KUMARAGURU COLLEGE OF TECHNOLOGY
(Autonomous Institution Affiliated to Anna University of Technology
COIMBATORE – 641049

CURRICULUM AND SYLLABUS
(REGULATIONS 2009)

First and Second Semester

B.E. AUTOMOBILE ENGINEERING
## KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE – 641 049
(An Autonomous Institution Affiliated to Anna University of Technology Coimbatore)
### CURRICULUM
#### Regulation-2009

## B.E – AUTOMOBILE ENGINEERING

### SEMESTER - I

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG101</td>
<td>Technical English</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MAT101</td>
<td>Engineering Mathematics – I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PHY101</td>
<td>Engineering Physics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CHY101</td>
<td>Engineering Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MEC101</td>
<td>Engineering Graphics</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CSE101</td>
<td>Programming with ‘C’</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>GHE101</td>
<td>Personal Values -I</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**PRACTICAL**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY401</td>
<td>Physics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>MEC401</td>
<td>Engineering Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CSE401</td>
<td>Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 32**

**TOTAL CREDIT – 24**

### SEMESTER - II

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG102</td>
<td>English For Pragmatic Usage</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>MAT102</td>
<td>Engineering Mathematics – II</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PHY103</td>
<td>Materials Science</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CHY103</td>
<td>Applied Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MEC102</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC103</td>
<td>Manufacturing Technology -I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**PRACTICAL**

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHY401</td>
<td>Chemistry Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CSE451</td>
<td>Advanced Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>MEC402</td>
<td>Manufacturing Technology – Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>GHE102</td>
<td>Personal Values -II</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 31**

**TOTAL CREDIT – 23**
ENG101 TECHNICAL ENGLISH
(Common to all branches of Engineering and Technology)

OBJECTIVES

• To assist learners enhance their technical jargon and to impart knowledge about the application of technical English.
• To familiarize learners with different rhetorical functions of technical syntax
• To inculcate written proficiency in commercial and business context
• To improve the competency of professional writing with special reference to career related situations
• To provide pragmatic exposure to technical correspondence.

UNIT – I FOUNDATIONS OF TECHNICAL COMMUNICATION 5 hrs

UNIT - II TECHNICAL SYNTAX 5hrs

UNIT – III CORRESPONDENCE IN CORPORATE SECTOR 9hrs

UNIT – IV TECHNICAL WRITING 5hrs

UNIT - V GENERAL CORRESPONDENCE 6hrs

L: 30 T: 15 Total : 45Hrs

TEXT BOOK

REFERENCES

MAT101 ENGINEERING MATHEMATICS I
(Common to All Branches of Engineering & Technology)

OBJECTIVES:
On completion of the course the students are expected
- To know eigen values and eigen vectors and diagonalization of a matrix.
- To understand the concepts of three dimensional geometry including plane, straight line and sphere.
- To know about the geometrical aspects of curvature, evolute and envelope.
- To understand the concepts of partial differentiation, maxima and minima.
- To solve ordinary differential equations of certain types.

UNIT – I MATRICES
9hrs
Eigen values and eigenvectors of a real matrix – Properties of eigen values and eigenvectors- Cayley - Hamilton theorem (excluding proof) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – II THREE DIMENSIONAL ANALYTICAL GEOMETRY
9hrs
Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Plane section of a sphere – Orthogonal spheres.

UNIT – III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS
9hrs
Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

UNIT – IV FUNCTIONS OF SEVERAL VARIABLES
9hrs

UNIT – V ORDINARY DIFFERENTIAL EQUATIONS
9hrs
Linear equations of second order with constant coefficients – Euler’s and Legendre’s linear equations - Method of variation of parameters – Simultaneous first order linear equations with constant coefficients.

L: 45, T: 15 Total: 60Hrs

TEXT BOOK

REFERENCES
PHY101 ENGINEERING PHYSICS
(Common to all branches of Engineering and Technology)

OBJECTIVES
At the end of the course the students would be exposed to
- To impart fundamental knowledge in various engineering subjects and applications
- Design of acoustically good buildings
- Structure identification of engineering materials
- Non destructive techniques
- Interferometric techniques in metrology, communication and civil engineering
- Application of quantum physics to optical & electrical phenomena
- Application of lasers in engineering and technology.

UNIT – I  ACOUSTICS AND ULTRASONICS  9hrs
Classification of sound characteristics of musical sound, Loudness Weber Fechner law Decibel, Phon, Reverberation time, Derivation of Sabine’s formula for reverberation time (Rate of Growth and Rate of Decay) Absorption coefficient and its determination - Factors affecting acoustics of buildings (Optimum reverberation time, Loudness, Focussing, Echo, Echelon effect, Resonance and Noise) and their remedies. Ultrasonic production Magnetostriction & piezoelectric methods - Detection Thermal and Piezoelectric methods, properties, Determination of velocity of ultrasonic waves in liquid using acoustic grating - Applications SONAR, Measurement of velocity of blood flow & movement of heart.

