COURSE CURRICULUM
FOR
UNDERGRADUATE PROGRAMME
B.TECH
IN
COMPUTER SCIENCE & ENGG.

FACULTY OF ENGINEERING & TECHNOLOGY
CHANDRA SHEKHAR AZAD UNIVERSITY OF AGRICULTURE & TECHNOLOGY,
CAMPUS ETAWAH-206001
## Course Curriculum of B.Tech. (Mechanical Engineering)

**Branch : Mechanical Engineering**  
**Year: 1**  
**Semester-I (Common to all branches)**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>HU 111</td>
<td>Professional Comm. I (common to all branches)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CH 111</td>
<td>Engineering Chemistry-I</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>PH 111</td>
<td>Engineering Physics-I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>MA 111</td>
<td>Mathematics-I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CE 111</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>EE 111</td>
<td>Basic Electrical Engineering</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>CE 111</td>
<td>Engineering Graphics-I</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8.</td>
<td>ME 111</td>
<td>Workshop Practices-I</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9.</td>
<td>GP 111</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

* To be taken in alternate weeks  
** To be taken in alternate weeks

Total Periods : 34  
Total Credits : 32

**Branch : Mechanical Engineering**  
**Year: 1**  
**Semester-II**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>HU 121</td>
<td>Professional Comm. II (common to all branches)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>CE-122</td>
<td>Environmental Studies</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3.</td>
<td>CS-121</td>
<td>Introduction to computing</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>CH-121</td>
<td>Engineering Chemistry-II (Environmental &amp; Ecology)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>PH-121</td>
<td>Engineering Physics-II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>MA-121</td>
<td>Mathematics-II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>ME-121</td>
<td>Engineering Thermodynamics</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>EC-121</td>
<td>Basic Electronics</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>ME-122</td>
<td>Engineering Graphics-II (M/C Drawing)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11.</td>
<td>ME-123</td>
<td>Workshop Practice-II</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10.</td>
<td>GP 111</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Total Periods : 37  
Total Credits : 37
### Semester-III

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>CS 231</td>
<td>Computer Programming</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>MU 231</td>
<td>Engineering Economics</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>CE 231</td>
<td>Strength of Materials</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>EC 231</td>
<td>Electronics II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CS 231</td>
<td>Computer Organization</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>MA 231</td>
<td>Mathematics III</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>ME</td>
<td>Material Testing Lab</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GP 231</td>
<td></td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Periods : 34**
**Total Credits : 30**

### Semester-IV

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>CS 241</td>
<td>Discrete Mathematics</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CS 242</td>
<td>System Analysis &amp; Design</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>EC 241</td>
<td>Digital Circuit Design</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>CS 243</td>
<td>Data Communication</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CS 244</td>
<td>Data Structure &amp; Programming</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CS 245</td>
<td>System Software</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>GP 241</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Periods : 34**
**Total Credits : 28**

### Semester-V

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>HU 351</td>
<td>Management Science</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CS 351</td>
<td>Formal Language &amp; Automata Theory</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>CS 352</td>
<td>Computer Network</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>CS 353</td>
<td>Relational Database System</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CS 354</td>
<td>Operating System-I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CS 355</td>
<td>Micro Processor Based System Design</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>GP 351</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Periods : 34**
**Total Credits : 28**
### Year:III  Semester-VI

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>CS 361</td>
<td>Internet Fundamental &amp; Application</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CS 362</td>
<td>Interactive Computer Graphics</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>CS 363</td>
<td>Language Processor</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>CS 364</td>
<td>Computer Architecture</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CS 365</td>
<td>Operating System-II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CS 366</td>
<td>Design Analysis of Algorithm</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>CS 367</td>
<td>System Administration Lab</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GP 361</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

Note: Summer Field training of one credit (0-0-2) of four week is compulsory in this semester in the Month of June and evaluation of which will be carried out along with seventh semester.

### Year:IV  Semester-VII

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>CS 471</td>
<td>Software Engineering</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CS 472</td>
<td>Object Oriented Programming &amp; Methodology</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>CS 473</td>
<td>Data Base Application Design</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>OE 471</td>
<td>Open Elective-I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CS 474</td>
<td>Professional Elective-I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CS 475</td>
<td>Project-I</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>CS 476</td>
<td>Summer Field Training</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GP 471</td>
<td>GENERAL PROFICIENCY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

### Year:IV  Semester-VIII

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Periods</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td>CS 481</td>
<td>Web Technology</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CS 482</td>
<td>Visual Programming</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>CS 483</td>
<td>Professional Elective II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>CS 484</td>
<td>Professional Elective III</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>OE 481</td>
<td>Open Elective II</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CS 485</td>
<td>Project II</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>GP 481</td>
<td>GENERAL PROFICIENCY</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Periods : 34
Total Credits : 32
HU 111  PROFESSIONAL COMMUNICATION – I  3(2-1-0)

Unit-I
Grammar & Composition- Articles, prepositions, spotting errors, Modals, foreign expression and their usage, Formation of nouns, adjectives, precis writing, paragraph writing.

Unit-II
Nature of communication- Process of communication, non verbal communication, business communication, barriers to communication, global aspects. Ethical aspects, legal aspects, accuracy, brevity, clarity and appropriateness in communication.
Oral presentation- Importance of acquiring oral presentation skills, body language, voice, modulation, audience awareness, presentation plan, visual aids, use of connectives, conducting a meeting, participating in a meeting.

Unit III
Report writing – structure of reports, front matter, main body, back matter.
Style of reports- Definition, the scientific attitude, readability of report, choice of words and phrases, construction and length of paragraphs and sentences.

Unit-IV
- Study of selected literary texts
- Collection of short essays
- Of studies- Francis Bacon
- A Bookish topic- RK Narayan
- Science & Human Life- JBS Haldane
- Water- CV Raman

Unit V
- Collection of short stories
- The barbar’s trade union – Mulk Raj Anand
- The lament
- The gift of magi- O’ Hanry
- The eyes are not here – Ruskin Bond
- Renunciation- Ravindra Nath Tagore
- The capital of the ward- Earnest Hemingway

Practical Aspects
Use of language laboratory to develop communication skills
Word accent- Production of correct accentual patterns involving two or three syllables words
Intonation- Rising tone, and talking time, ear training, production tests.
Common errors- In articles, prepositions, conjunctions, connectives and other aspects of language and grammar, listing reading material, tables, spelling, semanties of connectives, modifiers and varieties in sentences and paragraphs.

Books recommended

CH 111  ENGINEERING CHEMISTRY I  4(2-1-3*)

Atoms and Molecules
Particle in a box illustrating energy quantization, angular momentum quantization, radial and angular parts of H atom wave functions/orbitals, probability and charge distribution. Many electron atoms. Homonuclear and heteronuclear diatomic, covalent bonds, ionic bonds and electro negativity concepts, hybridization and shapes of molecules. Non-covalent interaction (Van Der Waals and hydrogen bonding).

Solid State
Idea of spatial periodicity of lattices; elements of bond theory. Conductors, semiconductors and insulators. Experimental methods of structure determination using spectroscopic techniques such as IR, UV-Vis, NMR and mass spectrometry.

Reaction Dynamics
Rate laws, mechanisms and theories of reaction rates (collision and transition state theory). Lasers in Chemistry.

