner, which gives ample scope for the students to interact with one other and face a wide variety of issues, topics, and situations that they are likely to come across as entry-level managers.

**Learning Objectives:**

**By the end of the soft skills training program, the students will be able to:**

- Develop effective communication skills (spoken and written).
- Develop effective presentation skills.
- Become adept using electronic communication
- Conduct effective business correspondence and prepare good business reports.
- Become self-confident individuals by mastering inter-personal skills, team management skills and leadership skills.
- Develop all-round personalities with a mature outlook to function effectively in different circumstances.
- Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.

**UNIT-I ELECTRONIC COMMUNICATION**

- E-correspondence
- E-mail etiquette
- E-resume'; online job applications
- Letter of application
- Exercises

**UNIT – II SOFT SKILLS**

- Introduction
- Building attitude – personality traits
- Five aspects of soft skills – communication skills, problem solving skills, leadership skills, work ethics and team work
- Learning soft skills
- Impression management
- Goal setting Time management

**UNIT – III: DEVELOPING POSITIVE ATTITUDE**

- Introduction
- What is positive attitude?
- The power of positive attitude
- Positive thinking- the key to success
- Negative thinking
- Types of negative thinking
- The causes of negative attitude
- Consequences of negative attitude
- How to change negative attitude

**UNIT – IV ETIQUETTE AND MANNERS****ETIQUETTE**

- Introduction
- Modern etiquette
- Benefits of etiquette
- Classification of etiquette
- Telephone Etiquette
- Email Etiquette.

**MANNERS**

- Introduction
- Poor manners noticed in youth – why should good manners be practiced?
- Practicing good manners
- Professional manners
- Social skills (manners)

**UNIT – V INTERVIEW SKILLS**

- Introduction
  - On the day of interview
  - Dress code at interview
  - Job interview
- Why an interview?
- Types of interview
- Dress code for an interview
- Interview etiquette
- Types of questions asked
- Telephonic interview
- Possible reasons for rejecting a candidate
- Preparation before interview – basic tips.

**Textbooks:**

1. Technical Writing: Process and Product by Sharon J Gerson; Fifth edition. Pearson Publishers.
2. Soft Skills: Know Yourself and know the World by Dr.K.Alex - S. Chand Publishing .

**References:**

- 1.Prof. Kevnair's - Fluency Dictionaries
- 2.Kleiser Grenville-Common Errors in English:Aph publishing corporation
- 3.Shaw Harry and Collins- Errors in English Language and ways to correct them.

- 4.Body Language – Your success Mantra by Shalini Verma, S Chand, 2006
- 5.Strategies for Engineering Communication: Stevenson Susan and Steve Whitmore: Wiley, India.
- 6.How to build a better vocabulary – Nurnberg Maxwell & Morris Rosenblum: Grand Central Publishing
- 7.Six weeks to words of power –Funk Wilfred: W.R.Goyal Publishers & Distributors
- 8.Word power made easy – Norman Lewis
- 9.How to read better and faster: Norman Lewis, W.R.Goyal Publishers, New Delhi
- 10.Effective Technical Communication –Ashraf Rizvi

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME75**

**COMPREHENSIVE VIVA**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
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**Max Marks: 50**

The Evaluation for Comprehensive Viva-Voce shall be conducted by a committee consisting of Four Senior Faculty members of the Department headed by HOD. The main aim of Comprehensive Viva-Voce is to assess the students understanding in various subjects he / she studied during the B. Tech. course of study. There are no internal marks for the Comprehensive Viva-Voce.

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME76 MANUFACTURING PROCESSES LAB**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
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**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

**Syllabus for B. Tech. II Year II semester  
Mechanical Engineering**

**Code: 121ME77 FLUID MECHANICS & HYDRAULIC  
MACHINERY LAB**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
---	---	3	2

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

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

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**BASIC SPANISH LANGUAGE**  
 Open Elective - I  
 (Common to all branches)

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>						<b>x</b>	

Code: 3HC51

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

**Objectives:** The objectives of this course almost correspond to the A1 level of the Common European Framework of Reference for languages

**A) Aims and Objectives of the Course**

- i) To develop the following skills: Listening, speaking, reading & writing.  
Learners should be able to
- a) listen and comprehend elementary structures of the spoken language.
  - b) participate in simple conversations in different situations of every day life.
  - c) read and understand simple texts.
  - d) write sentences and short paragraphs on general topics and situations.
- ii) To develop creative aspect in language learning i.e. the ability to work out different patterns and combinations with the help of basic grammatical structures and lexical items.
- iii) To introduce the learners to aspects of life and culture of Spanish and Latin American people.

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**BASIC FRENCH LANGUAGE**  
 (Common to all branches)

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>						<b>x</b>	

Code: 3HC41

**L T P/D C**  
**3 - - 3**

**UNITE – 1 UN PRINTEMPS A PARIS**

VOCABULAIRE: Professions et nationalités, vie quotidienne et loisirs,  
 Descriptions physiques et psychologiques, nombres cardinaux.

**UNITE – 2**

GRAMMAIRE : Articles définis et indéfinis, genre et nombre des noms et des  
 Adjectifs, interrogation et négation, conjugaison du présent.

PHONETIQUE : Intonation, liaison, voyelles orales et nasales.

**UNITE – 3**

COMMUNICATION : Faire connaissance, inviter et répondre à une invitation, décrire  
 les personnes.

CIVILISATION : Paris, monuments et lieux publics. La vie de quatre parisiens  
 De professions différentes.

**UNITE- 4 AVENTURE EN BOURGOGNE**

VOCABULAIRE: Logement et nourriture, vêtements et couleurs, fêtes et  
 Faits divers, nombres ordinaux.

GRAMMAIRE : Articles partitifs, adjectifs démonstratifs et possessifs,  
 Prépositions et adverbess de quantité et de lieu, pronoms  
 Toniques, l'impératif, verbes pronominaux

**UNITE – 5**

PHONETIQUE : Intonation, semi-voyelles, liaison, consonnes sonores et  
 sourdes

COMMUNICATION : Exprimer l'ordre et t'obligation, demander et  
 commander, évaluer et apprécier, féliciter et remercier.

**UNITE – 6**

CIVILISATION : Une région de France : la Bourgogne, vie quotidienne à la  
 campagne.

**In addition Passé Composé will be introduced in the Unite 2**

Text Book : LE NOUVEAU SANS FRONTIERES – 1 (Text Book and  
 (Unit 1 & Unit 2) Exercise Book published by CLE INTERNATINAL – Phillippe  
 Dominique et al.



**SCHEME OF EXAMINATION:**

Internal Assessment                    30 marks  
Written Examination                    - 20 marks  
Viva Voce                                    - 10 marks

Final Written Examination: Grammar, Communication & Translation    70marks

Written Examination            - 50 marks            Viva voce                                    -20 marks

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**Open Elective - I**  
**BASIC GERMAN LANGUAGE**  
 (Common to all branches)

a	b	c	d	e	f	g	h	i	j	k	l	m
					x						x	

Code: 3HC46

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>

DEUTSCH FUR ANFANGER (German for beginners)

Syllabus

1. OBJECTIVE: To introduce the learners to basic German and to acquaint them with German culture. The learners should be able to express themselves in simple sentences on a few day-to-day situations.

2. DURATION: I-Semester

3. CLASSROOM STRENGTH: preferably not exceeding 30

4. MODE: Face-to-Face classroom interaction

5. TEACHING HOUSE: 2 HOURS and 2 TUTORIALS / WEEK

6. COURSE CONTENT:

## Unit 1

- Definite and indefinite articles (including negation)
- Noun: Gender and plural forms, cases (nominative, accusative, dative and genitive)

## Unit 2

- Verb: strong & weak verbs, verbs with separable and inseparable prefixes, modal verbs, position of verb in the main and subordinate clauses, auxiliary verbs, reflexive verbs in accusative and dative cases, imperative constructions.

## Unit 3

- Pronouns: personal, possessive, reflexive, interrogative and demonstrative
- Prepositions: with the accusative, dative and with both these cases

## Unit 4

- Adjective: declension with the
  - Indefinite article
  - Definite article
  - Without article
  - With the indefinite pronoun
  - Degrees of comparison (also adverbs), ordinal numbers, adjectives as nouns
- Conjunctions: subordinating and coordinating with respect to the position of the verb

## Unit 5

- Pretaritim of sein and haben
- Perfect tense

## Unit 6

- Negatin: of a sentence and of words therein.
- Sentence structure: general principles observed in German language.

7. READING LIST: One of the following books shall be used (depending upon the availability of the book)

Text book to be recommended out of the following.

- a) Braun, K., Nieder, L., Schmoie, F.1977. Deutsch als Fremdsprache I. A. Ernst Klett Verlag, Stuttgart.
- b) Schulz, D., Griesbach, H., 1968. Deutsche Sprachlehre fur Auslander. Max Hueber Verlag. Munchen.
- c) Hieber, W. 1987. Lernziel Deutsch (Special Indian Edition).Max Hueber Verlag. Munchen
- d) Neuneer, G., et al. 1979. Deutsch Aktiv. Langenscheidt. Berlin
- e) Schapers, R., et al. 1980. Grundkkurs Deutsch. I. Verlag fur Deutsch. Munchen
- f) Schapers, R., et al. 1981 Deutsch 2000 I. Max Hueber Verlag. Munchen
- g) Haussermann, U. et al. 1995 Sprachkurs Deutsch. Verlag Moritz Diesterweg. Frankfurt/Main.
- h) Muller, M., et al. 2001 Moment mal ! Langenscheidt. Berlin.
- i) Jutta Muller, Thomas Storz, 2006. Laguna. Heuber Veerlag, Ismaning. Deutschland.
- j) Hermann Funk, Christina Kuhn, Oliver Bayerlein., Studio d A 1. 2005 Comelsen Verlag, Berlin.
- k) Rosa-Marie Dallapiazza, Eduard von Jan, Till Schonherr, unter Mitarbeit von Jutta Orth-Chambah. Tangram aktuell 1 – Lektion 1 – 4, Lektion 5 – 8 2009. Max Hueber Verlag. Munchen.

9. SCHEME OF THE EXAMINATION:

Duration of written papers: 3 hours each

Paper 1 :Grammar and Translation (German > English and vice versa) 100 marks

Paper II: Reading comprehension, letter writing / short easay. 100 marks

Paper III: Viva voce

100 marks

**The minimum marks required for passing in EACH paper: 40 / 100**

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
Computer Graphics**

Code:3FC06

a	b	c	d	e	f	g	h	i	j	k	l
			x	x							

**L    T        P/D    C**  
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**Course Outcomes :**

- An understanding of the design issues for creating raster graphics
- An ability to apply rendering techniques to an actual computer graphics problem and associated datasets.
- An understanding of object transformations, representations, transformations and perspective projections.
- An understanding of color, illumination, and shading techniques.
- An understanding of the rendering and rasterization techniques.
- An understanding of the application of computer graphics techniques to visualization, animation, and computer aided design

**UNIT I**

**Introduction:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices (T1 – pp. 22–90)

**Output Primitives:** Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. (T1 – pp. 103-123, 137–145, 147–150, 164–171)

**UNIT II**

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. (T2 – pp. 72-99)

**2–D Geometrical Transformations:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. (T1 – pp. 204–227)

**UNIT III**

**2–D Viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm (T1 – pp. 237–249, 257–261, T2 – pp. 111–126)

**UNIT IV**

**3–D Object Representation:** Polygon surfaces, quadric surfaces, Spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods. (T1 – pp. 324–331, 340–342, 347–364, 516–531, 542–546, T2 – pp. 473–529, 721–739)

**3–D Geometric Transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations. (T1 – pp. 427–443)

**UNIT V**

**3-D Viewing:** Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping (T1 – pp. 452–481)

**Visible Surface Detection Methods:** Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods (T1 – pp. 489–505, T2 – Chapter 15)

**UNIT VI**

**Computer Animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. (T1 – pp. 604–616, T2 – chapter 21)

**TEXT BOOKS:**

- T1. Donald Hearn and M. Pauline Baker, Computer Graphics – *C version*, Pearson.
- T2. Foley VanDam, Feiner and Hughes, Computer Graphics Principles & Practice, Second Edition, Pearson.

**REFERENCE BOOKS:**

- R1. Donald Hearn and M. Pauline Baker, Computer Graphics, Second Edition, Pearson.
- R2. Zhigand xiang, Roy Plastock, Computer Graphics, Second Edition, TMH.
- R3. David F Rogers, Procedural elements for Computer Graphics, Second edition, TMH.
- R4. Neuman and Sproul, Principles of Interactive Computer Graphics, TMH.
- R5. Shalini Govil and Pai, Principles of Computer Graphics, Springer, 2005.
- R6. Steven Harrington, Computer Graphics, TMH.

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
DATA BASE SYSTEMS**

Code: 3FC03

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>X</b>	<b>X</b>		<b>X</b>								

**L T P/D C**  
**3 1 - 3**

**UNIT I:**

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor, History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

**UNIT II:**

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

**UNIT III:**

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

**UNIT IV:**

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

**UNIT V:**

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity, Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

**UNIT VI:**

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

**TEXT BOOKS:**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

**REFERENCES:**

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**JAVA PROGRAMMING**  
**(COMMON TO ME, EEE, BT, ECE)**

a	b	c	d	e	f	g	h	i	j	k	l
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**Code: 3EC03**

**Course Outcomes :**

- Understand the concept of OOP as well as the purpose and usage of principles of inheritance, Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
- Understand and implement concepts of polymorphism, encapsulation and method overloading.
- Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments)
- Students understand and implement error exception handling and multi-threading.
- Students learn to create GUI and write programs for event-handling using various user interface components on applets.