UNIT – II  CRYSTALLOGRAPHY & NON-DESTRUCTIVE TESTING  9hrs
Space lattice, unit cell, Bravais space lattices, Lattice planes, Miller indices Calculation of inter planar Distance, number of atoms per unit cell, Atomic radius, coordination number & packing factor for simple cubic, BCC, FCC and HCP structures NDT methods: Liquid penetrant method, Ultrasonic flaw detector, X-ray radiography & fluoroscopy. Thermography

UNIT – III  WAVE OPTICS  9hrs
Air wedge (theory and experiment) - testing of flat surfaces - Michelson interferometer, Types of fringes, Determination of wavelength of monochromatic source and thickness of a thin transparent sheet - Theory of plane, circularly and elliptically polarized light - quarter and half wave plates, production and analysis of plane, circularly and elliptically polarized light - Photo elasticity Birefringence - effect of a stressed model in a plane polariscope Isoclinic and isochromatic fringes Photo elastic bench

UNIT – IV QUANTUM PHYSICS  9hrs
Planck’s quantum theory of black body radiation (Derivations), Photo electric effect - Compton effect (derivation) and Experimental verification of Compton effect Schr dinger wave equation Time independent and time dependent equations (derivation), Physical significance of wave function, particle in a box (in one dimension) electrons in a metal.

UNIT – V  LASER & FIBRE OPTICS  9hrs
Einstein’s coefficients (A & B), Nd-YAG laser, He-Ne laser, CO2 laser, semiconductor laser - Homo-junction and Hetero-junction (only qualitative description) - Applications
Material processing, CD-ROM & Holography (Qualitative) Optical fibre- Principle and Propagation of light in optical fibres-Numerical aperture and acceptance angle-types of optical fibres Single and Multimode, step index & graded index fibres Applications - Fibre optics communication system, Fibre optic sensors(Displacement and temperature sensors), Medical endoscope.

L: 45, T: 15 Total: 60Hrs

TEXT BOOK


REFERENCES

OBJECTIVES
- To develop a sound knowledge of theoretical and modern technological aspects of applied chemistry.
- To correlate the theoretical principles with application oriented studies.

UNIT – I  ELECTROCHEMISTRY  9hrs
Single electrode potential - standard electrodes (Hydrogen & calomel electrodes) - electrochemical series - Nernst equation and problems. Types of electrodes (Metal-metal ion electrode, metal -metal insoluble salt electrode, glass electrode) - determination of pH using glass electrode - application of emf measurements and problems - reversible and irreversible cell - Galvanic cell - Concentration cells - Kohlrausch law of independent migration of ions and its application - Conductometric titration - Polarization - Over voltage - Decomposition potential.

UNIT – II  ENERGY STORING DEVICES  9hrs
Introduction - primary and secondary batteries (dry cells - alkaline batteries, lead acid storage cell, nickel - cadmium cell, lithium battery) - fuel cell (hydrogen and oxygen fuel cell) - photogalvanic cell.

Nuclear Energy Sources
Nuclear fission process - characteristics of nuclear fission - chain reactions - nuclear energy - nuclear reactors (light water nuclear power plant).

UNIT – III  THERMODYNAMICS  9hrs
Thermodynamics - thermodynamic processes (isothermal, isobaric, isochoric and adiabatic processes) - internal energy mathematical form of first law – enthalpy - limitation of first law - statement of second law of thermodynamics (Clausius and Kelvin) - definition of entropy - entropy change for a reversible process - entropy change for an isothermal expansion of an ideal gas and problems - definition of free energy and work function - Gibbs Helmholtz equation - applications and problems – Van’t Hoff isotherm and isochore - applications and problems.

UNIT – IV  SURFACE CHEMISTRY  9hrs
Adsorption: Types of adsorption - adsorption of gases on solids - adsorption isotherm (Freundlich, Langmuir isotherms) - adsorption of solutes from solutions - applications role of adsorption in catalytic reactions - ion exchange adsorption - basic principles in adsorption chromatography.

UNIT – V  SPECTROSCOPY  9hrs
Beer Lambert’s Law - colorimetric analysis - principles, instrumentation (block diagram only) - estimation of concentration of a solution by colorimetry - flame photometry - theory, instrumentation (block diagram only) and application – UV – Visible & IR spectroscopy - principles, instrumentation (block diagram only) and simple applications.