Electrochemistry
Application of electrode potentials to predict redox reactions in solution with special reference to Lattimer and Frost diagrams.
Transition Metal Chemistry
Structures of coordination compounds corresponding to coordination numbers up to 6. Types of ligands. Isomerism (geometrical, optical, ionization, linkage and coordination). Theories of bonding in coordination compounds, viz. crystal field theory, valence bond theory. Chelation. Brief application in organic synthesis and medicines etc.

Organic Metal Chemistry and Catalysis
Structure and bonding in organic metallic complexes, the sixteen and eighteen electron rules. Homogeneous catalysis, the role of metals in catalytic cycles during some chemical reactions (e.g. hydroformylation, hydrogenation etc.). Role of metals in biology: oxygen carrier, electron transfer.

Structure and Reactivity of Organic Molecules
Inductive effect, resonance, hyper conjugation, electrometric effect. Carbonation, carbanion and free radicals. Brief study of some addition, elimination and substitution reactions. Conformational analysis (a cyclic and cyclic molecules), geometrical and optical isomerism; E, Z and R, S nomenclature.

Polymerization
Basic concepts, classification and industrial application.

Photochemistry
Photo excitation of carbon substrates (Noh-ish type I and type II reactions), selected examples of the application of photolysis. Photosynthesis (Z-diagram). Chemistry of vision.

List of Experiments
- Acid-base titration (estimation of commercial caustic soda).
- Redox titration (estimation of iron using permanganometry).
- Complex metric titration (estimation of hardness of water using EDTA titration).
- Preparation and analysis of a metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes).
- Chemical kinetics (determination of relative rates of reaction of iodide with H₂O₂ at room temperature (clock reaction).
- Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water).
- Photochemical oxidation-reduction (study of photochemical reduction of ferric salt).
- Viscosity of solutions (determination of percentage composition of sugar solution from viscosity).
- Synthesis of aspirin.
- Synthesis of p-nitro aniline from acetonilide.
- Detection of functional groups in organic compounds.
- Radical polymerization of vinyl monomers such as styrene, acrylonitrile etc.
- Conductometric titration (determination of the strength of a given HCl solution by titration against a standard NaOH solution).

Suggested Text Books & References
1. "Blocks 1-5 of Chemistry Course", Indira Gandhi Open University, IGNOU, New Delhi, 1996.
PH 111 ENGINEERING PHYSICS-I 5(3-1-3*)

Theory of Relativity
Inertial frame of reference, Noninertial frames and fictitious forces, Outline of relativity, Michelson-Morley experiment, Lorentz transformation of space and time, length contraction, variation of mass with velocity, equivalence of mass and energy.

Geometrical Optics
Combination of thin lenses, cardinal points of coaxial system of thin lenses, thick lenses, location and properties of cardinal points, graphical construction of images.

Physical Optics
Interference - analytical treatment of interference, intensity distribution of fringe system, coherent and non-coherent sources, fundamental conditions of interference, Fresnel's biprism, displacement of fringes, wedge shaped films, Newton's rings Diffraction - single slit and double slit diffraction, diffraction grating, Limit of resolution, resolving power of grating and image forming systems. Polarisation-Brewster's law, double refraction, geometry of calcite crystal, optic axis, nicol prism, circularly and elliptically polarised light, retardation plates, production and analysis of planes, polarimeter.

Thermal Physics
Kinetic theory of gases, maxwellian distribution, mean free path, transport phenomena in gases, Imperfect gases and vander Waal's equation of state.

Acoustics
Production and applications of Ultrasonics, Acoustics of buildings.

Dynamics of fluids
Continuity equation, Bernoulli's theorem and its applications, Torcelli's theorem, Viscosity, flow of liquid through a capillary tube, capillaries in series and parallel, stoke's formula, rotation viscometer.

List of Experiments
- To determine the coefficient of viscosity of water by capillary flow.
- To determine the thermal conductivity of a bad and good conductor by Lee's method and Searl's method, respectively.
- To determine the wave length of light by Newton's ring method.
- To determine the wave length of light by Fresnel's biprism.
- To determine the dispersive power of the given material of the prism.
- To determine the focal length of combination of two thin lenses by nodal slide assembly and its verification.
- Determination of e/m by J. J. Thomson's method.
- Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature.
- Use of Carry Foster Bridge. Study of electromagnetic induction.
- Study of electromagnetic damping and determination of terminal velocity reached by a magnet falling in a metallic tube.
- Study of LCR circuits with AC current.
- Determination of Planck's Constant using photocells.

Suggested Text Books & References
3. Saha and Srivastava "A Treatise on Heat".
5. Ghatak, A.K., "Optics".

MA 111 MATHEMATICS – 1 4(3-1-0)

Calculus of Functions of One Variable

Calculus of Functions of Several Variables

Vector Calculus
Scalar and vector fields. Line and surface integrals. Gradient, divergence and curl. Line integrals independent of path. Green's theorem, divergence theorem and Stoke's theorem (without proofs) and their simple applications...
Suggested Text Books & References

CE 111 ENGINEERING MECHANICS 5(3-1-3**)

Fundamental of Mechanics- Basic concepts
Force Systems and Equilibrium
Force, Moment and couple, Principle of Transmissibility, Varignon's theorem, Resultant of force systems-
Concurrent and non-concurrent coplanar forces, Free body diagram, Equilibrium equations and their uses in solving
elementary engineering problems.
Plane Trusses
The structural model, simple trusses, analysis of simple trusses: method of joints, method of sections, graphical
method.
Friction
Introduction, laws of coulomb friction, simple contact friction problems, belt friction, the square screw thread,
rolling resistance.
Properties of Surface
First moment of an area and centroid, second moment and product of area of a plane area, transfer theorems, relation
between second moment and product of area, polar moment of inertia, principal axes, mass moment of inertia.
Virtual Work
Work of a force, Principle of Virtual work and its application.
Kinematics of Rigid bodies
Plane motion, Absolute motion, Relative motion, Translating axes and rotating axes.
Kinetics of Rigid Bodies
Plane motion, Work and energy, Impulse and momentum.
List of Experiments
- To determine the Newton's second law of motion by Fletcher's trolley apparatus.
- To determine the moment of inertia of a flywheel about its axis of rotation.
- To verify: (a) the conditions of equilibrium of forces by parallel force apparatus.
  (b) The principal of moments by crank lever.
- To find the compression in the rafters and tension in ties of simple roof truss models and to verify
  graphically.
- To determine the dry friction between inclined plane and slide boxes of different materials.
- To determine the coefficient of friction between the belt and rope and the fixed pulley.
- To determine the velocity ratio of a simple screw jack and to plot graph between (a) Effort-Load.
  (b) Friction-Load. (c) Efficiency-Load.
- To measure the area of a figure with the help of a Polar Planimeter.