**UNIT-I**

History of Java, Java buzzwords, datatypes, variables, simple java program, scope and life time of variables, operators, expressions, control statements, type conversion and casting, arrays, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, overloading methods and constructors, string handling, StringTokenizer.

Objective: On the completion of the unit, a student should be able to: i) Write ,compile and execute simple java programs ii) Understand the syntax of classes and objects creation in java iii) Explain the differences between classes and objects iv) differentiate methods and constructors v) Understand constructor and method overloading vi) Understand how to handle strings in java

**UNIT-II**

Inheritance –Definition ,single inheritance , benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract class, Base class object.

Objective:

On the completion of the unit, a student should be able to: i) Explain the benefits of inheritance ii) Understand how to access members of super class from subclass iii) Differentiate static and dynamic polymorphism iv) Understand the usage of final keyword in inheritance v) Understand the use of abstract class

**UNIT-III**

Interfaces : definition, variables and methods in interfaces , differences between classes and interfaces, usage of implements and extends keyword, uses of interfaces.

Packages: Definition, types of packages, Creating and importing a user defined package.

Applications using interface

Applications using packages

Objective:

On the completion of the unit, a student should be able to: i) Understand uses of interfaces and packages ii) Understand how to implement multiple inheritance in java iii) Explain the difference between classes and interfaces iv) Create and import packages



#### **UNIT-IV**

Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating user defined exceptions.

Multi-Threading:-Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread.

Applications of multithreading.

Objective:

On the completion of the unit, a student should be able to: i) Understand benefits of exception handling ii) Handle built-in and user defined exceptions iii) Understand the uses of multi-threading iv) Create multi-threaded programs using either Thread class or Runnable interface v) Know how to synchronize threads

#### **UNIT-V**

Advantages of GUI over CUI ,The AWT class hierarchy, Component, Frame, user interface components- labels, button, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, menubar, graphics, layout, managers –border, grid, flow and card layouts.

Applications: developing calculator, developing feedback form, developing biodata.

Objective:

On the completion of the unit, a student should be able to: i) Understand the advantages of GUI over CUI ii) Write GUI programs

#### **UNIT-VI**

Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.

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

Applications: Developing of simple advertisements.

Objective:

On the completion of the unit, a student should be able to: i) Able to handle events using delegation event model ii) Write applet programs

#### **TEXT BOOKS**

1. Java; the complete reference, 6th editon, Herbert schildt, TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

#### **REFERENCES**

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell,Seventh Edition, Pearson Education

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
PRODUCT DESIGN & SERVICE**

Code:3B515

a	b	c	d	e	f	g	h	i	j	k	l
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**L T P/D C**  
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**Unit I : Introduction to Design Thinking::**

Product Research, Art, Design and Society - Creativity and Brain-storming for Design – Nature of Technology Entrepreneurship, Characteristics/Qualities, Skills of Technology Entrepreneur, IPR relating to Designs and Registration of Industrial Designs

**Unit II : Introduction to Service Design:**

Challenges & Critical Success Factors, Requirements Engineering, Service Design Process, Tools for Service Design, Mapping the Customer Journey; Tools for Innovation, Conjoint Analysis, Voice of Customer Methods.

Product Features, Attributes of a Good Design, Design Elements : Usability, Aesthetics, Functionality

**Unit III : Introduction to Product Design:**

Product Architecture and Modularity, Product Innovation, Products and Product Suites, Product Development, Process Development, Value Engineering, Product Design Specifications, Principles of Ergonomics.

**Unit IV : Design for Manufacturing**

Re-manufacturing, Sustainability, Design for Environment, Reliability and Robustness, Safety Considerations, Quality Aspects, Design for Serviceability.

**Unit V : System & Engg Design:**

Physical Models and Experimentation, Prototype development, Bill of Materials, Interface of Materials, Processes and Designs, Codes & Standards

**Unit VI : Design Methodology**

Live Design & Design Tools – Design Structure, Matrix Modeling, Product Metrics, Concurrent Engineering, CAD/CAM, Design Review

Recommended Text Books:

- 1) Kevin Otto & Kristie Wood, “Product Design”, Peason Education, 2011
- 2) Prashant Kumar, “Creativity, Concepts and Usability”, PHI, 2012

Additional References:

- 1) Yousef Haik, “Engg Design Process” Thomson Brodes / Codel.
- 2) N F M Roozenburg I.Eekels, “Product Design Fundamentals and Methods” Wiley Publications.
- 3) Nigel Cross, “Engineering Design Methods: Strategies for Product Design”, Wiley, 2008.

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
ENTREPRENEURSHIP**

Code:3ZC04

a	b	c	d	e	f	g	h	i	j	k	l
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**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up's

**UNIT I**

**INTRODUCTION TO ENTREPRENEURSHIP:** Definition of entrepreneurship, Evolution of entrepreneurship, Classification of Entrepreneurs, Entrepreneurship as a Process, Entrepreneurial Propensity, Benefits and Drawbacks of Entrepreneurship. Characteristics of entrepreneur, Qualities and skills, functions of entrepreneur. Women Entrepreneurs, Problems and opportunities.

**UNIT II**

**FORMS OF ENTREPRENEURSHIP:** Small Business, Importance in Indian Economy, Types of ownership, sole trading, partnership, Joint Stock Company, Important features of Various types of businesses, corporate entrepreneurship, entrepreneurship, Role of Government in the promotion of Entrepreneur, State Enterprises in India.

**UNIT III**

**EXPLORING OPPORTUNITIES AND STRATEGIES:** Opportunity Analysis, SWOT Analysis, Internal and External Environment. First-Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategies and Managing Newness, Marketing strategies for start-ups, Pitfalls in start-up analysis. Taxes as bottlenecks for the growth of new start-up's, subsidies and incentives given to save taxes

**UNIT IV**

**BUSINESS PLAN AND FEASIBILITY STUDIES:** Preparation of an Effective Business Plan, Contents of a Business Plan, Detailed discussion of the business plan. Model Business, Feasibility study, Environmental scanning, Economic Analysis, Industry Analysis, Competitive Analysis. Write Up for an effective feasible and bankable report.

**UNIT V**

**INNOVATIONS AND PROTECTION OF IDEAS:** Creativity process in developing Innovation, breakthrough innovations and its consequences on the society. Inspiring innovations. New product ideas, Idea generation methods, quality gates, prototype building, Test marketing. Protecting the ideas, Applying for Intellectual Property rights, Patents, Copyrights, Trademarks, Geographical Indicators. Introduction to World Intellectual Property Organization (WIPO).

**UNIT VI**

**FINANCIAL ASPECTS OF THE ENTREPRENEURSHIP:** Sources of Capital ,Debt and Equity, Commercial Banks, Angel Investors, Venture capitalist, IDBI,ICICI,IFCI,SFC'c. Government Grants and Subsidies. Registration Process and the documentation required. Government Agencies helping in Registration Process. DIC, NSIC and other Central and State Institutions.

**Books Recommended:**

- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.

**References:**

- Alfred E. Osborne, Entrepreneur's Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
- Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.
- S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
- Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
- S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth And A key to Business Success, New Age International Publishers, First Edition, (formerly Wiley Eastern Limited), New Delhi, 2007



### **UNIT – V**

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.

**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.

### **UNIT – VI**

**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.

### **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. Mechanism and Machine Theory / JS Rao and RV Dukkupati / New Age
3. The theory of Machines /Shiegley/ Oxford.

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering**

Code: 3B512

**METAL CUTTING & MACHINE TOOLS**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>									

**L T P/D C**  
**3 1 --- 3**

*After completing the subject, students will be able to:*

- *Understand the basic process of metal cutting, theory of metal cutting, various tool materials and economic aspects of machining*
- *Understand the principle and working of lathe machines, shaping machines and planing machines and calculate the machining time*
- *Understand the principle and working of Drilling and Boring machines and calculate the machining time*
- *Understand the principle and working of Milling machine and Broaching machine and calculate the machining time*
- *Understand the principle and working of Grinding machine, Lapping and Honing machine*
- *Ability to understand the principle of Jigs & Fixtures and understand the principle of some unconventional machining processes*

**UNIT – I**

Metal cutting theory – Elements of cutting process – Geometry of single point tool and angles, Chip formation and types of chips – chip breakers. Mechanics of orthogonal cutting –Merchant's Force diagram- Problems, cutting speeds, feed, depth of cut, Tool wear, Tool life-Taylor's Equation- Problems, Cutting Fluids, Machinability, Tool materials. Economics of machining – Tool life for minimum cost and maximum production - Problems

**UNIT – II**

Lathe – Principle of working, specification of lathe – types of lathe – Lathe operations & Important Accessories – Taper turning & thread turning-Problems-machining time calculations. Turret and Capstan lathes – Differences – tool holding devices - tool layout, examples.

Shaping and Planing machines –Differences- Principles of working – Quick return mechanisms- Principal parts – specification, classification, operations performed, machining time calculations.

**UNIT – III**

Drilling and Boring Machines – Principles of working, types of drilling machines, operations performed – Elements of twist drill – Machining time, Boring machines – Fine boring machines – Jig Boring machine.

**UNIT – IV**

Milling machine – Principle of working – specifications – classifications of milling machines – Principal features, Milling methods–Up & Down Milling, Milling operations, Geometry of End milling cutter – Indexing Methods - Problems – Machining time in milling.

Broaching -Types-Classification-Broach elements-Advantages-Limitations.

**UNIT –V**

Grinding machine – cutting action – classification of grinding machines – cylindrical and surface grinding machine –Different types of abrasives and bonds, Specification and selection of a grinding wheel, Truing and Dressing the grinding wheels, Lapping and Honing – comparison to grinding

**UNIT - VI**

Jigs and fixtures- Applications-differences- Elements of Jigs & Fixtures – Principles of location and clamping – Types of Locating and clamping devices, Types of Jigs and Fixtures.

Unconventional Machining: Principles of working and applications of USM, AJM, EDM, ECM, LBM and EBM.

**TEXT BOOKS:**

1. A course in Workshop Technology Vol II (Machine tools) – B.S.Raghu Vamshi – Dhanpat Rai & Co.
2. Production Technology by R.K. Jain and S.C. Gupta.
3. Manufacturing Science, Amithabha Ghosh and Mallik, Affiliated East West Press

**REFERENCES:**

1. Production Technology by H.M.T. (Hindustan Machine Tools).
2. Production Engineering / P.C.Sharma / S.Chand & Co



**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering**

Code: 3B513

**APPLIED THERMODYNAMICS – II**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>	<b>x</b>	<b>x</b>									

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- Understand steam power plants and the Rankine cycle on p-v, T-S and h-s diagrams
- Understand the working principles and basic design parameters of different types boilers.
- Understand the function of steam nozzle, Wilson line
- Understand the difference between impulse and reaction turbines, draw velocity diagrams
- Understand the Principle of operation of reaction turbine, features of Parsons reaction turbine and to draw the velocity diagrams for the same.
- Understand the working principles of different condensers and understand the gas turbine power plants
- Understand the working principle of jet propulsion and rocket engines

**UNIT – I**

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

**UNIT II**

**Boilers :** Classification – Working principles – with sketches including H.P.Boilers – Mountings and Accessories – Working principles, 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.

**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 to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

**UNIT – IV**

**Steam Turbines:** Classification – 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.

**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.

**UNIT V**

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

**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 – VI**

**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 – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods.

**Rockets:** Application – Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

**TEXT BOOKS:**

1. Thermal Engineering / R.K. Rajput / Lakshmi Publications
2. Gas Turbines – V.Ganesan /TMH

**REFERENCES:**

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
2. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
3. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering**

Code: 3B514

**DESIGN OF MACHINE MEMBERS – I**

a	b	c	d	e	f	g	h	i	j	k	l
x			x								

**L T P/D C**  
**3 1 --- 3**

*After completing the subject, students will be able to:*

- *develop ability to analyze, design and select machine elements for various applications - with attention to strength, rigidity, factor of safety, reliability, and manufacturing consideration*
- *analyze Strength/Failure theories and Safety factors for machine members under steady and fatigue loads.*
- *acquire procedure to analyze and design of permanent joints such as Riveted and welded joints etc. for different applications.*
- *learn technique to design shafts, keys and shaft couplings*
- *understand various types of springs and their applications and learn how to design helical and leaf springs with practical engineering problems*
- *acquire procedure to analyze and design of temporary joints bolted joints for different applications*

**UNIT I: Introduction:**

Basic design process and requirements of machine design, use of standards in design, design synthesis; Engineering materials, stress-strain diagrams, mechanical properties of engineering materials; Materials selection techniques

**Design against static loading:**

Stresses due to axial loads, bending moment, torsional moment and eccentric axial loading, factor of safety, principal stresses, theories of elastic failure; Design of shafts under combined loading, design for strength and rigidity, concept of stiffness in tension / compression, bending and torsion

**UNIT II: Design against Fluctuating Loads:**

Stress concentration & its factors, fluctuating stresses, fatigue failure, endurance limit, Soderberg, Goodman, Modified-Goodman and Gerber criterion, Fatigue design under combined stresses. Design for finite and infinite life. Shaft design against fluctuating and shock loads.

**UNIT III: Design of Keys, Couplings and Joints:**

Types of keys, Design of saddle, sunk, feather, Woodruff and Kennedy keys.  
Design of rigid and flexible couplings, Design of cotter joint and knuckle joint

**UNIT IV: Design of springs:**

Types of springs, terminology of helical spring, stress and deflection equations, spring materials, helical spring design against static and fluctuating loads, concentric springs, surge in springs

**UNIT V: Design of Joints - I:**

**Design of Threaded joints:** Bolted joint design with static loads and fluctuating loads, eccentrically loaded bolted joints.