TEXT BOOK

REFERENCES

MEC101 ENGINEERING GRAPHICS
(Common to all branches of Engineering and Technology)

OBJECTIVES
- To understand the principle of orthographic projection of points, lines, surfaces and solids.
- To understand the principle of section and development of solids.
- To understand the principle of Isometric and Perspective projections.
- To study the principle of free-hand sketching techniques.

UNIT - I  PLANE CURVES, PROJECTION OF POINTS AND LINES  15ahrs
Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points. Projections of straight lines located in first quadrant - determination of true length and true inclinations.

UNIT -II  PROJECTIONS OF SURFACES AND SOLIDS   15hrs
Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane., Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.

UNIT- III  SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES   15hrs
Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

UNIT -IV  PICTORIAL PROJECTIONS   15hrs
Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms and pyramids when its base resting on the ground by vanishing point method.

UNIT -V  FREE-HAND SKETCHING   15hrs
Free hand sketching techniques sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning. Sketching pictorial views from given orthographic views.

L: 30, P: 45 Total: 75Hrs

TEXT BOOK
REFERENCES

CSE101 PROGRAMMING WITH ‘C’
(Common to all branches of Engineering & Technology)

OBJECTIVES
• To learn the basic concepts of computing.
• To know the methodology of problem solving.
• To develop skills in programming using C language.

UNIT-I BASICS OF COMPUTERS AND PROGRAMMING LANGUAGES 9hrs

UNIT II C FUNDAMENTALS 9hrs

UNIT III FUNCTIONS AND ARRAYS 9hrs
Functions – Introduction- Declaration of function and function prototypes-The return statement- Types of functions-Call by value and Call by reference-Function returning more values-Function as an argument- Function with operators - Function and decision statements-Function and loop statements-Functions with arrays and pointers- Recursion- Pointer to function- Storage class –Introduction- Automatic, External, Static and Register variables-Arrays- Introduction- Array initialization – Definition of array- Characteristic of array-One dimensional array - Predefined Streams - Two dimensional array - Three or multi-dimensional arrays – sscanf( ) and sprintf( ) functions – Operation with arrays.

UNIT IV STRINGS AND POINTERS 9hrs

UNIT V STRUCTURE, UNION AND FILES 9hrs

**L: 45, T: 15 Total: 60Hrs**

**TEXT BOOK**


**REFERENCES**

UNIT – I

UNIT – II

UNIT- III

Total: 15Hrs
1. Torsional Pendulum determination of rigidity modulus of wire and moment of inertia of disc.
2. Non Uniform Bending - Young modulus determination
3. Viscosity- Determination of co-efficient of Viscosity of liquid by Poiseuilles flow
4. Lee’s disc- Determination of thermal conductivity of a bad conductor
5. Air wedge- Determination of thickness of a thin wire
6. Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer.
7. Determination of specific resistance of given coil of wire – Carey Foster’s Bridge.
8. Spectrometer - Determination of wavelength of Hg source using Grating
10. Determination of Band gap of semiconductor material.

Total: 45Hrs
MEC401 ENGINEERING PRACTICES LABORATORY
(Common to all branches of Engineering and Technology)

A. CIVIL ENGINEERING

1. Carpentry
   - Study of carpentry tools
   - Preparation of T joint
   - Preparation of dovetail joint

2. Plumbing
   - Study of pipeline joints
   - Preparation of plumbing line sketches for water supply.

B. MECHANICAL ENGINEERING

1. Fitting
   - Study of fitting tools
   - Preparation of L joint
   - Preparation of square joint

2. Sheet Metal Working
   - Study of sheet metal working tools
   - Preparation of cone and tray

3. Welding
   - Study of arc welding tools and equipment
   - Preparation of butt joint

   21hrs

C. ELECTRICAL ENGINEERING PRACTICE

12hrs

- Basic household wiring using switches, fuse, indicator-lamp, etc.,
- Preparation of wiring diagrams.
- Stair case light wiring.
- Tube light wiring
- Study of iron-box, fan with regulator, emergency lamp and microwave oven.
D. ELECTRONIC ENGINEERING PRACTICE

12hrs

List of Experiments

1. Assembling simple electronic component on a small PCB and Testing.
2. Soldering simple electronic circuits and checking continuity.
   • DC and AC voltage measurement
   • DC and AC current measurements.
   • Resistance Measurement.
   • Continuity measurement.
4. Testing of Electronic components
   • Resistors
   • Inductors and capacitors
   • Diodes (resistance in forward bias and reverse bias)
   • Transistors
5. Study of CRO and Function generator
   • Study of Panel Controls
   • Measurement of Amplitude, Frequency, phase difference