Suggested Text Books & References

EE 111 BASIC ELECTRICAL ENGINEERING 5(3-1-3**)

DC Networks
Kirchoff's laws, node voltage and mesh current methods; Delta-star and star-delta conversion; Classification of
Network Elements, Superposition principle, Thevenin's and Norton's theorems.
Single Phase AC Circuits
Single phase EMF generation, average and effective values of sinusoids; Solution of R, L, C series circuits, the j
operator, complex representation of impedances; Phasor diagram, power factor, power in complex notation; Solution
of parallel and series-parallel circuits; Resonance.
Three phase AC Circuits
Three phase EMF generation, delta and Y-connection, line and phase quantities; Solution of three phase circuits,
balanced supply voltage and balanced load; Phasor diagram, measurement of power in three phase circuits; Three
phase four wire circuit; Unbalanced circuits.
Magnetic Circuits
Ampere's circuitual law, B-H curve, solution of magnetic circuits; Hysteresis and eddy current losses; relays an
application of magnetic force.
Transformers
Construction, EMF equation, ratings; Phasor diagram on no load and full load; Equivalent circuit, regulation and
efficiency calculations; Open and short circuit tests; Auto-transformers and three phase transformers.
**Induction Motors**
The revolving magnetic field, principle of operation, ratings: Equivalent circuit; Torque-speed characteristics; Starters for squirrel cage and wound rotor type induction motors; Single phase induction motors.

**DC Machines**
Construction, EMF and torque equations; Characteristics of DC generators and motors; Speed control of DC motors and DC motor starters; Armature reaction and commutation.

**Electrical Measuring Instruments**
DC PMMC instruments, shunts and multipliers, multi-meters; Moving iron ammeters and voltmeters; Dynamometer wattmeters; AC watt-hour meters, Extension. of instrument ranges.

**Power Supply Systems**
General structure of electrical power systems; Power transmission and distribution via overhead lines and underground cables, Steam, hydro, gas and nuclear power generation.

**List of Experiments**
- To measure the armature and field resistance of a DC machine.
- To calibrate a test (moving iron) ammeter, and a (dynamometer) wattmeter with respect to standard (DCPMMC) ammeter and voltmeters.
- Verification of circuit theorems, Thevenin's and Superposition theorems (with DC sources only).
- Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
- Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC supply.
- Open circuit and short circuit tests on a single-phase transformer.
- Connection and starting of a three-phase induction motor using direct on line (DOL), or star-delta starter.
- Connection and measurement of power consumption of a fluorescent lamp.
- Starting and speed control of a DC shunt motor.
- Connection and testing of a single-phase energy meter (unity power factor load only).
- Two-wattmeter method of measuring power in three-phase circuit (resistive load only).
- Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature.
- Design and use of potentiometer.
- Study of LCR circuits with AC current.

**Suggested Text Books & References**

**CE 112 ENGINEERING GRAPHICS-I**

**General**
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic projections, B.I.S. Specifications.

**Projections of Points and Lines**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes, shortest distance intersecting and nonintersecting lines.

**Planes Other than the Reference Planes**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.

**Projections of Plane Figures**
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes). Obtaining true shape of the plane figure by projection.

**Projection of Solids**
Simple cases when solid is placed in different positions, Axis, faces and lines lying in the faces of the solid making given angles.

**Development of Surface**
Development of simple objects with and without sectioning.

**Isometric Projection**
Nomography
Basic concepts and use.

Suggested Text Books & References

ME 111 WORKSHOP PRACTICE I 2(0-0-3)

Carpentry Shop
- Study of tools & operations of a carpentry joints.
- Simple exercise using jack plain.
- Prepare half lap corner joints, mortise & tenon joints.
- Simple exercise on wood working lathe.

Fitting Shop
- Study of tools & operations.
- Simple exercise involving fitting work.
- Making perfect male – female joints.

Black Smithy Shop
- Study of tools & equipments.
- Simple exercises based on black smithy operation such as upsetting, drawing down, punching, bending, fullering, swaging.

Welding Shop
- Study of tools & operations.
- Preparation of simple butt & lap joint.
- Oxy-acetylene welding.

Sheet Metal Shop
- Study of tools & operations.
- Making funnel complete with soldering.
- Fabrication of toolbox, tray, electrical panel boxes etc.

Machine Shop
- Study of tools & operations.
- Plane turning, step turning, taper turning, threading.
- Single point cutting tool grinding.

Suggested Text Books & References

HU 121 PROFESSIONAL COMMUNICATION – II 3(2-0-1)

Unit-I
Technical written communication- Nature origin and development of technical communication, salient features, chief characteristics of technical writing, basic difference between technical writing and general writing, Role of diction in technical writing and general writing.

Unit II
The salient features of scientific and technical communication
1. Fragmented sentences
2. Parallel comparisons
3. Squinting construction and split infinitive
4. Dangling Participles and gerunds
5. Coherence, unity, chronological, method, spatial method, inductive method, deductive method.

Unit III
Proposal writing- Types of proposals, The chief characteristics of a good proposal, structure or format of proposal the deference between a report and a proposal.

Writing scientific and semi-technical articles- Tables, figures, footnotes, bibliography, pie graphs, bar charts, flow charts, line graphs.

Unit IV
1. The effect of the scientific temper on Man –Bertrand Russell.
2. Technological Ombudsman—Alvin Toffler.
4. The Scientist and Poet—D.G. King—Hele
5. The Language of literature and science—Aldous Huxley
6. The aims of science and the humanities—Moody E.
7. The mother of the science—A.J. Bahm
8. The progress in the arts and science—Bronowski

Unit V

Phonetic Transcription—The definition, Broad phonetic transcription, narrow phonetic transcription, Dipthong, plosives, Friatives, Lateral

Practical Aspects—Listing comprehension
a. Ear Training
b. Uses of latest scientific techniques (AVR comprehension training) comprehension accelerator, AVR comprehension reteometer.

Reading comprehension—Reading at various speeds, slow, fast, very fast, reading different kinds of texts for different purposes (for example, for relaxation, for information, for discussion at a later stage etc.)

Speaking—Achieving desired clarity and fluency, manipulating, paralinguistic features of speaking voice quality pitch tone, pausing for effectiveness, while speaking, making a short class room presentation,

Group Discussion—Use of persuasive strategies including rhetorical devices (for emphasizing, for instance, being polite and firm; handling question and taking in criticism of self; term taing strategies and effective intervention using body language.)

Books Recommended

CE 122 ENVIROMENTAL STUDIES 4(3-0-1)

Unit 1: The Multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Unit 2: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agricultural and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, sue of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

• Role of an individual in conserve of natural resources.

• Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems

• Concept of an ecosystem.

• Structure and function of an ecosystem.

• Producers, consumers and decomposers.

• Energy flow in the ecosystem.

• Ecological succession.

• Food chains, food webs and ecological pyran.

• Introduction, types, characteristic features, Structure and function of the following ecosystem :-

a) Forest ecosystem

b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its conservation

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

Unit 5: Environmental Pollution (8 lectures)

Definition
- Causes, effects and control measures of
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment (7 lectures)

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

Unit 7: Human Population and the Environmental (6 lectures)

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

Unit 8: Field work (5 lectures)

- Visit to a local area to document environmental assets-rive/forest/grassland/hill mountain.
- Visit to a local pollution site-Urban/rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

References:
2. Bharucha Erach, The Biodiversity of India. Mapin Publishing Pvt. Ltd. Ahmedabad-3080 013, India, Email: mapin@icenet.net (R)
4. Clark R.S., Marine Pollution, Clanderson Press oxford (TB)
7. Down to Earth, Centre for Science and Environmental (R)
18. Survey of the Environment, The Hindu (M)

CS 121 INTRODUCTION TO COMPUTING 4(2-1-3)

Introduction
Introduction to the computer devices such as keyboard, mouse, printers, disk, files, floppies, etc. Concept of computing, contempory, OSs such as DOS, Window 95, MAC-OS, UNIX, etc. (Only brief user level description). Introduction to the e-mail, ftp, rlogin and other network services, world wide web. Introduction to the typesetting softwares such as Microsoft office.