**Design of Riveted joints:** Types riveted joints, failures of riveted joints, design of lap and butt riveted joints, Eccentric loading of riveted joints.

**UNIT VI: Design of Joints - II:**

**Welded joints:** Types of welded joints, strength of butt and fillet joints, axially loaded symmetrical and unsymmetrical welded joints, bending moment and tensional moment, welded joints subjected to eccentric and variable loading.

**TEXTBOOKS:**

1. **Design of Machine Elements** – Third Edition / V.B.Bhandari / Tata McGraw-Hill Pub.
2. **Mechanical Engineering Design** / J.E.Shigley, C.R.Mischke / Tata McGraw-Hill Pub.
3. Materials Selection in Mechanical Design / Michael F. Ashby
4. Mechanical Design Handbook/PSG

**REFERENCE BOOKS:**

1. **Fundamentals of Machine Elements** / Bernard Hamrock, Steven Schmid, Bo Jacobson / Tata McGraw Hill
2. A Text of Machine Design – R S Khurmi
3. Design of machine Elements -Kulakarni

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
**Code:3ZC01**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
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**3      1      3**

**Course Objective:** To make the students understand the concepts and principles of Business Economics at micro level and basic principles of Financial Accounting and Analysis, which facilitate them in making better planning and decisions.

**UNIT I**

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Definition, Nature and Scope of Business Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Elasticity of Demand and Demand Forecasting.

**UNIT II**

**THEORY OF PRODUCTION AND COST ANALYSIS:** Production Function – Isoquants and Isocosts, Internal and External Economies of Scale, Laws of Returns. Cost Analysis: Cost concepts, different types of costs, cost control and cost efficiency, Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems).

**UNIT III**

**INTRODUCTION TO MARKETS:** Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Pricing strategies, transfer pricing and performance measurement, Price-Output Determination in case of Perfect Competition and Monopoly

**UNIT IV**

**FUNDAMENTALS OF FINANCIAL ACCOUNTING:** Concepts and conventions, principles of Double-Entry, Book Keeping, Journal, Ledger, Trial Balance, Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.

**UNIT V**

**CAPITAL BUDGETING TECHNIQUES:** Nature and scope of Capital Budgeting, Methods of Capital Budgeting: Traditional methods and Discounting Cash Flow methods.

**UNIT VI**

**RATIO ANALYSIS:** Introduction to Ratio analysis – Leverage ratios – Liquidity ratios – Turnover ratios – Profitability ratios, Du-pont chart. (Simple problems)

**Books Recommended:**

- Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

**References:**

- Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
- H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
- Suma Damodaran, Managerial Economics, Oxford University Press.
- Lipsey & Chrystel, Economics, Oxford University Press.

**Syllabus for B. Tech. III Year I semester**  
**Mechanical Engineering**  
**QUANTITATIVE APTITUDE**

Code: 3HC76

a	b	c	d	e	f	g	h	i	j	k	l
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**L T P/D C**  
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**Course Objectives:**

- Students learn and solve problems related to number systems
- Students find averages of numbers and groups
- Students solve problems related to ratio and proportion
- Students find simple interest, solve time work and distance problems
- Students solve mensuration problems
- Students interpret the various kinds of data and find the relation between them.

**Unit I**

Number System: Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers - Fractions.

**Unit II**

Average: Average of different groups, Replacement of some of the items - Percentage - Profit and Loss.

**Unit III**

Ratio and Proportion: Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share – Mixtures.

**Unit IV**

Simple Interest: Effect of change of P, R and T on Simple Interest - Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest – Time and Work – Time and Distance.

**Unit V**

Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures .

**Unit VI**

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

**Text Books:**

1. Quantitative Aptitude by R.S. Agarwal
2. Quantitative Aptitude by Abhijit Guha

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
GROUP PROJECT**

Code: 3B578

a	b	c	d	e	f	g	h	i	j	k	l
x	x	x	x	x				x	x		

**L T P/D C**  
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Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects.

Enables to apply modern IT tools and technologies

Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society.

Enhances communicative skills and team work

The students learn the ability to work as an individual with multidisciplinary approach

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the teacher and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also. There will be 75 marks in total with 25 marks of internal evaluation.

The **internal evaluation** shall consist of:

Day to day work	10 marks
Report	05 marks
Demonstration / presentation	10 marks
End examination	50 Marks.

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering**

Code: 3B579

**APPLIED THERMODYNAMICS LAB**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
	<b>x</b>	<b>x</b>									

**L T P/D C**

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After completing the subject, students will be able to conduct:

- *Performance test on air compressor will make the student to analyze the performance of the comp*
- *Disassembly and assembly of I.C engine will make the student understand the internal components and their functionality*
- *Heat balance test will make the student the student understand have the energy supplied to the engine in distributed in a cycle*
- *Vapour compression relise ration will make the student understand the components and working of a refrigeration cycle*
- *Value timing diagram will make the student understand the operation of inlet and exhaust valves in a cycle*

**LIST OF EXPERIMENTS**

**Note:** Minimum of 10 experiments to be performed

1. I.C. Engines Valve / Port Timing Diagrams
2. I.C. Engines Performance Test ( 4 -Stroke Diesel Engines )
3. I.C. Engines Performance Test on 2-Stroke Petrol
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine retardation and motoring test on 4- stroke diesel engine
5. Heat Balance on I.C. Engines
6. Determination of Air/Fuel Ratio and Volumetric Efficiency on IC Engines.
7. Determine of Economical speed test for fixed load on 4-stroke Engine.
8. Determine optimum cooling water temperature on IC Engine
9. Dis-assembly/Assembly of Engines
10. Performance Test on Reciprocating Air – Compressor Unit
11. Performance test on variable compression ratio petrol engine.
12. Study of Boilers



**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering  
MACHINE TOOLS LAB**

Code: 3B580

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>	<b>x</b>					<b>x</b>			

L T P/D C

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After completing the subject, students will be able to conduct:

- 1) Ability to understand the uses of precision measuring instruments such as vernier calipers, micrometers, gear tooth vernier, bevel protractor, sine bar and measure dimensions of various workpieces using the instruments
- 2) Ability to understand the principle and working of lathe and shaper machine and perform various operations on work pieces
- 3) Ability to understand the principle and working of Shaper, Drilling and Milling machine and perform various related operations on work pieces
- 4) Ability to understand the principle and working of grinding machines and perform various operations on work pieces
- 5) Perform alignment test on lathe and drilling machines

**List of Experiments**

- 1) Introduction to General purpose machine tools - Lathe, Drilling machine, Milling machine, Shaper and Grinding machines
- 2) Study of measuring and inspection tools used in Machine tool laboratory: – Vernier caliper, micrometers, height gauge, V-block, surface plate, Bore gauges, Pitch gauges, straight edges, dial gauge, plug and ring gauges, slip gauges, tool maker's microscope.
- 3) Lathe Operations-I: Facing, Plain turning, Step turning, Taper turning and Chamfering
- 4) Lathe Operations-II: Thread cutting, Grooving and Knurling
- 5) Drilling Operations-I: Drilling, Boring, Reaming
- 6) Drilling Operations-II: Counter boring, Counter sinking and Tapping
- 7) Shaping Operations: Machining of V-Block
- 8) Milling Operations
- 9) Surface Grinding Operations
- 10) Tool and Cutter Grinder: Grinding of Tool angles of single point cutting tool
- 11) Machine tool alignment test on Lathe
- 12) Machine tool alignment test on Drilling machine

**Syllabus for B. Tech. III Year I semester  
Mechanical Engineering**

**Code: 3B590 TECHNICAL PAPER WRITING & SEMINAR-I**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
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The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defence before a departmental committee consisting of Head, a senior faculty and supervisor	15 marks

**Syllabus for B. Tech. III Year II semester**  
**Mechanical Engineering**  
**METROLOGY & INSTRUMENTATION**

Code: 3B515

a	b	c	d	e	f	g	h	i	j	k	l
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*After completing the subject, students will be able to :*

- understand the type of fit, procedure of gauge design, the different linear measurements and angular measuring instruments.
- understand the procedure of finding the flatness using optical flat and interferometer, working of tool maker's microscope, To evaluate surface roughness
- understand the measuring elements of screw threads and to learn the techniques of measuring gear elements and to familiarize with surface engineering techniques.
- Understand the necessity for the measurement of various physical quantities like pressure or temperature, General usage of various measuring instruments and the associated errors and the instrument response to various inputs
- Know the various types of pressure sensors and pressure gauges for low pressure, medium pressure and high pressure application
- Measure the speed, vibrations using displacement pick ups and accelerometers of typically machine beds and tool posts in lathe etc

**A. METROLOGY :****UNIT – I**

**Systems of limits and fits:** Introduction, normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly, Indian standard system-Problems

**Linear Measurement:** Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

**Measurement Of Angles And Tapers:** Bevel protractor, angle slip Gauges, spirit levels, Sine bar, rollers and spheres used to determine the tapers, problems.

**UNIT – II**

**Limit Gauges:** Taylor's principle – Design of go and No go gauges, plug, ring, snap, gap gauges, Problems.

**Optical Measuring Instruments:** Tool maker's microscope and its uses

**Surface Roughness Measurement:** Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA, R.M.S Values, Rz value, Methods of measurement of surface finish-profilograph, Talysurf, Problems

**UNIT- III**

**Screw Thread Measurement:** Elements of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch.

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

**B. INSTRUMENTATION:**

**UNIT – IV**

**Introduction and 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 – V**

**Measurement of Pressure:** Units – classification – different principles used. Manometers, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, Mc leod pressure gauge.

**Measurement of Temperature:** Classification – Ranges – Various Principles of measurement – Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

**UNIT – VI**

**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 Force And Torque** - Elastic force meters, load cells, Torsion meters, Strain gauge Rosettes.

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

**TEXT BOOKS:**

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Engineering Metrology / R.K. Jain / Khanna Publishers
3. Measurement Systems: Applications & Design by D.S Kumar.
4. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE

**REFERENCES:**

1. Production Engineering/P.C.Sharma
2. Measurement systems: Application and Design, Doebelin Earnest. O. Adaptation by Manik and Dhanesh/ TMH

**Syllabus for B. Tech. III Year II semester**  
**Mechanical Engineering**  
**Code:3ZC11 LOGISTICS AND SUPPLY CHAIN MANAGEMENT**  
**(Same as 4Z319)**

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**Course Objective:** The objective of the course is to give the student an overview of Supply Chain management principles and practices

**\*The students need Statistical Table to solve numerical problems.**

**Prerequisites:** Knowledge of Production and Operations Management, Marketing Management and QABD taught in second semester of the programme.

#### UNIT I

**INTRODUCTION TO LSCM:** Logistics and Competitive strategy Understanding the Supply Chain. Objective and Importance of Supply Chain Process View of Supply Chain. Competitive and Supply Chain Strategies, Achieving Strategic Fit, Challenges of SCM

#### UNIT II

**SUPPLY CHAIN DRIVERS AND METRICS:** Drivers for Supply Chain Performance, Framework for Structuring drivers. Facilities, inventory, transportation, information, sourcing and pricing. Obstacles to Achieving fit. Designing the Supply Chain Network. Role of distribution in the Supply Chain, Factors influencing network design, the role of network in the Supply Chain.

#### UNIT III

**DEMAND FORECASTING & AGGREGATE PLANNING IN SUPPLY CHAIN:** Demand Forecasting in Supply Chain Components of forecast and forecasting methods. Role of IT in forecasting. Aggregate Planning in Supply Chain Planning Supply and Demand in A Supply Chain, Managing Predictable Variability.

#### UNIT IV

**LOGISTICS AND SUPPLY CHAIN RELATIONSHIPS:** Benchmarking the logistics process and SCM operations –Mapping the supply chain processes – SCOR model – Supplier and distributor benchmarking – setting benchmarking priorities –identifying logistics performance indicators –Channel structure – channel relationships – Transportation, Inventory Planning & Managing - logistics service alliances.

#### UNIT V

**WAREHOUSE MANAGEMENT:** Importance, Structure, Business process of warehouse management, product unit used for packaging and shipping, supply chain relevant for warehouse management, Goods receipt, Issue & Transfer within the warehouse, Warehouse management automation & IT integration, RFID.

#### UNIT VI

**MANAGING GLOBAL LOGISTICS AND GLOBAL SUPPLY CHAINS:** Performance of Logistics and Supply chain in India, Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy – The global supply chains -Global supply chain business processes.

#### Books Recommended:

- Sunil Chopra and Peter Meindl: *Supply chain Management: Strategy, Planning and Operation, 3/e*, Pearson Education, New Delhi 2007.

- Donald J.Bowersox and David J.Closs, *Logistical Management: The Integrated Supply Chain Process*, Tata McGraw Hill, 2006.

**References:**

- Martin Christopher, *Logistics and Supply Chain Management*, Pitman, London.
- B.S.Sahay, *Supply Chain Management for Global Competitiveness*, Macmillan, New Delhi.2003.
- Philip B.Schary, Tage Skjott-Larsen: *Managing the Global Supply Chain*, Viva, Mumbai, 2006.
- Monczka: *Purchasing and Supply Chain Management* Thomson, 2006.
- Ballou, *Business Logistics/Supply chain Management*5/e Pearson Education.
- David Simchi-Levi, Philip Kaminsky,Edith Simchi-Levi, *Designing and Managing The Supply Chain* 2<sup>nd</sup> ed. Tata McGraw Hill Publishing Company Ltd.,2006
- Amit Sinha, Herbert Kotzab , *Supply Chain Management A managerial Approach*, Tata McGraw Hill Education Private Ltd, 2012.