Total: 45Hrs
LIST OF EXERCISES

1. Practice sessions on the usage of Office package.
2. To find the biggest of 3 numbers.
3. To find whether the given number is an Armstrong number.
4. To find the roots of a quadratic equation.
5. To sum the individual digits of an integer.
6. To evaluate the sine series and to generate Fibonacci series.
7. To perform matrix operations
   - Calculation of row sum and column sum
   - To find the maximum and minimum number
   - Addition and multiplication
8. To perform string operations.
9. To check whether a given number is prime or not using functions (use all function prototypes)
10. To compare two strings using pointers.
11. Mark sheet processing using files.

Total : 45Hrs
EN102 ENGLISH FOR PRAGMATIC USAGE
(Common to all branches of Engineering & Technology)

OBJECTIVES
To impart the reading comprehension through interpretative and analytic reading exercises, provide exposure to the learners on drafting letters and filling up several applications, improve the level of competency of public speaking with special reference to academic related situations besides, giving practical exposure to professional and formal speaking.

READING COMPREHENSION 10hrs
1. Exercises to examine the reading comprehension capacity
2. Reading for global understanding
3. Reading for specific information
4. Reading for Reviewing (Books, Articles)

TARGETTED WRITING 15hrs
5. Writing Applications
   Opening an SB account and filling bank challans for various purposes
   Applying for a Passport
   Filling applications for competitive exams
   Applying for Medical Leave
6. Drafting Job Application Letters
7. Writing Resume
8. Writing Statement of Purpose for pursuing higher studies abroad
9. Preparing Notices and Circulars
10. Booking train tickets Online
11. Thematic writing

PUBLIC SPEAKING 10hrs
11. Appropriate stress and tonal variation
12. Accent neutralization and pronunciation improvement
13. Welcoming a gathering
14. Proposing a Vote of Thanks
15. Compering
16. Presenting one’s perception on the picture given
17. Giving Seminars

KINESThETICS & FORMAL SPEAKING 10hrs
18. Assessing body language during presentation
19. Involving in constructive conversation
20. Assigning formal situations to enhance the style of telephonic conversation
21. Discriminating assertive and aggressive conversation
22. Power point presentations

Total: 45Hrs

TEXT BOOK
REFERENCES

MAT102 ENGINEERING MATHEMATICS II
(Common to CE, AE, ME, MCE, AU, EEE, ECE & EIE branches)

OBJECTIVES
On completion of the course the students are expected
• To understand double and triple integrations and enable them to find area and volume using multiple integrals.
• To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.
• To understand analytic function and conformal mappings.
• To know the basics of residues, complex integration and contour integration.
• To understand about Laplace transform and its properties and to solve certain linear differential equations using Laplace transform technique.

UNIT – I MULTIPLE INTEGRALS 9hrs
Double integration – Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in cartesian coordinates – Change of variables between cartesian and polar coordinates.

UNIT –II VECTOR CALCULUS 9hrs
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in the plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT – III ANALYTIC FUNCTION 9hrs
Functions of a complex variable – Analytic function – Necessary conditions, Cauchy Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping \( w = z + c, cz \), \( 1/z \) and bilinear transformation.

UNIT – IV COMPLEX INTEGRATION 9hrs
Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Classification – Residues – Cauchy’s residue theorem (excluding proof) – Contour integration – Unit circle and semi-circular contours (excluding poles on real axis).

UNIT – V LAPLACE TRANSFORM 9hrs

L: 45, T: 15 Total: 60Hrs

TEXT BOOK
REFERENCES

PHY103 MATERIALS SCIENCE
(Common to Mechanical, Mechatronics, Aeronautical and Automobile Engineering)

OBJECTIVES
At the end of the course students would be exposed to

- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

UNIT – I CONDUCTING MATERIALS 9hrs

UNIT – II SEMI CONDUCTING MATERIALS 9hrs
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

UNIT – III MAGNETIC & DIELECTRIC MATERIALS 9hrs

UNIT – IV NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9hrs

UNIT – V CRYSTAL DEFECTS AND STRENGTHENING OF MATERIALS 9hrs
Crystal imperfection - point defects-line defects - planar defects - bulk-Dislocations-Edge dislocation Screw dislocation Burger Vector Dislocation climb-slip, twinning – multiplication of dislocations. Strengthening mechanisms for the improvement of mechanical properties- cold working precipitation hardening, solute hardening and
diffusion hardening-Fracture-Mechanism of brittle fracture (Griffith’s theory ) and Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its prevention - creep different stages in creep curve-Factors affecting mechanical properties Grain size and heat treatment Mechanical test Tensile, compression, hardness, impact creep, fatigue and stress.