Introduction to Programming
Concept of algorithms, Example of Algorithms such as how to add ten numbers, roots of a quadratic equation. Concept of sequentially following up the steps of the algorithm. Notion of program, programmability and programming languages. Structure of programs, object codes, compilers. Introduction to the Editing tools such as vi or MS- VC editors. Concepts of the finite storage, bits, bytes, kilo, mega and gigabytes. Concepts of character representation. Languages for system programming: study of Basics, Fortran, Pascal, Cobol etc.

Computer Programming Lab
- Concepts of flow charts and decision tables, Examples and practice problems.
- Introduction to Digital computers and its components, Introduction to DOS and UNIX operating systems.
- Development of computer program for example
- Roots of quadratic and Cubic equations
- Summation of N natural numbers
- Arranging numbers in ascending and descending orders
- Separation of odd arid even numbers, etc.

Suggested Text Books & References

CH 121 ENGINEERING CHEMISTRY II (ENVIRONMENT AND ECOLOGY) 3(2-1-0)

General
Introduction, components of the environment, environmental degradation.

Ecology
Air Pollution and Control
Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, greenhouse effect, depletion of ozone layer; standards and control measures.

Water Pollution and Control
Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution
Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution
Sources, effects, standards and control.

Books & References

PH 121 ENGINEERING PHYSICS-II 4(3-1-0)
Vector analysis
Scalar and vector fields, gradient of a scalar field, Divergence and curl of a vector fields, Line integral of a vector field, Gauss- divergence theorem, Stoke's theorem

Electromagnetism
Quantization & conservation of charge, Coulomb's law (vectorial form) and superposition principle, Concept of electric field lines, flux of E-field, Gauss' law, Electric Potential energy and potential, Conductors, capacitors and dielectric materials, Magnetic field, Force on a moving charge in a magnetic field, Force on current element, Torque on current loop, Biot-Savart law, Ampere's law, Electromagnetic induction and Faraday's law, Magnetism in materials, Maxwell's equations, Electromagnetic Waves.

Thermoelectricity
Seebeck effect, law of successive temperatures, law of intermediate metals, peltier effect, Thomson effect, Thermoelectric power, application of thermodynamics on thermocouple.

Modern Physics
Elements of wave properties of particles and particle properties of waves, Nuclear Energy, Lasers- spontaneous and stimulated emission of radiation, Einstein coefficient, Parts of laser, types of lasers and their application.

Solid State Devices
Energy band diagram; covalent bonds; bound and free electrons, holes; electron and hole mobilities; intrinsic and extrinsic semiconductors; Fermi and impurity levels; impurity compensation, charge neutrality equation and semiconductor conductivity; Einstein relation; drift and diffusion current; photo conductivity and Hall effect.

Suggested Text Books & References

MA 121 MATHEMATICS – II 4(3-1-0)
Linear Algebra

Ordinary Differential Equations
Formation of ODE's, definition of order, degree and solutions. ODE's of first order: separable variables, homogeneous and nonhomogeneous equations; exactness and integrating factors, linear equations and Bernoulli equations. General linear ODE's of nth order: solutions of homogeneous and nonhomogenous equations, operator method, methods of undetermined coefficients and of variation of parameters. Solutions of simple simultaneous ODE's.

Laplace Transforms
Transforms of elementary functions, transforms of derivatives and derivatives of transforms, inverse transforms, transforms of periodic functions, unit step function, shifting theorems, solutions of ODE's using Laplace transforms.

Numerical Methods
Difference operators-forward, backward, central, shift and average operators and relations between them. Newton's forward and backward interpolation: Lagrange interpolation and the error formula for interpolation. Numerical differentiation and integration-Trapezoidal rule and Simpson's one-third rule including error formulas.

Suggested Text Books & References
2. V. Krishnamurthy, V., Mainra, V.P., and Arora, J.L. "An Introduction to Linear Algebra", Affiliated East-West, 1976.

ME 121 ENGINEERING THERMODYNAMICS 4(3-1-0)


Suggested Text Books & References

EC 121 BASIC ELECTRONICS 5(3-1-3)


BASIC ELECTRONICS LAB
- Characteristics Curve for common base emmitor & common collector transducers.
- Characteristics of field effect transistors.
- Verification of properties of operational amplifiers.
- Study of CRO.
- Study of working of data acquisition system.

Suggested Text Books and References
2. Milliman & Halkias, "Basic Electronics Principle".

ME 121 ENGINEERING GRAPHICS-II (M/C DRAWING) 2(0-0-3)

Basic Concepts
I. S. drawing-conventions, line symbols, kinds of line, drawing sheet lay-out, rules of printing, preferred scales.

Projections
Perspective, orthographic, isometric and oblique projections, isometric scale, isometric drawing. Technical sketching.

Shape Description (External)
Multiplanar representation in first- and third angle systems of projections, glass-box concept, sketching of orthographic views from pictorial views, precedence of lines.
Sketching of pictorial (isometric and oblique) views from Multiplanar orthographic views. Reading exercises. Missing line and missing view exercises.

**Shape Description (Internal)**
Importance of sectioning, principles of sectioning, types of -sections, cutting plane representation, section lines, conventional practices.

**Size Description**

**Computer Aided Drafting**
Basic concepts and use.

**Suggested Text Books & References**

**ME 122 WORKSHOP PRACTICE II 2(1-0-2)**

**Carpentry**
Timber, seasoning and preservation, plywood and ply boards. Engineering applications.

**Foundry**
Moulding sands, constituents and characteristics, pattern, materials, types, core prints. Role of gate, runner, riser, core and chaplets, causes & remedies of some common casting defects like blow holes, cavities and inclusions.

**Metal Joining**
Definitions of welding, brazing & soldering processes; and their applications. Oxy-acetylene gas welding processes, equipments, techniques, type of flames; and their applications. Manual metal arc welding technique and equipment, AC and DC welding electrodes, constituents and functions of electrode coating. Welding positions. Type of welding joints. Common welding defects such as cracks, undercutting, slag inclusions, porosity.

**Metal Cutting**

**Forging**
Forging principle, materials, operations like drawing, upsetting, bending and forge welding, use of forge parts.

**List of Practical**

**Carpentry Shop**
- Preparation of cross lap joints.
- Preparation of bridle joints.

**Fitting Shop**
Simple exercising involving filing, drilling, taping and dieing.

**Foundry Shop**
- Mould of any pattern.
- Casting of any simple pattern.

**Machine Shop**
Job on lathe with plane turning, taper turning, step turning, chamfering, threading. Study of drilling, grinding; and shaping machine.

**Welding Shop**
- Preparation of square butt joints by MMA welding.
- Prepare lap joint MMA welding.

**COMPUTER PROGRAMMING**
Overview of computer components and their function, computer languages, problem analysis, flow charts, decision tables, pseudocodes algorithms, stepwise refinement.