**Syllabus for B. Tech. III Year II semester**  
**Mechanical Engineering**  
**Code: 3ZC05 GENERAL MANAGEMENT & ENTREPRENEURSHIP**

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**Course Objective:** The course is designed to impart the necessary managerial skills and tactics required for an emerging Entrepreneur for the Engineering students to enhance their career prospects and ambitions of starting a new Enterprise.

**Pre-requisites:** This course shall require a student to have knowledge in Managerial Economics and Financial analysis, Management Science, Operations management.

#### **UNIT I**

**INTRODUCTION TO MANAGEMENT AND ENTREPRENEURSHIP:** Changing Face of Management-Entrepreneurship, Modern Management with Entrepreneurial Orientation.. Meaning of Entrepreneurship. Benefits and Drawbacks of Entrepreneurship Reasons feeding the Entrepreneurial fire. Understanding Entrepreneurship as a Process. Multiple roles of Entrepreneur: Intrapreneur, Inventor, Coordinator, Manager and Controller. Psychological and behavioral aspects of First-Generation Entrepreneur. Case Studies

#### **UNIT II**

**PROCESS DEVELOPMENT AND INNOVATION PROJECT MANAGEMENT:** Business Process Model, Value chain for Manufacturing industries and Service Industries. Frugal Innovation. Creativity process in developing Innovation.. Types of New Products, Forecasting of New Products, Stages in the New Product Development, Prototype building and pitching Going ahead with ideas, killing the ideas through Stage Gate Models, pitching of full fledged idea. Choosing the Start-Up Team.

#### **UNIT III**

**PROJECT MANAGEMENT & FEASIBILITY REPORT:** Project Inception, Project Implementation, and Project control. Analyzing the project by employing capital budgeting techniques, Risk Management, tools and techniques. Methods of Appraising the Project. Industry Analysis pertaining to the Product, Competitive Analysis and Market analysis. Preparation of feasibility report, Contents of Feasibility Report. Exercise to write an effective Feasibility report. Case Studies.

#### **UNIT IV**

**PROTECTION OF IDEAS AND MECHANISM:** Exposure to intellectual property rights to the entrepreneur in the Indian and the World context. Registration process for Patents, Copyrights, Trademarks, Geographical indicators. Legal Framework in administration of Intellectual property rights. Meaning of Infringement, consequences of Infringement. Cases on Infringement. Case Studies.

#### **UNIT V**

**VENTURE FINANCING AND ISSUES RELATED TO PRICING:** Meaning of Venture Capitalist, Process of Venture Capital, Seed Funding, First Phase Funding, Second Phase Funding and Final Phase funding. Cost analysis, Preparation of standard costing, Finalizing the output, fixing the pricing based on market structure, Monopoly, oligopoly market structures and marketing pricing practices for attracting customers. Case Studies

#### **UNIT VI**

**MANUFACTURING AND QUALITY MANAGEMENT:** Plant Layout, Process and Product Layout, Service Factory. Introduction to Quality Circles, Quality inspection, ISO Certification, process of

certification and exposure to the entrepreneurs of the need for certification. Quality certification for Manufacturing industrial. Case Studies

**Books Recommended:**

- "Projects: Planning, Analysis, Selection, Financing, Implementation, and Review", Prasanna Chandra, TMH, New Delhi, 2012
- "Project Management", Jeffrey K. Pinto, Pearson, 2011
- Small Scale industries and Entrepreneurship Vasanth Desai "Himalya publishing 2012

**References:**

- Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
- Entrepreneurship Rajeev Roy "" oxford ,2012
- Fundamentals of Entrepreneurship Nandan H, PHI, 2013
- Entrepreneurship Development Khanka, ,S.Chand 2012
- Robert Hisrich et al "enterpreneruship TMH 2012
- Entrepreneurship Development B.Janikairam and M Rizwana



**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering  
BANKING OPERATIONS, INSURANCE AND RISK  
MANAGEMENT**

**Code:3ZC03**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
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**Course Objective:** The objective of the course is to provide to students an understanding of Banking Operations, Insurance Market, and Risk Management Principles and techniques to control the risk & the major Institutions involved and the Services offered within this framework.

**UNIT I**

**INTRODUCTION TO BANKING BUSINESS:** Introduction to Banking sectors-History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank New Dimensions and products- E-Banking, Mobile-Banking, Net Banking, CRM, cheque system and KYC system.

**UNIT II**

**BANKING REFORMS AND REGULATIONS:** Banking regulation Act-1949, Reserve Bank of India Act-1934, Establishment of RBI, Functions and credit control system; Role of commercial banks and its functions. Banking sector reforms in India and deficiencies in Indian banking including problems accounts and Non-Performing Assets.

**UNIT III**

**INTRODUCTION TO INSURANCE:** Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance; life insurance and its products: Role of Agents and brokers.

**UNIT IV:**

**INSURANCE BUSINESS ENVIRONMENT:** Regulatory and legal frame work governing the insurance sector, history of IRDA and its functions: Business and economics of insurance, need for changing mindset and latest trends.

**UNIT V**

**INTRODUCTION TO RISK MANAGEMENT:** Introduction to Risk, meaning and types of risk in business and individual, Risk management process, methods: Risk identification and measurement, Risk management techniques; Non insurance methods

**UNIT VI**

**FINANCIAL RISK MANAGEMENT:** Introduction to Financial markets. Financial risk management techniques –Derivatives, Hedging and Portfolio management techniques: Derivatives and types of Derivatives-Futures, options and swaps: Shares, Commodity and Currency trading in India.

**Books Recommended:**

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
- General Principles of Insurance Harding and Ewantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.

**References:**

- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteswar: Risk Management Insurance and Derivatives, Himalaya, 2008.
- Gulati: Principles of Insurance Management, Excel, 2009.
- James S Trieschmann, Robert E. Hoyt & David N. Sommer: Risk Mgt. & Insurance, Cengage, 2009.
- Dorfman: Introduction to Risk Management and Insurance, 8/e, Pearson, 2009.
- P.K. Gupta: Insurance and Risk Management, Himalaya, 2009.
- Vivek & P.N. Asthana: Financial Risk Management, Himalaya, 2009.
- Jyotsna Sethi & Nishwan Bhatia : Elements of Banking and Insurance, 2/e, PHI, 2012.

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

Code:3ZC09

**TOTAL QUALITY MANAGEMENT**

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**Course Objective:** The objective of the course is to equip with the skills and knowledge necessary to implement a successful TQM program in their company, an understanding of the history, purpose and fundamentals of TQM, the tools and techniques that can improve operations, product quality, process quality, customer satisfaction.

**UNIT I**

**INTRODUCTION:** Basic Management concepts, Quality and Total Quality Management, Principles and Philosophies of Quality Management, Quality and Business performance, attitude and involvement of Top Management.

**UNIT II**

**MANAGEMENT OF PROCESS QUALITY AND CUSTOMER FOCUS AND SATISFACTION:** Definition of quality, Quality Control, a brief history, Quality Gurus, Product Inspection Vs., Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling. Process Vs. Customer, Internal Customer Conflict, Quality Focus, Customer Satisfaction, Role of Marketing and Sales, Buyer - Supplier relationships.

**UNIT III**

**ORGANIZING FOR TQM:** The systems approach, Organizing for Quality Implementation, making the transition from a traditional to a TQM organizing, Quality Circles. Bench Marketing: Evolution of Bench Marketing; Meaning of Bench Marking, Benefits of Bench marking, the Bench marking process, pitfalls of bench marking.

**UNIT IV**

**PRODUCTIVITY, QUALITY AND REENGINEERING:** The leverage of Productivity and Quality, Management systems V s. Technology, Measuring Productivity, and Improving Productivity Re-engineering.

**UNIT V**

**THE COST OF QUALITY:** Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost Information, Accounting Systems and Quality Management.

**UNIT VI**

**ISO 9000:** Universal Standards of Quality: ISO around the world, ISO 9000 ANSI /ASQCQ-90. Series Standards, benefits of ISO 9000 certification, the third party audit, Documentation ISO 9000 and services, the cost of certification implementing the system.

**Books Recommended:**

- Shridhara Bhat K, TQM – Text & Cases, First Edition 2002,. Himalaya Publications
- "Total Quality Management" by Joel E.Ross.

**References:**

- A.R.Aryasri, Management Science, TATA Mc,Graw Hill
- TQM – Sundararajan
- Poornima M Charantimoth, TQM, Pearson Education, First Indian Reprint 2003
- Rose JE, TQM , Kogan Pak India Pvt. Hyderabad 1993
- "Statistical Quality Control" by E.L.Grant.

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

**Code: 3ZC07 FUNDAMENTALS OF DISASTER MANAGEMENT**

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**Course Objectives:**

1. To provide students an exposure to disasters, their significance and types.
2. To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
3. To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4. To enhance awareness of institutional processes in the country
5. To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

**UNIT I**

**INTRODUCTION TO DISASTERS:** Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) Disasters – Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.). Differential impacts – in terms of caste, class, gender, age, location, disability.

**UNIT II**

**GLOBAL TRENDS IN DISASTERS:**

Urban disasters, pandemics, complex emergencies, Climate change Case Study on Climate Change.

**UNIT III**

**APPROACHES TO DISASTER RISK REDUCTION:** Disaster cycle – its Analysis, Phases. Culture of safety, prevention, mitigation and preparedness; Community-based DRR: Structural and nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions / Urban Local Bodies (PRIs / ULBs), district administration, states, centre, and other stakeholders; Case studies.

**UNIT IV**

**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT:** Factors affecting Vulnerabilities, differential impacts; Impact of Development projects such as dams, embankments, changes in land-use etc; Climate change adaptation; Relevance of indigenous knowledge, appropriate technology and local resources; Case studies.

**UNIT V**

**DISASTER MANAGEMENT IN INDIA:** Hazard and vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management; Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programs and legislation); Case studies.

**UNIT VI**

**APPLICATION OF TECHNOLOGY IN DISASTER MANAGEMENT:** IT in Disaster Management – Databases – RDBMS – Management information systems – Decision support systems – GIS – Intranets and Extranets – Video Conferencing, Trigger Mechanism – Remote Sensing – Contribution of remote sensing and GIS. Case Studies and Global Initiatives.

**Books Recommended:**

- B. K. Khanna: “Disasters: All you wanted to know about”, New India Publishing Agency, New Delhi
- Pradeep sanhi, Madhavi malalgoda and arya bandhu, “Disaster risk reduction in south asia “PHI
- Amita sinval, “Understanding earthquake disasters” TMH, 2010

**References:**

- Natural Hazards and Disaster Management: R.B. Singh, Rawat Publications
- Remote Sensing and GIS by A.M. Chandra and S.K. Ghosh, Narosa Publishing house
- GIS – Fundamentals, Applications and Implementations: Dr. K. Elangovan, New India publishing agency

**Suggested Reading List:**

- Alexander David, Introduction in ‘Confronting Catastrophe’, Oxford University Press
- Andharia J., Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples’ Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management
- Carter, Nick 1991. Disaster Management: A Disaster Manager’s Handbook. Asian Development Bank, Manila Philippines.
- Cuny, F. 1983. Development and Disasters, Oxford University Press. Document on World Summit on Sustainable Development 2002.
- Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.
- Government of India, 2009. National Disaster Management Policy
- Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster Risk Management, N IDM, New Delhi
- Indian Journal of Social Work 2002. Special Issue on Psychosocial Aspects of Disasters, Volume 63, Issue 2, April.
- Kapur, Mu & others, 2005: Disasters in India Studies of grim reality, Rawat Publishers
- Kapur Anu 2010: Vulnerable India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi.
- Pelling Mark, 2003 The Vulnerability of Cities: Natural Disaster and Social Resilience Earthscan publishers, London
- Reducing risk of disasters in our communities, Disaster theory, Tearfund, 2006.
- UNISDR, Natural Disasters and Sustainable Development: Understanding the links between Development, Environment and Natural Disasters, Background Paper No. 5. 2002.
- IFRC. 2005. World Disaster Report: Focus on Information in Disaster, pp. 182-225.

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

Code: 3B617

**DESIGN OF MACHINE MEMBERS-II**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>			<b>x</b>								

**L T P/D C**

**3 1 --- 3**

After completing the subject, students will be able to:

- Understand the basic design concepts of bearings and design procedures with bearing catalogue.
- Understand how to formulate and be able to solve the design related Engine parts
- Understand the fundamental relationships among various design parameters and design requirements in the process of design of spur gear
- The design hand book data to determine the values of stresses ,load factors, factor of safety in design of helical gears
- Design and analyze cylinders and pressure vessels with the help of design hand book
- Apply the statistical methods to design simple machine members and Students will involve in an open ended design project

**UNIT I: Design of Bearings:**

**Sliding Contact Bearings:** Classification of bearings, basic modes of lubrication, Petroff's equation, McKee equation, bearing design, selection of parameters.

**Rolling contact bearings:**

Types of rolling contact bearings, static load carrying capacity, dynamic load carrying capacity, equivalent bearing load, load-life relationship, load factors, bearing reliability ,selection of bearing from manufactories catalogues.

**UNIT II: Design of I.C. Engine parts:**

Design of Cylinder, piston, connecting rod and crank shaft. Material selection.

**UNIT III: Design of Spur:**

Classification of gears, gear terminology, undercutting, gear tooth failures; Force analysis; Strength analysis: bending strength (Lewis equation), beam and wear strength of gear tooth, checking for dynamic (Buckingham equation) and wear considerations; design procedure for spur gears (estimation of module, centre distance, face width etc).

**UNIT IV: Design of Helical gears:**

Introduction, terms of helical gears, formative no.of teeth, proportion of helical gears, Design equations of helical gears. design procedure for helical gears (estimation of module, centre distance, face width etc).