Total : 45Hrs

TEXT BOOKS


REFERENCES

OBJECTIVES
To impart a sound knowledge of theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies, phase equilibria and powder metallurgy as required for the mechanical and related engineering students.

UNIT- I  FUELS  11hrs
Classification of fuels, coal varieties, analysis of coal – proximate and ultimate analysis - coke manufacture (Otto-Hoffman by product coke oven method) - characteristics of metallurgical coke - cracking - thermal cracking and catalytic (fixed bed & fluidized bed), synthetic petrol – polymerization - thermal - catalytic methods (Fischer Tropsch method, Bergius process), knocking - octane number - antiknock characteristics - diesel - cetane number - gaseous fuels (production composition and uses of producer gas, water gas and natural gas).

Combustion - gross and net calorific value - determination of calorific value by bomb colorimeter - explosive range- spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

UNIT- II  MECHANICAL ENGINEERING MATERIALS  11hrs
Abrasives: Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).
Refractories: characteristics, classification (acid, basic and natural refractories), properties (refractoriness, refactoriness under load, dimensional stability, porosity thermal spalling) - manufacture of refractories (general methods) - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks only.
Lubricants: functions - classification with examples - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based only) - solid lubricants (graphite, molybdenum sulphide).
Engineering plastics - polymer blends and alloys - properties with examples - polyamide, poly carbonates polyurethanes and thermocole.

UNIT-III  CORROSION SCIENCE  8hrs
Corrosion - principles of electrochemical corrosion difference between chemical and electrochemical corrosion - factors influencing corrosion - types of corrosion - galvanic corrosion, differential aeration corrosion – (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion - corrosion control (cathodic protection - sacrificial anode) - Protective Coatings – Paint, Electroplating of Copper.

UNIT- IV  WATER TECHNOLOGY  8hrs
Boiler feed water - requirements - formation of deposits in steam boilers and heat exchangers - disadvantages (wastage of fuel, decrease in efficiency, boiler explosion) - prevention of scale formation - external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - caustic embrittlement - boiler corrosion - priming and foaming - desalination by reverse osmosis – Treatment of Domestic water.
UNIT- V PHASE RULE
Phase rule - condensed phase rule -construction of phase diagram - thermal analysis - simple eutectic system (Ag-Pb system only) - applications of phase rule.

POWDER METALLURGY
Preparation of metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) - mixing and blending - compacting - sintering - advantages and limitations of powder metallurgy.

Total: 45Hrs

TEXT BOOKS

REFERENCES
MEC102  ENGINEERING MECHANICS
(Common To CE, AE, ME, MCE, AU, TXT, FT & BIO branches)

OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

UNIT -I  BASICS & STATICS OF PARTICLES  12hrs

UNIT- II  EQUILIBRIUM OF RIGID BODIES  12hrs
Moment of a force about point – Varignon’s theorem- Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

UNIT- III  PROPERTIES OF SURFACES AND SOLIDS  12hrs
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

UNIT- IV  FRICTION  12hrs
Frictional force-Law of coloumb friction, simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction

UNIT- V  DYNAMICS OF PARTICLES 12hrs

L: 45, T: 15, Total: 60Hrs

TEXT BOOKS


REFERENCES

MEC103  MANUFACTURING TECHNOLOGY – I
(Common to Mechanical and Automobile Engineering)

OBJECTIVES

- To understand the concept and basic mechanics of metal cutting, sheet metal forming and bulk deforming processes.
- To understand the basic concepts and working of different metal casting and welding processes.

UNIT- I     METAL CASTING PROCESSES         9hrs

UNIT- II   FABRICATION PROCESS                               10hrs

UNIT- III BULK DEFORMATION PROCESSES          9hrs

UNIT -IV SHEET METAL FORMING PROCESSES      8hrs

UNIT- V METAL CUTTING (TURNING) PROCESS   9hrs
Lathe – specifications, types – mechanisms and major Sub-assemblies – operations performed – work holding and supporting devices – working principle of single and multi-spindle automats.

Total   : 45Hrs

TEXT BOOKS
REFERENCES

OBJECTIVES
Should be conversant with the theoretical principles and experimental procedures for quantitative estimations and hands on experience in using analytical equipments.

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of molar and normal solutions of the following substances - oxalic acid, sodium carbonate, sodium hydroxide, hydrochloric acid.

WATER TESTING
3. Determination of total hardness, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content by Winkler's method.
5. Determination of alkalinity in a water sample.
6. Determination of chloride content of water sample by argentometric method.