**Algorithmic Programming Language**
Example from numerical methods like solutions of linear algebraic equations; integration and solutions of differential equations. Also from non-numerical methods like searching, simple string pattern, machining etc.

**Suggested Text Books & References**

- Sastry SS. "Introductory method of Numerical Analysis", Prentice Hall of India.

**ENGINEERING ECONOMICS**

**Microeconomics**
Demand Theory & Demand Forecasting, Production Theory, Cost Theory, X-Inefficiency.

**Market Dynamics**
Forms of Market, Elements of Com petti on, Perfect Competition, Monopoly & Prince Discrimination, Imperfect Competition Oligopoly.

**Pricing Policies**

**Firm as an Organization**
Objectives of the Firm, Types of the Firm, Firm versus markets, Uncertainty and Finn, Vertical and Horizontal Integration, Diversification, Merges and Takeovers.

**Macroeconomics**

**Suggested Text Books & References**

- Gupta G.S. "Managerial Economics"
- Davis, H. "Managerial Economics", ELBS - Pitman.
- Joel Dean, "Managerial Economics", Prentice hall.

**COMPUTER ORGANISATION**

**Representation of information**
Number systems, integer and floating point representation, character codes (ASCII, EBCDIC), En-or detection & correction codes.

**Basic Building Block**

**Suggested Text Books & References**

- Assembler "Manual for the Chosen Machine".
ELECTRONICS – II

Review of d.c. analysis biasing and bias stability for BJTS: small signal equivalent circuit; linear analysis, multiple stage circuits, biasing of FETS, FET equivalent circuit and amplifiers.

Feedback And Amplifier Classification
Effect of feedback on gain and impedance; emitter and source follower; step response of amplifiers; low frequency response; high frequency equivalent circuit; high frequency response, gain-BW product; effect of feedback on frequency response single and double pole representation; high impedance circuits.

Differential Amplifiers
CMRR; operational amplifiers; applications-summer, integrator, current converter; instrumentation amplifiers, active filters; compactors, Schmidt trigger, square and triangular wave generation. Monostable; wien bridge and tuned oscillators, OP-amp bias currents and offset voltages, frequency response, measurement of OP-amp parameters, coupled amplifier.
Voltage regulators; regulators in a regulator design; protection circuits; fixed and adjustable regulators; switching regulators.
Class A and Class B power amplifiers; push-pull amplifiers; audio power amplifier ICs like LM 380, distortion in Class AB push-pull amplifiers; Class C amplifiers; power OP-amps and MOSFETs.
Voltage controlled oscillators; IC timer 555; applications.

Suggested Text Books & References

MATHEMATICS - III

Complex Variable
Complex number, Arc and diagram, complex functions, limit, continuity and differentiability Cauchy-Reimann equations, harmonic functions, construction of analytic functions, by mile-Thomson method, conformal mapping, transformations W=Z², Hz, e, (az + b)/cz=d).

Fourier Series
Periodic functions, Fourier series offunctions with period 2 change of interval, Half range sine and cosine series.

Laplace Transform
Laplace transform, existence theorem, first shifting theorem, multiplication and division by T, Laplace transform of deviated Inverse Laplace transform, Application to solve Linear differential equations.
Unit step function, Dirac delta function - their Laplace transforms, second shifting theorem, Laplace transform of periodic function, Applications.

Series Solution of Differential Equation
Serious solution, Frobenious method, Legendre and Bessels equations.

Partial Differential Equation
Linear and non-linear partial differential equations of first order. four standard forms.

Suggested Text Books & References
- Kreyszig E. "Advanced Engineering Mathematics".
- Prasad C. "Advanced Engineering Mathematics".
- Pati T. "Functions of Complex Variable".

STRENGTH OF MATERIALS

Analysis of Stress: Plane Stress, Stress components associated with arbitrary oriented Faces in plane stress, principal stresses, Maximum shearing stress, Mohr's circle representation of plane stress.

Analysis Strain: Strain components. Strain-displacement relation. Strain components associated with arbitrary sets of axes, Principal strains, Maximum shearing strain, Mohr's circle representation of plane strain, Strain rosettes.

Stress-Strain relations: The tensile test, Elastic stress-strain relations, Thermal Strain, Strain energy in an elastic body, stress-strain relations for composite materials, Poissons ratio, Relations between various elastic constants, Yield criteria.

Statically indeterminate Problems: Composite bars and thermal stresses.

Thin-walled Pressure Vessels: Stresses and deformations in thin cylindrical and spherical vessels.

Torsion: Geometry of deformation of a twisted circular shaft Stress and deformation in twisted circular solid and hollow shafts, Strain Energy due to torsion, Power transmitted by circular shaft.

Shear Force and Bending Moment Diagrams
Stresses due to Bending: Geometry of deformation of asymmetrical beam subjected to pure bending. Bending stress and deformation in symmetrical elastic beams subjected to pure bending, Shear stress in Symmetrical elastic beams transmitting both shear and bending moment, Combined stresses, Short columns.

Deflections due to bending: The moment curvature relation, Integration of the moment curvature relation, Superposition, The load deflection differential equation, Moment-area method, Castigliano's theorem.


Springs: Types of springs. Close-coiled and open-coiled springs.

Suggested Text Books & References
- Sharmes, L.H. "Introduction to Solid Mechanics", Prentice Hall of India Ltd.
- Popova, E. "Engineering Mechanics of Solids".
- Singer, "Strength of Materials".

DISCRETE MATHEMATICS

Formal Logic
Introduction to formal logic, formulas of prepositional logic, boolean valuations and truth sets, predicate calculus, quantification, Notion of interpretation, validity, consistency and completeness.

Sets
Sets, operations on sets.

Functions
Ordered pairs, functions and sequences, recursive definitions.

Relations
Relations, partially ordered sets, equivalence relations, composition of relations, colosures.

Algebraic Structures
Lattices, semigroups, groups, rings, fields, etc.

Graph Theory
Incidence, degrees, walks, paths, circuits, Euler graphs, hamiltonian paths, trees, spanning tree, network flow, cut-sets, planar graphs, etc.

Combinatorics
Counting techniques -pigeon-hole principle, infinite sets, mathematical induction. Permutations (with repetitions, etc.). Generating functions. Recurrence relations and their solutions.

Suggested Text Books & References
- Deo, N. "Graph Theory with Applications to Engineering and Computer Science", Prentice Hall of India, 1980.

SYSTEM ANALYSIS & DESIGN

Overview
Overview of system analysis and design, Business systems concepts, systems development life cycle, project selection, feasibility analysis, design implementation, testing and evaluation.

Project Selection
Sources of project requests, managing project review and selection, preliminary investigation.

Feasibility Studies
Technical and economical feasibility, cost and benefit analysis.
System requirement specification and analysis, fact finding techniques, Data flow diagrams, data dictionaries, process organization and interaction, decision trees and tables structural English advanced Modelling methods, ER Diagram & DFDS, Entity relationship model.
Detailed Design
Modularization, module specification, file design, system development involving database. Program Design, Practical Design.
System control and quality assurance, system administration and training, conversion and operation plans, Hardware and Software selection.

Suggested Text Books & References
- Thomas, R. & Prince "Information systems for Planning & Control".
- Hawrys Zbiewyes LT. "Introduction to System Analysis & Design", Prentice Hall of India.