**UNIT V: Design of Cylinders and Pressure Vessels:**

Thin and thick cylinders under internal and external pressures; Design of cylinders: Lamé's equation, Clavarino's and Birnie's equations, Barlow's equation. Compound cylinders; thin spherical vessels; Design of end closures

**UNIT VI: Statistical Considerations in Design:**

Frequency distribution, frequency curves, measures of central tendency and dispersion, probability distribution, Normal curve, design and natural tolerances; Probabilistic aspects of variations in geometry of

machine elements, material properties, external loading and initial / boundary conditions, probabilistic approach to design, reliability.  
Introduction to failure analysis and design

**TEXTBOOKS:**

1. **Design of Machine Elements** – Third Edition / V.B.Bhandari / Tata McGraw-Hill Pub.
2. **Mechanical Engineering Design** / J.E.Shigley, C.R.Mischke / Tata McGraw-Hill Pub.

**REFERENCE BOOKS:**

1. **Fundamentals of Machine Elements** / Bernard Hamrock, Steven Schmid, Bo Jacobson / Tata McGraw Hill
2. Probabilistic Mechanical Design / Edward B. Haugen
3. A Text Book of Machine Design -Kurmi



**Syllabus for B. Tech. III Year II semester**  
**Mechanical Engineering**  
**HEAT TRANSFER**

Code: 3B618

a	b	c	d	e	f	g	h	i	j	k	l
x	x	x	x							x	

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- To demonstrate basic knowledge of heat transfer by understanding: differences between conduction, convection and radiation; Students shall be able to formulate basic differential equations for heat transfer; Students must be able to understand the importance of thermal conductivity of materials
- Students shall be able to deal with problems like conduction through walls and composite walls; critical radius of insulation; heat transfer in fins
- Students must be in a position to Calculate of heat transfer coefficient; overall heat transfer coefficient; log-mean temperature differences
- Students must be in a position differentiate forced and natural convection problems correlations; and demonstrate the use of Biot, Nusselt, Reynolds, Grashof, Rayleigh and Prandtl numbers; basic radiative heat transfer, basic principles of mass transfer
- To make the students capable of employing the heat transfer principles in real life situation
- To bring in confidence to apply the principles in industrial appliances and machinery like Power Plants, Heat Exchangers, coolers etc

**UNIT – I**

**Introduction:** Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about 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 – Initial and boundary conditions.

**One Dimensional Steady State Conduction Heat Transfer:** Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation

**One Dimensional Steady State Conduction Heat Transfer:** Variable Thermal conductivity – systems with heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature.

**One Dimensional Transient Conduction Heat Transfer :** Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems- Concept of Functional Body

**UNIT – III**

**Convective Heat Transfer :** Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem and method, application for developing semi – empirical non- dimensional

correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

**Forced convection: External Flows:** Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer -Flat plates and Cylinders.

**Internal Flows:** Concepts about Hydrodynamic and Thermal Entry Lengths – Division of internal flow based on this –Use of empirical relations for Horizontal Pipe Flow and annulus flow.

#### UNIT – 1V

**Free Convection:** Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for Vertical plates and pipes.

#### UNIT V

**Heat Transfer with Phase Change: Boiling:** – Pool boiling – Regimes Calculations on 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.

#### **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 VI

#### **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 grey bodies – radiation shields – electrical analogy for radiation networks.

#### **TEXT BOOKS:**

1. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International

#### **REFERENCE BOOKS:**

1. Heat Transfer / HOLMAN/TMH
2. Heat Transfer – P.K.Nag/ TMH
3. Heat and Mass Transfer – R.K. Rajput – S.Chand & Company Ltd.
4. Heat and Mass Transfer-Kondandaraman

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering  
CAD/CAM**

Code: 3B619

a	b	c	d	e	f	g	h	i	j	k	l
x	x										

L T P/D C

3 1 --- 3

After completing the subject, students will be able to:

- demonstrate differences between Computer Aided Design (CAD) process and conventional design
- understand the existing geometric modeling and develop a geometric modeling for a new component in design process
- write a CNC manual part program and understand the difference between manual part program and computer assisted part program
- implement Group Technology concept in modern manufacturing methods
- understand the different Computer Aided Processes Planning(CAPP) and CAQC in industry
- understand the difference between Computer Integrated Manufacturing Systems

**UNIT – I**

Computers in Industrial Manufacturing, Product cycle, scope of CAD/CAM, Applications of CAD/CAM, brief treatment of interactive input/output devices, Graphic terminals, display devices, hard copy devices, storage devices, selection criteria of CAD workstations

**UNIT – II**

**Computer Graphics:** Raster scan graphics coordinate system, Line drawing algorithms windowing, line clipping algorithm, transformation of geometry, 2D & 3D transformations, mathematics of projections, hidden surface removal, database structures for graphic modeling.

**UNIT – III**

**Geometric modeling:** Requirements of Geometric modeling, Wireframe modelling- entities, curve representation methods, surface modeling-entities, surface representation methods, solid modelling-B-rep, CSG representation, modeling facilities desired.

**Automated drafting facilities:** Basic geometric commands, layers, display control commands, editing commands, dimensioning

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

**Computer Aided Quality Control (CAQC):** Terminology in quality control, the computer in QC, contact and Non-contact inspection methods, computer aided testing, integration of CAQC with CAD/CAM.

**UNIT – VI**

**Computer integrated manufacturing systems:** CAD/CAM integration, Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits

**TEXT BOOK:**

1. CAD / CAM A Zimmers & P.Groover/PE/PHI
2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

**REFERENCES:**

1. Automation , Production systems & Computer integrated Manufacturing/ Groover/P.E
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
3. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

Code: 3B620

**DYNAMICS OF MACHINERY**

a	b	c	d	e	f	g	h	i	j	k	l
	x	x	x								

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to

- Understand the effect of precession motion on the stability of moving vehicles
- Understand the phenomenon of friction and in developing different applications like, brakes, clutches and dynamometers etc.
- Understand and development of speed controlling devices like flywheel and governors
- Understand the motion of different machine elements and the forces involved in them

**UNIT – I: FRICTION, CLUTCHES, BRAKES & DYNAMOMETERS:**

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

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

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

**UNIT – II**

**GYROSCOPIC AND PRECESSIONAL MOTION:**

Static and dynamic force analysis of planar mechanisms.

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

**UNIT –III**

**TURNING MOMENT DIAGRAM AND FLY WHEELS:**

Dynamics of Reciprocating Parts, Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

**UNIT-IV**

**GOVERNERS:**

Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs. Sensitiveness, isochronism and hunting. Quality and stability of governors.

**UNIT – V**

**BALANCING:**

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

**Balancing of Reciprocating Masses:** Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of “V” multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive efforts. Field balancing.

**UNIT – VI**

**VIBRATION:** Introduction, Definitions, Types of vibrations, Free longitudinal vibrations, Damped vibrations, forced damped vibrations, Vibration Isolation & Transmissibility, Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Multi rotor system - Holtzer method

**TEXT BOOKS:**

1. Theory of machines and mechanisms-vicker, Shigley
2. Theory of Machines / S.S Rattan/ McGraw Hill Publ.

**REFERENCES:**

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering  
LOGICAL REASONING**

**Code:3HC77**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>	<b>x</b>										

**L T P/D C**  
**- - 2 1**

After completing the subject, students will be able to

**Unit I**

Students figure out the number and alphabet series

**Unit II**

Students grasp the concept of analogy and solve related problems

**Unit III**

Students classify and figure out odd one

**Unit IV**

Students realize the various techniques for coding and decoding

**Unit V**

Students solve the relations puzzles.

**Unit VI**

Students solve the problem related to number, ranking and arithmetic reasoning

**Unit – I**

Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.

Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.

**Unit – II**

Classification / Odd One Out: Word Classification, Number Classification, Letter Classification.

Coding – Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding.

**Unit – III**

Blood Relations: Deciphering Jumbled up Descriptions, Relation Puzzle – Direction sense test.

Number, Ranking & Time Sequence Test – Arithmetical Reasoning – Mathematical Operations.

**Unit – IV**

Data Sufficiency: Problems in which a question on any topic such as Coding – Decoding, Blood Relations, Directions, Arithmetical Reasoning etc.

Puzzle Test: Classification Type Questions, Seating Arrangements Comparison Type Questions, Sequential Order of Things, Selection Based on given conditions, Family – Based Puzzles, Jumbled Problems.

**Unit – V**

Assertions and Reason – Logical Venn Diagrams – Alpha Numeric Sequence Puzzle.

Cubes and Dice – Analytical Reasoning

**Unit – VI**

Logical Deduction: Logic, Statement – Arguments, Statement – Assumptions, Statement – Conclusions, Deriving Conclusions from Passages.

Clocks & Calendar.

**Text Book:** Verbal and Non Verbal Reasoning by R.S.Agarwal.



**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

**Code: 3B681**

**COMPREHENSIVE VIVA-VOCE-II**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>	<b>x</b>	<b>x</b>				<b>x</b>	<b>x</b>	<b>x</b>			

**L T P/D C**  
**--- --- --- 1**

After completing the subject, students will be able to:

Students are assessed in the courses they have undergone till the completion of that academic year  
 They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills

There are no sessional marks. The end examination shall be conducted by a committee consisting of an External examiner, Head of the department and two senior faculty members. It carries marks 50.



**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering  
HEAT TRANSFER LAB**

Code: 3B682

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>	<b>x</b>	<b>x</b>							

**L T P/D C**  
--- --- **3 2**

*After completing the subject, students will be able to*

1. Compute the thermal conductivity of a given material experimentally and understand the physical significance of the thermal conductivity of the given material insulating powder.
2. To calculate overall conductance of composite walls under given conditions.
3. To compute the forced and free convection heat transfer coefficients under given conditions from fundamentals.
4. Able to calculate LMTD for parallel flow and counter flow heat exchangers and overall heat transfer coefficient.
5. should be able to calculate the emissivity of a given surface and to calculate Stefan-Boltzmann's constant experimentally.
6. Understand the phenomena of pool boiling and to draw the boiling curve by showing different phases of boiling.

Note: A minimum of 10 experiments are to be conducted

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

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

Code: 3B683

**METROLOGY & INSTRUMENTATION LAB**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>	<b>x</b>					<b>x</b>		<b>x</b>	

**L T P/D C**

--- --- 3 2

After completing the subject, students will be able to:

- Understand the working and conduct experiments using various measuring instruments for measurement of linear & angular objects, gear teeth and threads
- Understand the principle and procedure for measuring surface roughness
- Understand and demonstrate the calibration of various instruments used for measurement of torque, pressure, displacement, load and vibration

**Note:** Minimum 5 experiments to be conducted from each section

**Section A:**

**METROLOGY LAB**

1. Measurement of lengths, heights, diameters by vernier calipers and micrometers
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier for checking the chordal addendum and chordal height of spur gear.
4. Thread measurement by Two-wire/ Three-wire method
5. Tool makers microscope and its application.
6. Angle and taper measurements by Bevel protractor and Sine bar.
7. Surface roughness measurement by Taly Surf.

**Section B:**

**INSTRUMENTATION LAB**

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Calibration of Load Cells
8. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.

**Syllabus for B. Tech. III Year II semester  
Mechanical Engineering**

**Code: 3B691 TECHNICAL PAPER WRITING & SEMINAR-II**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**  
--- --- 2 1

The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defence before a departmental committee consisting of Head, a senior faculty and supervisor	15 marks

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B721 PRINCIPLES OF FINITE ELEMENT METHOD**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**

**4 -- -- 4**

After completing the subject, students will be able to:

- Identify mathematical model for solution of common engineering problems related to 1D problem
- Formulate mechanical problems such as trusses and beams into finite elements
- Derive Finite element matrix equation for 2D and ax symmetric problems by different methods by applying basic laws in mechanics to apply isoparametric formulation to engineering problems
- Solve thermal problems using FEM
- Use professional-level finite element software to solve engineering problems related to structural dynamics and heat transfer problems. He should also in a position to handle open end design related projects in multi disciplinary subjects.

**UNIT-I:**

**FUNDAMENTALS OF FEM:**

Introduction, Historical back ground, strain displacements, strain stress, equilibrium, potential energy principal, Ray leigh – Ritz method, Galerkin’s method.

**FINITE ELEMENT MODELING OF ONE DIMENSIONAL PROBLEMS (BAR ELEMENT):**

Elements, nodes, number scheme, coordinate systems, shape functions, element stiffness matrix & force vectors using potential energy approach, Assembly of the local stiffness matrices and load vectors, quadratic shape functions, temperature effect on bar element.

**UNIT-II:**

**FINITE ELEMENT MODELING OF TRUSSES:**

Plane trusses, local and global coordinate systems, direction cosines, stiffness matrix, Stress calculation, temperature effects.

**FINITE ELEMENT MODELING OF BEAMS:**

Potential energy approach to derive stiffness and load matrices, shear force and bending moment calculations.

**UNIT-III:**

**FINITE ELEMENT MODELING OF TWO-DIMENTIONAL PROBLEMS USING TRAIINGULAR ELEMENTS:**

Introduction, Isoparametric representation of triangular element, potential energy approach to derive element stiffness and force matrices.

**AXISYMMETRIC FORMULATION:** using triangular element, boundary conditions in long cylinder subjected to internal pressures.

**UNIT-IV:**

**TWO DIMENSIONAL ISOPARAMETRIC ELEMENTS:**

Introduction to isoparametric formulation, shape functions of four node quadrilateral and eight node quadrilateral elements. Concept of numerical Integration

**INTRODUCTION TO 3D ELEMENTS:**

Tetrahedral and Hexahedral elements for three dimensional problems.

**UNIT-V:**

**FINITE ELEMENT MODELING OF HEAT TRANSFER:**

Galerkin approach, Steady state on-dimensional heat conduction problems, steady state heat transfer in thin fins, Two dimensional steady state heat conduction with triangular element.