ELECTRO CHEMICAL ANALYSIS
7. To find out the strength of given hydrochloric acid by pH meter.
8. Conductometric titration of mixture of acids.
10. Redox titration Iron Vs. dichromate.

PHOTOMETRY
11. To determine the iron content of an unknown solution (1, 10 phenanthroline / Thiocyanate method)
12. To determine sodium and potassium in water

VISCOMETRY

REFERENCE S

Total : 45 Hrs
CSE451 ADVANCED PROGRAMMING LABORATORY
(For all branches other than CSE & IT)

List of Programs
UNIX & C

The following programs are to be executed in Linux environment.
C programs are expected to employ pointers wherever possible.

1. Create a file which contains the student details and perform the following operations.
   a. Display the contents of a file on the screen.
   b. Rename the file
   c. Create a new directory and move the above file into it.
   d. Copy the contents of two files into a third file.

2. Create a file which contains the employee details such as Employee No., Employee Name, Employee Salary, Employee Designation and perform the following operations.
   e. Search for a particular employee.
   f. Create a file containing details of employees with salary greater than 5000 using pipes.

3. List the files and directories created and change the access rights of the employee file as follows.
   g. Only readable
   h. Only writable

4. Write a C program to find the roots of a quadratic equation of the form \( ax^2 + bx + c = 0 \). The roots can be calculated using the formula \( -b \pm \sqrt{b^2-4ac} \).
   \[ \frac{2a}{2a} \]
   Write a function to calculate the roots of the given equation. The function must use three formal parameters to receive the coefficients a, b and c and two pointer parameters to send the roots to the calling function.

5. Write a C program to find the sum of two \((nxn)\) matrices and to print the resultant matrix using pointers.

6. Write a C program to count
   a. No. of characters.
   b. No. of words.
   c. No. of lines / sentences in a given text file.

7. Write a C program that compares two text files and returns 0 if they are identical and 1 if they are not identical.
MATLAB PROGRAMS

8. Matrices – Addition, subtraction, multiplication, Inverse and Determinant of a matrix calculation.
10. Polynomial curve fitting.

Total : 45 Hrs
MEC402 MANUFACTURING TECHNOLOGY LAB – I  
(Common to Mechanical and Automobile Engineering)  

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

1. Facing, plain and step turning  
2. Taper turning using compound rest  
3. Taper turning using taper turning attachment  
4. Single start V thread cutting and knurling  
5. Boring and internal thread cutting  
6. Mould with solid and split patterns  
7. Mould with loose-piece pattern  
8. Mould with Core  
9. Testing of moulding sand – Grain fineness number, Green strength, Permeability  
10. Arc Welding of Lap and T- joints  
11. Gas Welding of a joint  
12. MIG Welding of a joint  
13. Conversion of round rod in to square rod  
14. Conversion of round rod in to hexagonal bolt head  

Total: 45 Hrs
UNIT – I 5hrs

UNIT – II 5hrs
Harmony between body, mind & soul – physical well being – Exercises practical benefits - Benefits of meditations – benefits of Kaya Kalpa – Applying the practices in Life –

UNIT – III 5hrs

Total : 15Hrs
KUMARAGURU COLLEGE OF TECHNOLOGY
(Autonomous Institution Affiliated to Anna University, Chennai)
COIMBATORE – 641049

CURRICULUM
(REGULATIONS 2009)

First to Eighth Semester

B.E. AUTOMOBILE ENGINEERING

Chairman
Board of Studies
### B.E – AUTOMOBILE ENGINEERING

#### SEMESTER - I

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG101</td>
<td>Technical English</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MAT101</td>
<td>Engineering Mathematics – I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PHY101</td>
<td>Engineering Physics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CHY101</td>
<td>Engineering Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MEC101</td>
<td>Engineering Graphics</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CSE101</td>
<td>Programming with ‘C’</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>GHE101</td>
<td>Personal Values -I</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY401</td>
<td>Physics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>MEC401</td>
<td>Engineering Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CSE401</td>
<td>Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 32**  
**TOTAL CREDIT – 24**

#### SEMESTER - II

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG102</td>
<td>English For Pragmatic Usage</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>MAT102</td>
<td>Engineering Mathematics – II</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PHY103</td>
<td>Materials Science</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CHY103</td>
<td>Applied Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MEC102</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC103</td>
<td>Manufacturing Technology-I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHY401</td>
<td>Chemistry Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CSE451</td>
<td>Advanced Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>MEC402</td>
<td>Manufacturing Technology – Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>GHE102</td>
<td>Personal Values -II</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 31**  
**TOTAL CREDIT – 23**
### SEMESTER - III