DIGITAL CIRCUITS DESIGN

Mixed logic representation, design of machine on ROMs and PLANS, interactive networks Digital System structure, pipe lined and serial structure, Process interface design such as numerical control, PLCs, control sequencing use sequencers. Hardware description languages, programming using HPLs. Firmware based design, design of control units, microprogram design.
Algorithm implementation with digital systems.

Suggested Text Books & References
- J.P. Hayes, "Digital System Design and Microprocessor".
- W.I. Fletcher, "Engineering Approach to Digital Design".
- Peatman "Digital System".

DATA COMMUNICATION

Baseband data transmission, Baseband pulse shaping, Inter Symbol Interface (ISI), Dubinary Baseband PAM, System Many signalling schemes, Equalisation, Synchronisation Scrambler and Unscramble.
Error detection and correction codes, Linear Block Encoding. Algebraic Codes, Cyclic Codes, Convolution codes, Best Error, Correcting Codes performance of Codes.
Synchronous and Asynchronous transmission, Modem, serial interface Circuit switching packet, switching, Hybrid switching. Architecture of computer network, OSI model, data communication protocols.

Suggested Text Books & References
- Roden, M.S. "Analog and Digital Communication System", P.H.I.
- Scheber, W.L. "Data Communication", MGH.
- Tanebaum, "Computer Networks".

DATA STRUCTURE & PROG. METHODOLOGY

Programming in C.
Elementary data structures
Arrays and strings; packing; space arrays; algorithm development; complexity; simple example of algorithm development; recursion.
Sequential Search
Divide and conquer binary search; selection and insertion sort; merge-sort; quicksort; complexity of sorting. Linear lists - stacks; stack use- postin notation recursion removal. queues-circular queues.
Linked list-definition on Pascal and C; creation and deletion of nodes; circular and deletion of nodes; circular and doubly linked lists; applications of list.
Graphs and representation sets: UNION and FIND operations; graph algorithms; optimisation and greedy method; minimum spanning tree, shortest path.

Trees: A VL trees; threaded trees; heapsort; tries and B-trees; external search.

Tables and information retrieval: hashing; depth first and breadth first search; examples of backtracking.

String algorithms: pattern search and text editing.

Structured approach to programming step wise refinement approach.

Reasoning about programs, program specification, pre-and post condition, weakest pre-conditions, program assertions, loop invariants.

Programming style-documentation, basic concepts of program testing.

**Suggested Text Books & References**


**SYSTEM SOFTWARE**

Machine architecture, instruction set, addressing modes of the chosen machine, arithmetic & logic operations, floating point operations.

C Programming: Review of syntax of C with emphasis on features like pointers. Bit operations, Pre-processors, files.

Assemblers, Cross Assemblers: Two pass assembler design, data structures and algorithms.

Macro Processors: Definitions, nested macro-definitions, macro expansion, conditional macro-expansions.

Linking, Loading, and Relocation, Static and Dynamic linking. Loading and Relocations.

Editors, debuggers, interactive programming environments.

DOS: Introduction to interrupts, structure of the interrupt vector table, interrupt types, software interrupts, Hardware interrupts, interrupts, at a glance, interrupt calls from C, internal structure of DOS, Booting DOS,. COM & EXE Programs, BIOS, Memory resident programs. Running Batch files.

Programming Examples of text handling, file management, interface and device driver, programming in C.

**Suggested Text Books & References**


**MANAGEMENT SCIENCE**

**Principles of Management**


**Functions of Management**


**Organisation Theory**

Group Dynamics: Defining and classifying groups, Group Processes. Group task. Group Cohesiveness.

Conflict Management: Discovery of conflicts, Processing of grievances, conflicts resolution, conflict and intergroup relations.

Suggested Text Books & References
- Koontz, H. and Weihrich, H., "Essential of Management".
- Mathur, S. S., "Principles of Management".
- Agarwal, R.D., "Organisation and Management".
- Robbin. S.P., "Organisational Behaviour".
- Hicks & Gullet, "Organisations: Theory and Behaviour".
- Allen, "Management and Organisation".

FORMAL LANGUAGE AND AUTOMATA THEORY

Finite Automata and Regular Expressions
Deterministic and non-deterministic finite automata Regular expression, Two-way finite Automata, Finite automata with output, Properties of Regular sets, Pumping lemma, closure properties, My-hill-Nerode theorem.


Push Down Automata (PDA): Definitions, Relationship between PDA and Context free Languages (CFL) properties of CFLs properties of CFLs, Decision Algorithms.

Turing Machines: The Turing machine model, Computable languages and functions.

Modification of Turing machines, Church's Hypothesis, Undesirability.

Properties of recursive and recursively enumerable languages, Universal Turing machines, Post correspondence problem, introduction to recursive function theory.

Chomsky Hierarchy: Regular grammars, Unrestricted grammars, Context sensitive languages, Relation between classes of languages.

Suggested Text Books & References
- Hopcroft and Ullman, "Introduction to Automata theory Languages and Computation", Narosa,
- Kohan, "Theory of Computer Science".
- Korral, "Theory of Computer Science".

COMPUTER NETWORKING

Overview of OS I reference model, topology design, Media Access Control Level, Services, Problems and protocols, Practical local area network design and implementation. IEEE LAN Standards, Logical Link Control protocols, HDLC, ALOHA, Slotted ALOHA, FDDI, Client Server model and related software's.

Network Layer level services, problems and protocols. WAN, MAN, interconnection networks related software's TCP/IP, Novel NetWare, Routers, Bridges and Gateways their Practical implementation aspects. X.25, Internet and related software's NETSCAPE and MOSAIC.

Transport layer, services, problems and their protocol.

Brief functioning of upper layers E-mail and other application.

Suggested Text Books & References
Black, "Computer Networks".
Schwartz, "Communication Networks".
Stevens, "UNIX Network Programming".
Dugglas, "TCP/IP and internetworking".

RELATIONAL DATA BASE SYSTEM

Introduction
Data Base System Concepts and architecture, Data models, scheme and instances, Data independence Data base language and Interface.

Data Modelling Using the Entity-Relationship Model
ER model concepts, Notations for ER diagram, Extended E.R. model, Relation-hips of higher degree.

Relational Data Model and Languages
Relational data Model concepts, constraints, relational algebra. Relational Calculus, Tuple and Domain calculus.

SQL, data definitions queries and up-dates in SQL, QBE, Data definitions, queries and up-dates in QBE.

Example DBMS System (ORACLE/INGRESS/SYBASE)
Basic architecture. Data definitions Data Manipulation.

Database Design

Query Processing and Optimisation
Algorithms for executing query operations, Heuristics for query optimisations.

Transaction Processing Concepts
Transaction and system concepts, schedules and Recoverability serializability of schedules.

**Concurrency Control Techniques**
Locking Techniques for concurrency control Time stamping and concurrency control.

**Suggested Text Books & References**
- Elmasri, Ramex Shamkant B. Navathe, "Fundamentals of Data base Systems".
- Prakash, Naveen., "Introduction to Database Management", Tata McGraw Hill.

**OPERATING SYSTEM - I**

**Introduction**

**Operating System Structure**
System components, operating system service, System structure.

**Concurrent Processes**

**CPU Scheduling**
Scheduling concepts, Performance criteria, Scheduling algorithms. Algorithm evaluation, Multiprocessor scheduling.