**UNIT-VI:**

**FINITE ELEMENT MODELING OF DYNAMIC PROBLEMS:**

Introduction, solid elements with distributed mass, Lagrangian method, element mass matrices, evaluation of eigen values and eigen vectors for axial vibrating members and beams.

**INTRODUCTION TO FEM SOFTWARES:** Feature of commercially available soft wares, convergence criteria, FEM concept of mesh generation, geometry isotropy, pre-processing and post-processing, Type of errors in FEM.

**TEXT BOOKS:**

1. Tirupathi R-Chandrupatla: “Introduction to finite elements in engineering”, PHI publishers
2. Singiresu S.Rao -The finite element methods in Engineering , BH, Elsevier publishers

**REFERENCES:**

1. George R.Buchan, Finite elements analysis, Schhaum’s outlines-tata MC graw –hill edition,
2. David V.Hutton “Fundamentals of finite elements analysis”.

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B722 REFRIGERATION & AIR CONDITIONING**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>	<b>x</b>								

**L T P/D C**  
**4 -- --- 4**

After completing the subject, students will be able to:

- Understand air refrigeration and types of air refrigeration systems
- Principle and working of VCR system and understand T-S and P-h diagrams of VCR cycles
- Principle and working of types of compressors, condensers, expansion devices and evaporators, and Types of refrigerants, and uses
- Understand the working of VARS and difference between VARS and VCR; understand the working of LI-Br Absorption system, Steam jet Refrigeration System. Understand the working Thermo-electric refrigeration system, Vertex tube.
- Understand the concept of Air-conditioning
- Types of A.C Systems and related load calculation problems
- Understand the elements of A.C systems, Understand the different heat pump circuits

**UNIT – I**

**Introduction to Refrigeration:** Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of Ideal cycles of refrigeration.

Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air crafts.

**UNIT – II**

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

**UNIT III**

**System Components:** Compressors – General classification – comparison – Advantages and Disadvantages.

Condensers – classification – Working Principles

Evaporators – classification – Working Principles

Expansion devices – Types – Working Principles

**Refrigerants** – Desirable properties – classification refrigerants used – Nomenclature – Ozone Depletion – Global Warming.

**UNIT IV**

**Vapor Absorption System** – Calculation of max COP – description and working of NH<sub>3</sub> – water system and Li Br –water ( Two shell & Four shell) System. Principle of operation Three Fluid absorption system, salient features. Steam Jet Refrigeration System – Working Principle and Basic Components.



Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

**UNIT – V**

**Introduction to Air Conditioning:** Psychometric Properties & Processes – Characterization of Sensible and latent heat loads — Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

Requirements of human comfort and concept of effective temperature- Comfort chart –Comfort Air conditioning – Requirements of Industrial air conditioning , Air conditioning Load Calculations.

**UNIT – VI**

**Air Conditioning systems:** Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. Heat Pump – Heat sources – different heat pump circuits.

**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.Bellaney

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

Code: 3B723

**POWER PLANT ENGINEERING**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>											

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- Understand Concept of Steam power plant layout, Different sources of energy, Fuel handling equipments,
- Understand Types of coals, coal handling, Coal storage, ash handling systems
- Understand Concept of Diesel Power Plant, Gas turbine plant, with auxiliaries
- Understand Concept of water power, hydrological cycle, Hydrographs, pumped storage plants and type dams and spill ways
- Understand Concept of Solar collectors, solar energy, Fuel cells, thermo electric and thermo ionic, MHD generation, Nuclear fuel and reactors
- Understand Concept of Capital cost, Different types of costs used in power plants, different types of factors

**UNIT – I:**

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

**STEAM POWER PLANT :**

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

**UNIT II****STEAM POWER PLANT :**

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

**UNIT – III****INTERNAL COMBUSTION ENGINE PLANT :****DIESEL POWER PLANT: Introduction – IC Engines,**

types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

**GAS TURBINE PLANT :**

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

**UNIT – IV**

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

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

**UNIT V**

**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.

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

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

#### **UNIT – VI**

**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

#### **REFERENCES :**

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. A Course in Power Plant Engineering: / Arora and S. Domkundwar.
3. An Introduction to Power Plant Technology / G.D. Rai.

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering  
Production Planning and Control  
(Professional Elective-I)**

Code: 3B725

a	b	c	d	e	f	g	h	i	j	k	l
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**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- Understand the uses of production planning control in an organization
- Understand the importance of forecasting in industry and the related techniques
- Understand the inventory management techniques
- Understand the materials management system through MRP
- Understand the concepts and procedures of routing and line balancing
- Understand the concepts of dispatching

**UNIT – I**

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

**UNIT – II**

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

**UNIT – III**

Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P-Systems and Q-Systems – Introduction to MRP, MRP II & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

**UNIT – IV**

Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure. Schedule –definition – Difference with loading  
Scheduling Policies – Techniques, Standard scheduling methods,  
Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

**UNIT – VI**

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

**TEXT BOOKS :**

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

**REFERENCES :**

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.
3. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Galgotia Publications, Pvt., Limited.

**Syllabus for B. Tech. IV Year I semester**  
**Mechanical Engineering**  
**Code: 3B726**      **AUTOMOBILE ENGINEERING**  
**(Professional Elective-I)**

a	b	c	d	e	f	g	h	i	j	k	l
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**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- study of two front wheel drive, rear wheel drive and four wheel drive
- understand the fuel systems like petrol injection system and diesel injection system
- know the thermo, water, forced circulation system, study of ignition system and we can know the various emission standards
- understand about clutches, single plate clutch, multi plate clutch, wheels, tyres and differential gear box
- know the steering geometry – Ackerman steering mechanism and Davis steering mechanism toe-in, and to know the objects of suspension system

**UNIT – I**

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

**UNIT – II**

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

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

Introduction to Electric and Hybrid Vehicles – Basic Principles of working

**UNIT – III**

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

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

**Unit – IV**

Emission from Automobiles – Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG,CNG, liquid Fuels and gaseous fuels, electrical-their merits and demerits.

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

**UNIT – V**

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

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

**UNIT – VI**

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

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

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

**TEXT BOOKS:**

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

**REFERENCES:**

1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner

**Syllabus for B. Tech. IV Year I semester**  
**Mechanical Engineering**  
**Code: 3B727 NON CONVENTIONAL SOURCES OF ENERGY**  
**(PROFESSIONAL ELECTIVE-I)**

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			x	x						x	

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- explain concept of various forms of renewable energy and solar energy
- outline division aspects and utilization of renewable energy sources for both domestic and industrial applications and wind energy
- outline division aspects and utilization of renewable energy sources for both domestic and industrial applications and Bio-energy.
- understand the principle and working of OTEC power plants
- analyze the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- Have knowledge about various renewable energy sources to analyze the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- able to choose the appropriate renewable energy as an alternate for conventional power in any application.

**UNIT – I**

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

**UNIT-II**

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

**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-III**

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

**UNIT-IV**

**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-V**

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

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

**UNIT-VI**

**DIRECT ENERGY CONVERSION** : Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and joul 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
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa



**Syllabus for B. Tech. IV Year I semester**  
**Mechanical Engineering**  
**Code: 3B728 JET PROPULSION & ROCKET ENGINEERING**  
**(PROFESSIONAL ELECTIVE-I)**

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			x	x						x	

**L T P/D C**  
**4 --- --- 4**

After completing the subject, students will be able to:

- understand open, closed and semi closed cycle of gas turbines, thermal jet engines, classification of energy flow, thrust power and propulsion efficiency
- understand essential components of turbo pro and turbo jet performance evaluation, thrust augmentation
- understand plant layout of Ramjet, principle of operation,
- understand liquid propellant Rocket engines, comparison of propulsion systems.
- understand flight mechanics, applications of thrust profiles, rocket heat transfer and ablative to cooling
- understand cryogenics, advanced propulsion systems, elementary treatment of Electrical Nuclear and Plasma Arc propulsion.

**UNIT-I**

Elements of Gas Turbine theory – Thermo dynamic Cycles, open closed and semi-closed – Parameters of performances – Refinements to simple cycle

**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 – II**

**Turboprop and Turbojet** – Thermo dynamic cycles, Plant layout, essential components, principles of operation – performance evaluation – Thrust Augmentation and Thrust reversal – Contrasting with Piston Engine Propeller plant.

**UNIT – III**

**Ramjet** – Thermo dynamic Cycle, plant lay-out, essential components – Principle of operation – performance evaluation – Comparison among atmospheric thermal jet engines – elementary treatment of Scram jet and pulse jet.

**UNIT – IV**

**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 – V**

**Rocket technology-I:** Flight mechanics, Application Thrust Profiles, Acceleration – staging of Rockets, need for – Feed systems, injectors and expansion nozzles – Rocket heat transfer and ablative cooling

**UNIT – VI**

**Rocket technology-II** – Testing & Instrumentation – Need for Cryogenics – Advanced Propulsion Systems, elementary treatment of Electrical Nuclear and Plasma Arc Propulsion.

**TEXT BOOKS:**

1. Fundamentals of I.C. Engines/Gill, Smith and Zierys
2. Rocket Propulsion / Sutton
3. Gas Turbines/V.Ganesan/TMH
4. Thermodynamics of Propulsion / Hill & Paterson

**REFERENCE BOOK:**

1. Gas Turbines / Cohen, Rogers & Sarvana Muttoo / Addison Wesley & Longman
2. Compressible fluid flow by Yahya

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering  
ROBOTICS**

Code: 3B729

(PROFESSIONAL ELECTIVE-II)

a	b	c	d	e	f	g	h	i	j	k	l
	x				x					x	

L T P/D C

3 1 --- 3

After completing the subject, students will be able to:

- demonstrate the basic knowledge in robotic systems their classification and application areas.
- demonstrate the ability to kinematically and dynamically model any open-loop/ serial robot and study associated forward/inverse kinematics.
- demonstrate the ability to plan trajectories in the presence/absence of obstacles.
- demonstrate the ability to function on multidisciplinary robot design teams.
- learn the control system concepts and their application in robotics through linear and nonlinear control schemes.
- understand commonly used sensory and vision systems used in robotics

**UNIT – I**

**Introduction:** An over view and applications of Robotics, classification by coordinate system and control system. Different types of robot actuators: pneumatic, hydraulic and electric

**UNIT – II**

**Motion Analysis and Manipulator Kinematics:** Specifications of matrices, Homogeneous transformations as applicable to rotation and translation, D-H notation, Differential transformations, Jacobians; Forward and inverse kinematics – problems.

**UNIT – III**

**Statics and Dynamics of manipulators:** Force and moment balance, Use of Jacobian, Velocity analysis, Lagrange – Euler and Newton – Euler formations for dynamics of manipulators – Problems.

**UNIT - IV**

**Trajectory Planning:** Path planning, Skew motion, joint integrated motion – straight line motion.

**UNIT - V**

**Control of Manipulators:** Introduction to control systems: open and closed loop control, transfer functions, characteristics of linear and nonlinear systems and their control schemes; model of a manipulator joint, actuator; control schemes applied in robotics: PID

**UNIT - VI**

**Robot Sensors and Vision:** Classification of sensors, sensors in robotics; introduction to machine vision, image representation and processing.

**TEXT BOOKS:**

1. Robotics and Control / Mittal R K & Nagrath I J / TMH.
2. Robotics / Fu K S/ McGraw Hill.

**REFERENCES:**

1. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons
2. Robotic Engineering / Richard D. Klafter, Prentice Hall

**Syllabus for B. Tech. IV Year I semester**  
**Mechanical Engineering**  
**MECHATRONICS**  
**(PROFESSIONAL ELECTIVE-II)**

Code: 3B730

a	b	c	d	e	f	g	h	i	j	k	l
			x	x						x	

L T P/D C

3 1 --- 3

After completing the subject, students will be able to:

- demonstrate difference between closed-loop control and open loop control system and actuation system
- understand the first order system and second order system and transfer functions
- write the frequency response functions and understand the adaptive control systems
- know the programmable logic controller and various measurement systems
- understand the graphic database and object oriented programmable concepts

**UNIT - I:**

**INTRODUCTION:** Definition, Traditional and mechatronic approaches, Measurement systems, Control systems, open loop and closed loop controls, Controllers, Response of systems; Examples of mechatronic systems

**UNIT – II:**

**ACTUATION SYSTEMS AND FEEDBACK DEVICES:** Mechanical, Pneumatic, Hydraulic, Electrical / electronic actuation systems, their comparison; important elements of each of the systems; selection criteria for each. Feedback Devices: Classification, position and velocity sensors, Proximity Sensors – inductive, capacitive, infrared.

**UNIT – III:**

**INTRODUCTION TO CONTROL SYSTEMS:** System models and their building blocks, associated mathematical aspects: differential equations in time domain, use of Laplace transform technique for obtaining model in s-domain; individual and combined system transfer functions, open loop and closed loop systems and their transfer functions, systems in series and parallel configurations; zeroes and poles of systems

**UNIT – IV:**

**RESPONSE OF SYSTEMS:** Approaches: time and frequency domain analysis. Modeling first and second-order systems, transient and steady-state responses; stability aspects: Bode and Nyquist plots

**UNIT – V:**

**CLOSED LOOP CONTROLLERS:** Control modes; proportional, derivative, integral and combined methods; Introduction to digital control: ADC (Analog-to-Digital Conversion), DAC (Digital-to- Analog Conversion),

**UNIT – VI:**

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

**TEXT BOOKS:**

1. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, by W. Bolton, Pearson Education Press, 3<sup>rd</sup> addition 2005.
2. Modern Control Engineering, Katsuhiko Ogata

**REFERENCES:**

1. Mechatronics System Design, Shetty, D and Kolk, R.A., Thomson Learning
2. Mechatronics, H.M.T Ltd., Tata McGraw-Hill

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B731**

**DESIGN FOR MANUFACTURE  
(PROFESSIONAL ELECTIVE-II)**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**  
**3 --- --- 3**

After completing the subject, students will be able to:

- Understand design process for manufacturing and selection of materials
- Understand the design rules for machining and metal casting processes
- Understand the design for manufacture principles for welding and forging
- Understand the design guidelines for extrusion and sheet metal operations
- Understand the assembly process and automated assembly process
- Understand the design guidelines for assembly operations

**Unit – I: Introduction:**

Design philosophy steps in Design process - General Design rules for manufacturability - basic principles of design Ling for economical production -creativity in design. Materials: Selection of Materials (or design Developments in Material technology -criteria for material selection - Material selection interrelationship with process selection process selection charts.