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 104</td>
<td>Engineering Mathematics – III</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE101</td>
<td>Mechanics of Machines</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC 105</td>
<td>Engineering Thermodynamics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC 106</td>
<td>Fluid Mechanics and Machinery</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC 107</td>
<td>Manufacturing Technology - II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE 102</td>
<td>Automotive Materials and Metallurgy</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**PRACTICAL**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUE 401</td>
<td>Machine Drawing</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>MEC 404</td>
<td>Fluid Mechanics and Machinery Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AUE 402</td>
<td>Manufacturing Technology – II Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>GHE 103</td>
<td>Human Excellence – Family values</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 35**

**TOTAL CREDIT – 28**

### SEMESTER - IV

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 108</td>
<td>Numerical methods</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MEC 109</td>
<td>Strength of Materials</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EEE251</td>
<td>Basics of Electrical and Electronics Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE104</td>
<td>Applied Thermodynamics &amp; Heat Transfer</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE 105</td>
<td>Automotive Chassis</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE106</td>
<td>Automotive Engines</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**PRACTICAL**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MEC 405</td>
<td>a) Strength of Materials Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>b) Metallurgy Laboratory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUE 403</td>
<td>Electrical and Electronics Engineering Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AUE 404</td>
<td>Computer Graphics &amp; Solid Modeling Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>GHE 104</td>
<td>Human Excellence – Professional values</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 33**

**TOTAL CREDIT – 25**

---

Chairman
Board of Studies
### SEMESTER – V

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUE107</td>
<td>Machine Components Design</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE108</td>
<td>Two and Three Wheeler Technology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE109</td>
<td>Automotive Electrical and Electronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE110</td>
<td>Fuels and Lubricants</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE111</td>
<td>Finite Element Analysis</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CHY107</td>
<td>Environmental Science and Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

#### THEORY

<table>
<thead>
<tr>
<th>PRACTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUE405</td>
</tr>
<tr>
<td>AUE406</td>
</tr>
<tr>
<td>AUE407</td>
</tr>
<tr>
<td>AUE408</td>
</tr>
<tr>
<td>GHE 105</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 34**  
**TOTAL CREDIT – 25**

### SEMESTER – VI

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUE112</td>
<td>Vehicle Dynamics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE113</td>
<td>Automotive Transmission</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE114</td>
<td>Engine Design</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE115</td>
<td>Automotive Pollution and Control</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE116</td>
<td>Automotive Advanced systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E1</td>
<td>Elective - I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

#### THEORY

<table>
<thead>
<tr>
<th>PRACTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUE 408</td>
</tr>
<tr>
<td>AUE 409</td>
</tr>
<tr>
<td>ENG 401</td>
</tr>
<tr>
<td>GHE 106</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 31**  
**TOTAL CREDIT – 24**

---

Chairman  
Board of Studies
# SEMESTER – VII

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUE117</td>
<td>Vehicle Dynamics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AUE118</td>
<td>Vehicle Body Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE119</td>
<td>Off Road Vehicles</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GSS103</td>
<td>Total Quality Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E2</td>
<td>Elective - II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E3</td>
<td>Elective - III</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUE 410</td>
<td>Vehicle Dynamics &amp; Simulation Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AUE 411</td>
<td>Vehicle Maintenance &amp; Reconditioning Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AUE 412</td>
<td>Mini project</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>GHE 107</td>
<td>Human Excellence – Global Values</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 29**  
**TOTAL CREDIT – 22**

# SEMESTER – VIII

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E 4</td>
<td>Elective – IV</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E 5</td>
<td>Elective – V</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E 6</td>
<td>Elective – VI</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUE 413</td>
<td>Project work</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

**TOTAL PERIODS – 27**  
**TOTAL CREDIT – 15**

Chairman  
Board of Studies
List of Elective Subjects:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSS102</td>
<td>Principles of Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GSS105</td>
<td>Entrepreneurship Development</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GSS107</td>
<td>Indian Economy</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GSS108</td>
<td>Operations Research</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE120</td>
<td>Automotive air-conditioning</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE121</td>
<td>Alternate fuels and energy systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE122</td>
<td>Automotive safety</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE123</td>
<td>Hydraulics and pneumatics systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE124</td>
<td>Rubber technology for automobiles</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE125</td>
<td>Measurements and metrology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE126</td>
<td>Computer simulation of IC engine processes</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE127</td>
<td>Microprocessor application in automobiles</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE128</td>
<td>Fuel cells technology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE129</td>
<td>Electric and hybrid vehicles</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE130</td>
<td>Automotive Aerodynamics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE131</td>
<td>Robotics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE132</td>
<td>Special Types of Vehicles</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE133</td>
<td>Modern Automobile Accessories</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE134</td>
<td>Microprocessor Based System Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE135</td>
<td>Fundamentals of Nanoscience</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE136</td>
<td>Design of Jigs, Fixtures and Press tools</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE137</td>
<td>Computational Fluid Dynamics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE138</td>
<td>Composite Materials and Structures</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE139</td>
<td>Transport Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE140</td>
<td>Fleet Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AUE141</td>
<td>Automotive Component Manufacturing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
ENG101 TECHNICAL ENGLISH
(Common to all branches of Engineering and Technology)