**Dead locks**
System model. Dead lock characterization. Prevention, avoidance and detection. Recovery from dead lock Combined approach.

**Memory Management**

**I/O management & Disk Scheduling**

**File System**

**Suggested Text Books & References**
2. Tanenbaum, A.S., "Operating System Design & Imlementation", Prectice Hall NJ.

**MICRO COMPUTER BASED SYSTEM DESIGN**
Architecture of 16 and 32 bit microprocessors such as Intel 8086/ 1861186/ 386/ 486 Motorola 68600/68010/68020 etc.

Comparative studies of the architectures, instruction types, addressing modes, interrupt structure.

Assembly language Programming on available 16/32 bit machine.

Hardware and software interrupt management.

Controllers such as key board, diskette and DMA.

Serial communication controller.

Dynamic RAM and its controller, Back up power for semiconductor memories.

Multiprocessor configurations, Numeric Processor I/O processor.

I/O standards RS 232C, centronics, SCSI, VIME, Ethernet LAN etc.

**Suggested Text Books & References**
- Lin and Gibson, "Microprocessor System", The 8086/8088 family, Prentice-Hall India.
- Rajalu Govind, IBM PC 4 Clones, "Harware, Trouble shooting and Maintenance", Tata McGraw Hill.
- Norton, "Assembly Language Programming on on PC", BPB Publication.
- Miller, "Assembly Language Programming on PC", BPB Publication.
INTERNET FUNDAMENTAL & APPLICATION

Overview of OSI reference model, topology design, Media access control level, Services, Problems and Protocols, Practical local area network design and implementation, IEEE LAN Standards, Logical link control protocols, HDLC, ALOHA, Slotted ALOHA, FDDI, Client Server model and related software's. Network layer level services, problems and protocols, WAN, MAN, Interconnection networks and related software's TCP/IP protocol suite, Novel NETWARE, Routers, Bridges and Gateways their practical implementation aspects. X.25, Internet and related software's NETSCAPE and MOSAIC. Transport layer, services, problems and their protocol. Brief functioning of upper layers E-mail and other applications.

Suggested Text Books & References
- Black, "Computer Networks".

INTERACTIVE COMPUTER GRAPHICS

Line Generation
Points, lines, Planes, Vectors, Pixels and frame buffers, Vector and character generation.

Graphics Primitives

Polygons
Polygons representation, Entering polygons, Filling Polygons.

Transformations
Matrics Transformations, transformation routines. Display procedures.

Segments
Segments table. Creating, Deleting and Renaming a segment Visibility, Image transformation.

Windowing and Clipping

Interaction
Hardware Input device handling algorithms. Event handling Echoing. Interactive techniques.

Three Dimensions
3-D Geometry Primitives, Transformations, Projection, Clipping.

Hidden line and surfaces

Rendering and Illumination
Introduction to curve generation. Bezier. Hermite and B-spline algorithms and their comparisons.

Suggested Text Books & References
- Henary Baper, "Computer Graphics".

LANGUAGE PROCESSORS

Compiler Structure
Analysis - Synthesis model of complication, various phases of a compiler, Tool based approach to compiler construction.

Lexical Analysis

Syntax Analysis
CFGs, Ambiguity, associativity, precedence, Top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, opreator precedence grammars, LR parses (SLR,LALR,LR), YACC.

Syntax Directed Definitions
Inherited and synthesised attributes, dependency graph, Evaluation order, bottom up and top down evaluation of attributes, I-and S-attributed definitions.

Type Checking
Type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

Run Time System
Storage organisation, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

Intermediate Code Generation
Intermediate representations, translation of declarations, assignments, control flow, boolean expressions and procedure calls. Implementation issues.

**Code Generation and Instruction Selection**
Issues, basic blocks and flow graphs, register allocation, code generation, dag representation of programs, code generation from dags, peephole optimisation.

**Suggested Text Books & References**

**COMPUTER ARCHITECTURE**

**Prerequisites: Computer Organisation**
Review of Pipeline, Examples of some pipeline in modern processors, pipeline hazards, data hazards, control hazards. Techniques to handle hazards, performance improvement with pipelines and effect of hazards on the performance.
Vector processors- Use and effectiveness, memory to memory vector architectures, vector register architecture, vector length and stride issues, compiler effectiveness in vector processors.
Single instruction multiple data stream (SIMD) architectures, Array processors, comparison with vector processors, example of array processors such as MMX technology.
Advanced pipeline techniques, interaction level parallelism, basic instruction scheduling to avoid conflicts, dynamic scheduling, effect of loop unrolling, branch prediction and their effectiveness in instruction level parallelism, issues of cache design.
Memory hierarchy. Cache Introduction. Techniques to reduce cache misses, techniques to reduce cache penalties, techniques to reduce cache hit times. Effect of main memory bandwidth, effect of bus width, memory access time, virtual memory etc.
RISC architectures, addressing modes, instructions formats, effect of simplification on the performance, example processors such as MIPS, PA-RISC, SP ARC, Power PC etc.
MIMD Multiprocessors, Centralised shared architectures, distributed shared memory architectures, synchronisation and memory consistency models, message passing architectures, comelier issues. Dataflow architectures. Interconnection networks.
World - wide parallel processing projects; Architecture of multiprocessor and multi-computer machines like hypercube, MMS, mesh, CM*, CMP Illiac IV, Monsoon machine; Dataflow architecture; CM machine; Teraflop computers.

**Suggested Text Books & References**

**OPERATING SYSTEM II**

**(System Administration)**
Understand configuration of Hardware, Configuration of Kernel, Setting up of serial Hardware, Configuration of TCP/IP Networking, Name service & Resolve Configuration, Understanding of various Network Application, Management of NIS, Understanding NFS and AFS, Configuration of Mail, Configuration of NNTP/TIN, File System & Quota Management

**Reference**
LINUX Administration
HPUX Administration Manual
DELALPHA Administration Manual
Tanbaum : Modern Operating System.

**ANALYSIS & DESIGN OF ALGORITHMS**
Divide and Conquer:
Binary search, Merge sort, Quick sort. Selection-sort.

**Greedy Method:**
Knapsack Problem, Job sequencing, Optimal merge patterns, Minimum Spanning trees.

**Dynamic Programming:**
All pairs shortest paths, optimal binary search trees. 0/1 Knapsack Problem, Travelling Sales person problem, Flow shop scheduling.
Search Techniques:
Code optimisation, Depth-first search, Breadth-first-searching.

Backtracking:
The 8-queen problem, Graph Colouring, Hamiltonian cycles.

Branch and Bound:
0/1 Knapsack Problem, travelling Sales person, problem, efficiency.

NP Hard and NP-Complete Problems:
Basic concepts, Cook's theorem, Simple NP-Hard problems.

Suggested Text Books & References
- Sedgewick, "Algorithms in C".

SOFTWARE ENGINEERING

Introduction
What is Software Engineering.

Software Development Life-cycle
Requirements analysis, software design, coding, testing, maintenance, etc.

Software Requirements Specification
Waterfall model, prototyping, interactive enhancement, spiral model. Role of Management in software development. Role of metrics and measurement.

System Design
Problem partitioning, abstraction, top-down and bottom-up design, Structured approach. Functional versus object-oriented approach, design specification and verification metrics, monitoring and control.