**Unit – II: Machining Process:**

Overview of various machining processes - general design rules for machining Dimensional tolerance and surface roughness - Design for machining - Ease - Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

**Metal Casting:** Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances -use of solidification simulation in casting design - product design rules for sand casting.

**Unit – III: Metal Joining:**

Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints - design of brazed joints.

**Forging:** Design factors for forging - Closed die forging design - parting lines of die5 drop forging die design - general design recommendations.

**Unit – IV:Extrusion & Sheet Metal Work:** Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking.

**Unit – V: Assembly advantages:**

Development of the assemble process, choice of-assemble method assemble advantages social effects of automation.

**Automatic Assembly Transfer Systems:** Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free - transfer machine.

**Unit – VI: Design of Manual Assembly:**

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

**TEXT BOOKS:**

1. Geoffrey Boothroyd, "Assembly Automation and Product Design", Marcel Dekker Inc., NY, 1992.
2. Engineering Design - Material & Processing Approach - George E. Deiter, McGraw Hill IntI. 2nd Ed. 2000.

**REFERENCE BOOKS:**

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

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B732**

**RAPID PROTOTYPING  
(PROFESSIONAL ELECTIVE-II)**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**  
**3 --- --- 3**

After completing the subject, students will be able to:

- Understand importance of rapid prototyping systems their classification and applications
- Understand the various methods of rapid prototyping
- Understand the various type of printers used in rapid prototyping
- Understand the rapid tooling principles and methods
- Understanding the rapid manufacturing and its uses
- Understanding the reverse engineering applications

**Unit-I Introduction to Rapid Prototyping:**

Need for Time Compression in Product Development, History of RP systems, Growth of RP industry, Data formats, RP information workflow, Classification of RP systems, Applications of Advantages & Limitations of RP.

**Unit-II Rapid Prototyping Processes:**

Stereo lithography (SL), Selective Laser Sintering (SLS), Fused Deposition Modelling (FDM), Solid Ground Curing (SGC), Laminated Object Manufacturing (LOM); Principle, Process details, Machine details, Advantages, Dis-advantages, Applications.

**Unit-III Concept Modelers:**

Introduction to concept modeler, Principle and applications of: Thermo Jet Printer, Sander's model market, 3-D printer, Genisys Xs printer, JP System 5, Object Quadra Systems. Softwares for Rapid Prototyping: Overview of Solid view, Magics, Mimics and Magics Communicator, View Expert and 3 Data Expert, 3D view, Velocity2, Rhino, Stl View, Internet based software, Collaboration tools.

**Unit-IV Introduction to Rapid Tooling:**

Introduction to Tooling, Need for RT, Conventional Tooling methods Vs RT Indirect Rapid Tooling Methods: Spray Metal Deposition, RTV Epoxy tools, Ceramic tools, Investment Casting, Spin-Casting, Die-Casting, Sand Casting, 3D Keltool process and Fusible Metallic Core. Direct Rapid Tooling: Direct AIM, LOM tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

**Unit-V Rapid Manufacturing:**

Introduction to RM, Factors influencing Accuracy, data Preparation: Errors due to tessellation, Errors due to Slicing, Part Building: Errors in the SL Process, SLS Process, Part Building Orientation: Orientation Constraints of the SL Process and SLS Process.

**Unit-VI CAD/CAM/CNC in relation to Rapid Prototyping:**



Reverse Engineering Machines and softwares, advantages and applications.

**TEXT BOOKS:**

1. Rapid Manufacturing - by D.T. Pham and S.S. Dimov, Springer, 2001
2. "Rapid Prototyping- Principles and Applications", C. K. Chua, K. S. Leong & C. S. Lim, World Scientific Publication.

**REFERENCE BOOKS:**

1. Wohlers Report 2000- by Teny Wohlers, Wohlers Associates, 2000.
2. Rapid prototyping - by Amithaba Ghose, Eastern Law house, 1997.
3. Stereolithography and other RP&M Technologies-by Paul F. Jacobs, ASME Press, 1996.
4. Rapid Prototyping & Manufacturing - by Paul F. Jacobs, ASME Press, 1996.

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering  
OPERATIONS RESEARCH**

Code: 3B724

a	b	c	d	e	f	g	h	i	j	k	l
		x	x							x	

**L T P/D C**  
**3 1 --- 3**

After completing the subject, students will be able to:

- understand the application & techniques of OR & Formulate & Obtain solution problems using linear programming (LP) by different methods
- understand the transportation problem their formulation and solution, understand the job sequencing under different condition
- understand the significance of replacement and the techniques of replacement of various types of items
- understand the Game theory concept & solutions and its industrial significance
- understand the importance of queue system and various possible configuration of queues, concept of inventory system, various inventory models
- concept of stage wise optimization and its implications, concept of simulation and its uses

**UNIT – I**

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

**LINEAR PROGRAMMING PROBLEM-** Formulation – Graphical solutions, Simplex method, Artificial variables techniques -Two–phase method, Big-M method -Degeneracy, Duality Principle.

**UNIT – II**

**TRANSPORTATION PROBLEM** – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.

**ASSIGNMENT PROBLEM** – Formulation – Optimal solution - Variants of Assignment Problem- Unbalanced, Traveling Salesman problem.

**UNIT – III**

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

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

**UNIT – IV**

**THEORY OF GAMES:** Introduction – Pure strategies-Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Mixed Strategies-Rectangular games without saddle points- Dominance principle – 2 X 2 games , m X 2 & 2 X n games -Graphical method.

**UNIT – V**

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

**INVENTORY :** Introduction – Single item Deterministic models without shortages– Single item inventory models with one price break and multiple price breaks – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

**UNIT – VI**

**SIMULATION:** Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Computers in Simulation.

**DYNAMIC PROGRAMMING:** Introduction – Bellman’s Principle of optimality – Applications of dynamic programming- shortest path problem -capital budgeting problem — linear programming problem.

**TEXT BOOKS:**

1. Operations research / Hira & Gupta
2. Operation Research /J.K.Sharma/MacMilan publishers.

**REFERENCES:**

1. Operations Research / S.D.Sharma/Kedarnath publishers
2. Operations research/V.K.Kapoor

**Syllabus for B. Tech. IV Year I semester**  
**Mechanical Engineering**  
**Code :3GC33 (CULTURE, VALUES, PROFESSIONAL ETHICS & IPR)**  
**(Common to all branches)**

**L T P/D C**  
**2 1 - 2**

a	b	c	d	e	f	g	h	i	j	k
					x		x			

After completing the subject, students will be able to:

By the end of the unit the student will able to: Know the importance of Indian culture. Present its relevance in present age.

By the end of the unit the student will able to: Differentiate between organization and profession. List out professional ethics. Work towards techniques of implementing professional ethics in future.

By the end of the unit the student will able to: Identify the core areas of ethics. Apply ethics in their professional and student life.

By the end of the unit the student will able to: Analyze the ancient wisdom. Apply core wisdom for professionals in modern age.

V. By the end of the unit the student will able to: Understand Invention and Creativity Appreciate the concept of intellectual property (IP) vis-à-vis physical property; Recognize the different kinds of intellectual property; Differentiate Industrial Property vs Copyrights Differentiate between types of IP Appreciate the rationale behind IP, and the underlying premises; Understand how a balance is sought to be achieved between the rights of the owner of IP on one hand and the rights of other individuals and the society in general on the other;

By the end of the unit the student will able to: Discuss the initiative taken at the Paris Convention; Understand the

**UNIT-1 INDIAN CULTURE:**

A Introduction to Culture Values and Ethics, Bharata, The Indian Concept of Human Life, Indian Civilization, Sanskrit and Indian Languages, Festivals, Sculpture, Music, Dance, Drama, Ayurveda, Family and its Importance, Indian Marriage System, Status of Women in Indian Society, Education, Purpose, Ancient System, Value Education, Interfaith Understanding, Happiness, Modernism and its Effect on Lifestyle, Mind and its Operation, Control of Mind, Yoga, Exemplary Life Sketches-Albert Einstein, Abraham Lincoln

**UNIT-II VALUE SYSTEM:**

Human Value System, Truthfulness, Righteousness, Peace, Non-Violence, Love, Kindness and Compassion, Humility, Faith, Courage, Optimism, Forgiveness, Ceiling on Desires (Control of Sense organs), Exemplary Life Sketches-M K Gandhi, Abdul Kalam

**UNIT-III ETHICS:**

Ethics in Ancient India, Ethics, Morals, Ethics and Human Life, Core Areas for Ethics, Values, Morality, Integrity, Honesty, Character, Loyalty, Trustworthiness, Courage and Confidence, Confidentiality, Secrecy and Transparence, Justification, Contracts and Spirit Promises and Schedules, Quarrels, Selfishness, Obstacles, Supporting Measures, Reputation and its sale, Decision Making in Ethics, Exemplary Life Sketches-Vishveshwaraiyah, , Jagadeesh Chandra Bose, Meghanad Saha

**UNIT- IV PROFESSIONAL ETHICS:**

Occupation, Profession, Professional, Professional Organization, Obligations Of a Professional, Temptations, Aptitude, Importance of Professional Ethics for Engineers, Code of Ethics, Need for a Code, Impact of Ethical Behaviour, The Code of Ethics for Engineers, Fundamental Principles and Cannons, Commerce and Ethics, Marketing Ethics, Finance and Ethics, Science, Religion and Ethics, Medical Ethics,

Genetics and Ethics, Politics and Ethics, Genders and Ethics, Media and Ethics, Computer Ethics, Exemplary Life Sketches- Narayan Murthy, Homi Jahangir Bhabha

**UNIT –V INTELLECTUAL PROPERTY RIGHTS (IPR):**

Invention and Creativity, Basic Types of Property, Need for Protection of IPR, IP Types Industrial Property (Patents, Trade Marks, Trade Secrets, Industrial Designs and Integrated Circuits), Copyrights and Related Rights, Geographical Indications.

**UNIT-VI**

WIPO Mission and Activities, GATT & Trips, Indian Position on WTO and strategies, Indian IPR legislations-commitments to WTO-Patent Ordinance and the Bill, Draft of a National Intellectual Property Policy, Case Studies on IP

**REFERENCES:**

1. The ABCs of Ethics by Michael. L. Buckner, Universe. Inc, New York Lincoln, Shanghai
2. Science, Faith and Ethics by Denis Alexander and Robert.S.White, Hendrickson Publishers, Massachusetts, USA, March 2006
3. **Vedic Science Primer by PSR Murthy, BS Publications, Hyderabad**
4. **Medical Ethics-Global View Points, Edited by Diane Andrews, Hennig Feld, Green Haven Press**
5. Divine Stories, Human Value Stories, Volume I and II, Sri Satya Sai Books and Publications

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering  
PROJECT phase-I**

**Code: 3B784**

a	b	c	d	e	f	g	h	i	j	k	l
			x	x						x	

**L T P/D C**

**--- --- 2 1**

A pre-project seminar in fourth year first semester will be evaluated for 50 marks as follows. This is aimed at the students to identify a project on which they are likely to continue for their project in final year second semester.

Preliminary Report on progress of the work	10 marks
Mid Semester presentation	10 marks
Final report	10 marks
Final Presentation and Defense before a departmental Committee consisting of head, a senior faculty and supervisor	20 marks

There shall be no external evaluation in pre-project seminar.

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

Code: 3B785

**INDUSTRY - ORIENTED MINI PROJECT**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>	<b>x</b>										

**L T P/D C**  
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After completing the subject, students will be able to:

Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects.

Enables to apply modern IT tools and technologies

Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society.

Enhances communicative skills and team work

The students learn the ability to work as an individual with multidisciplinary approach

There shall be an industry-oriented mini-Project in their specialization that may be carried out in collaboration with an industry / R & B organization / Academic Institution, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated during IV year I Semester. The industry oriented mini project shall be evaluated for a total of 150 marks with 50 marks for internal assessment and 100 marks for end examination. The mini project must be submitted in report form and should be presented before a committee, consisting of an external examiner, head of the department, a senior faculty member of the department and supervisor of the mini project.

**The pattern of internal evaluation** is as follows:

Work in progress as evaluated by internal guide	:	10 marks
Work in progress as evaluated by External guide	:	20 marks
Report	:	10 marks
Seminar presentation and defense of project	:	10 marks

If the mini project is conducted within the college, the work in progress is evaluated by the supervisor for 30 marks.





**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering  
CAD/CAM LAB**

Code: 3B786

a	b	c	d	e	f	g	h	i	j	k	l
			x								

L T P/D C  
--- --- 3 2

After completing the subject, students will be able to:

1. Ability to solve design and manufacturing problems using basic engineering principles and practices.
2. Ability to understand the existing geometric modeling and develop a geometric modeling for a new component in design process
3. Ability to do analysis using on some sort of geometric modeling using computer aided programming
4. Ability to produce detailed production drawings using commercially available drafting software
5. Ability to write a CNC manual part program and understand the difference between manual part program and computer assisted part program
6. Ability to import and export geometric modeling in to different design and manufacturing environment in collaborative engineering

1. **Solid 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.

## 2. Analysis

- a). Determination of deflection and stresses in 2D and 3D trusses and beams.
- b). Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axi-symmetric 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 Axi-symmetric components

## 3. Manufacturing

- a) Manual part programming for simple component CNC lathe- Plain Turning and Facing
  - b) Manual part programming for simple components CNC lathe- Step and Taper Turning (Multiple turning cycle)
  - c) Manual part programming for simple components CNC lathe- Thread cutting
  - d) Manual part programming for Drilling and Step boring on CNC Mill
- Development of NC code for free form and sculptured surfaces using CAM packages.
- e) Machining of simple components on CNC lathe and CNC Mill by importing NC Code from a CAM package.

**The following Software Packages may be used for the lab exercises:**

Use of AUTOCAD, CATIA, Creo, ANSYS, NASTRAN, HYPERMESH, Denford (Lathe & Mill)

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B787 PRODUCTION DRAWING PRACTICE LAB**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>		<b>x</b>									

**L T P/D C**  
--- --- 3 2

After completing the subject, students will be able to:

**Unit –I**

Able to analyze the production engineering drawings with respect to conventions (material and parts) notations and able to develop new drawings.

**Unit –II**

Able to understand the limits and type of fits in production engineering and to develop new drawings in designs.

**Unit –III**

To understand the indication of tolerances, form and position on drawings.

**Unit -IV**

To understand and analyze the surface roughness and its indication on mechanical components.

**Unit -V**

To understand and analyze each part involved in the assembly.

**Unit –VI**

To automate and reduce the human effort with the help of cad to minimize the error to improve the accuracy in production drawings.

**UNIT – I**

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

**UNIT – II**

**Limits and Fits:** Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

**UNIT – III**

**Form and Positional Tolerances:** Introduction and indication of the tolerances of form and position on drawings, deformation of run out and total run out and their indication.

**UNIT – IV**

**Surface roughness and its indication:** Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.  
Heat treatment and surface treatment symbols used on drawings.

**UNIT – V**

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

**UNIT – VI**

Part drawing using computer aided drafting by CAD software

**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.

**Text Books:**

1) Production Drawing: P.N.Reddy and T.A.Janardhan Reddy/Hi-Tech Publishers

**References:**

1) Geometric dimensioning and tolerancing-James D. Meadows/B.S. Publications.  
Engineering Metrology, R.K. Jain, Khanna Publications

2) Production Drawing K.L.Narayana and P.Kannaiah /New AGE Publishers

**Syllabus for B. Tech. IV Year I semester  
Mechanical Engineering**

**Code: 3B792 TECHNICAL PAPER WRITING & SEMINAR-III**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**  
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The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defence before a departmental committee consisting of Head, a senior faculty and supervisor	15 marks

**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering  
MANAGEMENT SCIENCE**

Code:3ZC02

a	b	c	d	e	f	g	h	i	j	k	l
								x	x	x	

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3      1      3**

**Course Objective:** The course is aimed at giving the basics of management, its principles, practices and latest concepts for increasing the performance of engineering graduates in their respective fields.

**UNIT I**

**INTRODUCTION TO MANAGEMENT:** Management- Definitions, Fayol's principles of Management, Levels of Management, functions of management. Planning: types of planning, planning process; Organizing: Organizational Design and structure, staffing; Directing; Maslow's Motivational theory, Leadership styles, Controlling: Basic control process.

**UNIT II**

**INTRODUCTION TO OPERATIONS MANAGEMENT:** Plant Location, plant layout, types of production, Work Study, Method study and Work Measurement, Basic Procedures Project Management: Network Analysis - Programme Evaluation and Review Techniques, Critical Path Method, Crashing of Simple Networks.

**UNIT III**

**MATERIALS MANAGEMENT:** Objectives of Materials, Need for Inventory Control, Economic Order Quantity, ABC Analysis, Inventory Control Systems, Just In Time, Introduction to LSCM, Quality Control Techniques– Inspection, ISO standards, Six Sigma.

**UNIT IV**

**(i) Human Resources Management:** Objectives of HRM, Challenges of HRM, HR Planning process HR functions and policies – Recruitment, Selection, Training and Development, Performance Appraisal, Balanced Score Card.

**(ii) Marketing Management:** Concept of Marketing, Functions, Marketing Mix, Product Life Cycle, Marketing Strategies, Channels of Distribution, Differences between products and services.

**UNIT V**

**INTRODUCTION TO ORGANIZATIONAL BEHAVIOR:** Definition, Nature and Scope, Perception – Perceptual selectivity and organization, Personality and Attitudes, Determinants of personality Formation of Attitudes-, Perceptual Distortions Attribution analysis Attribution theories, Johari Window and Transactional Analysis.

**UNIT VI**

**STRATEGIC MANAGEMENT:** Concepts in Strategic Management, Vision, Mission, Objectives, SWOT Analysis, Concept of Strategic Planning, Competitive Advantage, Concept of Core Competence; An overview, Process and its Implementation, Target Setting, Types of strategies, strategy formulation; Implementation.

**Essential Reading:**

- A R Aryasri: Management Science, Tata Mc Graw Hill

**Suggested Readings:**

- Dr. Y. Satyanarayana: Management control systems in competitive environment,
- Koontz & Wehrich: Essentials of Management, 6/e, TMH, 2005
- Kotler Philip & Keller Kevin Lane: Market Management 12/e, PHI, 2005
- 5 Strategic Management, Text and Cases, VSP Rao, V Hari Krishna
- Thomas N Duening & John M. Ivancevich Management – Principles and Guidelines

**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering  
Code: 3B733      **AUTOMATION IN MANUFACTURE**  
(PROFESSIONAL ELECTIVE-III)**

a	b	c	d	e	f	g	h	i	j	k	l
			x	x							x

**L   T   P/D   C**

**3   1   ---   3**

After completing the subject, students will be able to:

- Understand a production system, principles of automobile
- understand the methods of work part transfer mechanical buffer storage control functions
- understand the implementation of automated flow lines
- know the analysis and design of material handling systems, automated guided vehicle system
- understand adaptive control systems & Applications.
- understanding the business process Engineering. Concept of concurrent Engineering, techniques of rapid prototype.

**UNIT – I**

Introduction: Production system, Automated manufacturing systems, Reasons, Principles and strategies of automation, Basic elements of automated system, pneumatic and hydraulic circuit components,

**UNIT – II**

Assembly system and line balancing: Manual Assembly process, and work transport systems, Line pacing, Analysis of manual assembly lines, line balancing methods-problems, ways of improving line balance lines.

**UNIT – III**

Analysis of Automated flow lines: System configuration, Workpart transfer, General terminology and analysis of transfer lines without and with buffer storage.

Automated Assembly systems: Fundamentals and Design of assembly systems.

**UNIT – IV**

Automated material handling: Principles, Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems-technology, Analysis of material transport systems.

Automated storage systems: Basic terminology, AS/RS; Carousel storage, work in process storage,

**UNIT – V**

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

**UNIT – VI**

Concept of Concurrent Engineering, MRP,MRP II, Techniques of Rapid Proto typing.

**TEXT BOOK:**

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI

**REFERENCES:**

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

**Syllabus for B. Tech. IV Year II semester**  
**Mechanical Engineering**  
**Code: 3B734 COMPUTATIONAL FLUID DYNAMICS**  
**(PROFESSIONAL ELECTIVE-III)**

a	b	c	d	e	f	g	h	i	j	k	l
			x	x						x	

**L T P/D C**  
**4 --- --- 4**

After completing the subject, students will be able to:

- gain knowledge on using numerical techniques
- Understand various applied numerical methods to solve fluid flow problems
- understand and apply finite difference method to solve heat transfer problems
- know application of finite difference method and fundamentals of fluid flow modeling
- right fluid flow governing equations, momentum and energy equations apply to fluid flow problems
- gain knowledge about finite volume method to solve fluid flow problems

**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 Convection** – Heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

**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.

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

**UNIT - V**

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.

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

**UNIT -VI**  
**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.





**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering**

**Code: 3B735 QUALITY CONTROL AND RELIABILITY ENGG**

**(Professional Elective-III)**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**

**4 --- --- 4**

**UNIT-I**

Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance desing, quality costs – quality improvement.

**UNIT-II**

Statistical P process control X.R.p.c charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination)

**UNIT-III**

Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plan.

**UNIT-IV**

Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types, online quality control variable characteristics, attribute characteristics, parameter design.

**UNIT-V**

Quality function deployment – house of quality. QFD matrix, total quality management concepts, quality information systems, quality circles, introduction to ISO 9000 standards.

Realiability – Evaluation of design by tests – Hazard Models, Linear, Releigh, Weibull, Failure Data Analsis, reliability prediction based on weibull districtuon. Reliability improvement.

**UNIT-VI**

Complex system, reliability, reliability of series, parallel & standby system & complex systems & reliability prediction and system effectiveness.

Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and bedgeting, reliability testing.

**TEXT BOOKS:**

1. Eugene Grant, Richard Leavenworth “Statistical Process Control”, McGraw Hill.
2. G Taguchi, ‘Quality Engineering in Production System’, - McGraw Hill. 1989.
3. W.A.Taylor, ‘Optimization & Variation Reduction in Quality’, Tata McGraw Hill, 1991, Ist Edition

**REFERENCE BOOKS:**

1. Frank M. Gryna Jr. “Jurans Quality planning & Analyisi”, Mc Graw Hill.
2. Philippos, ‘Taguchi Techniques for Quality Engineering’, Mc Graw Hill, 1996, 2<sup>nd</sup> Edition.
3. LS Srinath, ‘Realiability Engineering’, Affiliated East West Pvt Ltd., 1991, 3<sup>rd</sup> Edition.
4. E.Bala Guruswamy, ‘Reliability Engineering’, Tata McGraw Hill, 1994.



**Syllabus for B. Tech. IV Year II semester****Mechanical Engineering****NanoTechnology****(Professional Elective-III)****Code: 3B736**

a	b	c	d	e	f	g	h	i	j	k	l
			x	x						x	

**L T P/D C****4 --- --- 4**

After completing the subject, students will be able to:

- understand the basics of quantum mechanics
- understand the preparation methods and characterization of nanomaterials
- understand mechanical and electrical and optical properties of different nanomaterials.
- understand the processing and synthesis of nanopowders.
- gain knowledge about inorganic materials used for synthesis of bio-application nanomaterials
- gain the knowledge about nanotechnology in diagnostics applications

**UNIT-I**

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

**UNIT-II**

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

**Nano particles of Alumina and Zirconia:** Nano materials preparation, Characterization, Wear materials and nano composites,

**UNIT-III**

**Mechanical properties:** Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties,

**Electrical properties:** Switching glasses with nanoparticles, Electronic conduction with nano particles

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

**UNIT-IV**

Process of synthesis of nano powders, Electro deposition, Important nano materials

**Investigating and manipulating materials in the nanoscale:** Electron microscopies, scanning probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.

**UNIT-V**

**Nanobiology :** Interaction between biomolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, Application of nano in biology, nanoprobes.

Analytical Applications-A new Methodology in medical diagnostics and Biotechnology, Current status of nano Biotechnology, Future perspectives of Nanobiology, Nanosensors.

**UNIT-VI**

**NanoMedicines :** Developing of Nanomedicines Nanosystems in use, Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications,

Molecular Nanomechanics, Molecular devices, Nanotribology, studying tribology at nanoscale, Nanotribology applications.

**TEXT BOOKS:**

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH



**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering**

Code: 3B888

**PROJECT Phase-II**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
			<b>x</b>	<b>x</b>						<b>x</b>	

**L T P/D C**  
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Out of total 200 marks for project work (in the final year second semester), 50 marks shall be for Internal Evaluation and 150 marks for the External Evaluation at the end of the Semester.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the chief superintendent. The committee consists of an external examiner, HOD, a senior faculty member and internal guide.

**The pattern of Internal Evaluation is as follows:****Division of marks for internal assessment – 50 marks**

- Progress of Project work and the corresponding interim report as evaluated by internal guides at the end of 5 weeks : 05 Marks
- Seminar at the end of 5 weeks : 05 Marks
- Progress of Project work as evaluated by guides at the end of 10 weeks : 05 Marks
- Seminar at the end of 10 weeks : 05 Marks
- Evaluation by the Guides ( at the end of 15 weeks) : 10 Marks
- Project Report : 05 Marks
- Final presentation and defense of the project : 15 Marks

If the project is conducted internally the marks supposed to be given by external guide will be given by internal guide himself.

**Division of Marks for External Evaluation – 150 Marks****Pattern of External Evaluation for Project**

- Final Project Report : 30 Marks
- Presentation : 20 Marks
- Demonstration / Defense of Project : 100 Marks

**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering**

Code: 3B889

**COMPREHENSIVE VIVA-VOCE-III**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>
<b>x</b>	<b>x</b>	<b>x</b>				<b>x</b>	<b>x</b>	<b>x</b>			

**L T P/D C**

**- - - 2**

After completing the subject, students will be able to:

Students are assessed in the courses they have undergone till the completion of that academic year. They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.

There shall be a Comprehensive Viva-Voce in IV year II Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of an external examiner, Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the B.Tech. course of study up to IV Year. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.





**Syllabus for B. Tech. IV Year II semester  
Mechanical Engineering**

**Code:3B893 TECHNICAL PAPER WRITING & SEMINAR-IV**

a	b	c	d	e	f	g	h	i	j	k	l
			x	x						x	

**L T P/D C**  
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The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defence before a departmental committee consisting of Head, a senior faculty and supervisor	15 marks