Coding
Top-down and bottom-up, structured programming, information hiding, programming style, internal documentation. Verification. Metrics, monitoring and control.

Testing
Levels of testing functional testing, structural testing, test plane, test cases, validation, metrics, monitoring and control.

Software Project Management
Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, Project Monitoring, Risk management, etc.

Suggested Text Books & References

OBJECT ORIENTED PROGRAMMING & METHODOLOGY

Object Modelling: Objects, class, Links and associations, Generalisation and inheritance, aggregation, abstract class, multiple inheritance, meta data.

Dynamic Modelling: Events and stages operations, Nest and state diagram tran. currency.

Functional Modelling: Data flow diagrams, specifying functions and constraints.

OMT (Object Modelling Technique) Methodology, examples and case studies to demonstrate methodology.

Object Oriented Language C++ (or any other available language such as SIMULA SMALL TALK etc.

Suggested Text Books & References
DATA BASE APPLICATION DESIGN

Design Theory for Relational Database
Functional Dependencies, Decomposition of Relation Schemes, Normal for Relations Schemes, Normal Forms for Relations Scheme, Multi valued and other kinds of Dependencies.

Query Optimization
Basic Optimization strategies, Algebraic Manipulation, Optimization of Selections in System, Exact optimization under weak equivalence.

Database Protection

Concurrent Operations on the Database
Basic concepts, A simple transaction model, A model with Read-and Write-only model, Concurrency for Hierarchical structured items, protecting against crashes, optimistic concurrency control.

Distributed Database Systems
Fragments of relations, Optimization transmission cost by semi joins, Distributed concurrency control, The Optimistic approach, Management of Deadlocks and crashes.

Suggested Text Books & References
- Rishe, "Database Design Fundamentals", Prentice Hall Inc.

WEB TECHNOLOGY

History of the web, growth of the web in past decade, protocols governing the web, web applications, security aspects on the web, computational features, encompassing the web. Development of web in India, creating web sites for individuals and corporate world.

Creating window, menus, file handling in window, dialogue boxes, scroll bars, list boxes, mouse techniques, reading key strokes in windows, windows messages, debugging in visual C++, multi document interface (MDI), object linking and embedding (OLE), writing X applications, constructing geographical user interface with X.

Suggested Text Books & References
- Barkakati, N. "X window system programming", Prentice-Hall.
- Holzener, Steven "Visual C++ programming", Prentice-Hall.
- Murray and Pappas, "The visual C++ handbook".

VISUAL PROGRAMMING

Foundations of Information Technology
Information concept & Processing
Definition of Information, Need for Information, Quality of Information, Value of Information, Categories and Levels of Information in Business Organization. Data concepts and Data Processing, data Representation-Number System.

Computer Appreciation
Definition of an Electronic Digital Computer, History, Generations, Characteristics and applications of computers, Classification of computers.

Elements of Computers Processing System
Hardware CPU, Peripherals, Storage Media, Software Definition, Role and Categories, Firmware and Human ware.

Computer & Communication
Need for Data Transmission Over Distances, Types of Data Transmission, Media for Data Transmission, Networking of Computers-Introduction of LAN ~ WAN, Client-Server Architecture.

Programming Language Classification
Computer Languages, Generation of Languages, Translators-Interpreters, Compilers, Assemblies, Introduction to 4GLS.

Information Technology Applications in India
Scientific, Business, Educational and Entertainment Applications, Industry Automation, Weather Forecasting, Awareness of Ongoing IT Projects in India NICNET ERNET etc.

Suggested Text Books & References
- Rajaraman, V. "Introduction to Computer".
- Morris, "Computer Organization".
- Hamacher, "Computer Organization".
- Kanter, "Managing Information System".

### LIST OF SUGGESTED OPEN ELECTIVES & PROFESSIONAL ELECTIVES

<table>
<thead>
<tr>
<th>Open Elective</th>
<th>Professional Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. E-Commerce, Strategic IT Management</td>
<td>2. Enterprise Network Management</td>
</tr>
<tr>
<td>3. Technology Management</td>
<td>3. Distributed Computing</td>
</tr>
<tr>
<td>4. Decision Support and Executive information system</td>
<td>4. Client Server Architecture</td>
</tr>
<tr>
<td>5. Software Technology</td>
<td>5. Relational Data Base System</td>
</tr>
<tr>
<td>6. Knowledge Management</td>
<td>6. JAVA Programming</td>
</tr>
<tr>
<td>7. IT in Marketing Management</td>
<td>7. RISC Architecture</td>
</tr>
<tr>
<td>8. IT in HR Management</td>
<td>8. Object Oriented Data Base Systems</td>
</tr>
<tr>
<td>11. Human Values</td>
<td>11. Image Processing</td>
</tr>
<tr>
<td></td>
<td>13. Real time system</td>
</tr>
<tr>
<td></td>
<td>14. CADVLISI</td>
</tr>
<tr>
<td></td>
<td>15. GIS and Remote Sensing</td>
</tr>
<tr>
<td></td>
<td>16. High Speed Network, Client Server</td>
</tr>
<tr>
<td></td>
<td>17. Client Server Computing</td>
</tr>
<tr>
<td></td>
<td>18. Mobile Computing</td>
</tr>
<tr>
<td></td>
<td>19. Fuzzy and Neural Network</td>
</tr>
<tr>
<td></td>
<td>20. Multimedia Application</td>
</tr>
<tr>
<td></td>
<td>21. A.I. &amp; Application</td>
</tr>
</tbody>
</table>

**Note:** The Institutions can frame syllabi of professional electives and open electives to be offered by them in the particular area.

### Open Electives

#### HUMAN VALUES

The objective of the course is an exploration of human values which go into making a "good" human being, a 'good' human society and a 'good' life. The context is the work life and the personal life of modern Indian professionals.

1. The value—crisis in the contemporary Indian Society.
2. The nature of values: the value spectrum for a ‘good’ life
3. The Indian system of values.
4. Material development and its values: the challenge of science and technology
5. Psychological values: integrated personality; mental health
6. Societal values: the modern search for a ‘good’ society; justice, democracy, rule of law; values in the Indian constitution.
7. Aesthetic values: perception and enjoyment of beauty
8. Moral and ethical values; nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.
9. Work ethics; professional ethics.
10. Spiritual values; different concepts; secular spirituality.
11. Relative and absolute values.
12. Human values: humanism and human values; human rights; human values as freedom, creativity, love and wisdom.
13. Management by values; professional excellence; inter-personal relationships at work place; leadership and team building; conflict resolution and stress management; management of power.
SCIENCE TECHNOLOGY AND SOCIETY

It will be innovative course dealing with social, human and ethical implications of engineering and technology, with special reference to the Indian situation. Its three main components are:

(i) Social and Cultural history of technology,
(ii) Social and Human critiques of technology,
(iii) Engineering Ethics and Professional Ethics.

The proposed course-structure is as follow:

1. Science, Technology and Engineering, as knowledge and as social and professional activities.
2. Inter-relationship of technology growth and social, economic and cultural growth; historical perspective.
5. Rapid technological growth and depletion of resources. Reports of the club of Rome. Limits to growth; sustainable development.
6. Energy crisis; renewable energy resources.
8. Technology and the arms race. The nuclear threat.
9. Appropriate technology movement Schumacher; later developments.