OBJECTIVES
- To assist learners enhance their technical jargon and to impart knowledge about the application of technical English.
- To familiarize learners with different rhetorical functions of technical syntax
- To inculcate written proficiency in commercial and business context
- To improve the competency of professional writing with special reference to career related situations
- To provide pragmatic exposure to technical correspondence.

UNIT – I FOUNDATIONS OF TECHNICAL COMMUNICATION 5 hrs

UNIT - II TECHNICAL SYNTAX 5hrs

UNIT – III CORRESPONDENCE IN CORPORATE SECTOR 9hrs

UNIT – IV TECHNICAL WRITING 5hrs

UNIT - V GENERAL CORRESPONDENCE 6hrs

L: 30  T: 15  Total : 45 Hrs

Chairman
Board of Studies
TEXT BOOK


REFERENCES

MAT101 ENGINEERING MATHEMATICS I
(Common to All Branches of Engineering & Technology)

OBJECTIVES:
On completion of the course the students are expected
• To know eigen values and eigen vectors and diagonalization of a matrix.
• To understand the concepts of three dimensional geometry including plane, straight line and sphere.
• To know about the geometrical aspects of curvature, evolute and envelope.
• To understand the concepts of partial differentiation, maxima and minima.
• To solve ordinary differential equations of certain types.

UNIT – I     MATRICES         9hrs
Eigen values and eigenvectors of a real matrix – Properties of eigen values and eigenvectors– Cayley - Hamilton theorem (excluding proof) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – II    THREE DIMENSIONAL ANALYTICAL GEOMETRY  9hrs
Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Plane section of a sphere – Orthogonal spheres.

UNIT – III   GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9hrs
Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

UNIT – IV    FUNCTIONS OF SEVERAL VARIABLES                     9hrs

UNIT – V     ORDINARY DIFFERENTIAL EQUATIONS     9hrs
Linear equations of second order with constant coefficients – Euler’s and Legendre’s linear equations - Method of variation of parameters – Simultaneous first order linear equations with constant coefficients.

L: 45, T: 15 Total: 60Hrs

Chairman
Board of Studies
TEXT BOOK


REFERENCES

PHY101 ENGINEERING PHYSICS
(Common to all branches of Engineering and Technology)

OBJECTIVES
At the end of the course the students would be exposed to
- To impart fundamental knowledge in various engineering subjects and applications
- Design of acoustically good buildings
- Structure identification of engineering materials
- Non destructive techniques
- Interferometric techniques in metrology, communication and civil engineering
- Application of quantum physics to optical & electrical phenomena
- Application of lasers in engineering and technology.

UNIT – I ACOUSTICS AND ULTRASONICS  9hrs
Classification of sound characteristics of musical sound, Loudness Weber Fechner law
Decibel, Phon,-Reverberation Reverberation time, Derivation of Sabine s formula for
reverberation time (Rate of Growth and Rate of Decay) Absorption coefficient and its
determination - Factors affecting acoustics of buildings (Optimum reverberation time,
Loudness, Focussing, Echo, Echelon effect, Resonance and Noise) and their remedies.
Ultrasonic production Magnetostriction & piezoelectric methods - Detection Thermal and
Piezoelectric methods, properties, Determination of velocity of ultrasonic waves in liquid
using acoustic grating - Applications SONAR, Measurement of velocity of blood flow &
movement of heart.

UNIT – II CRYSTALLOGRAPHY & NON-DESTRUCTIVE TESTING  9hrs
Space lattice, unit cell, Bravais space lattices, Lattice planes, Miller indices Calculation of
inter planar Distance, number of atoms per unit cell, Atomic radius, coordination number &
packing factor for simple cubic, BCC, FCC and HCP structures NDT methods:  Liquid
penetrant method, Ultrasonic flaw detector, X-ray radiography & fluoroscopy. Thermography

UNIT – III WAVE OPTICS  9hrs
Air wedge (theory and experiment) - testing of flat surfaces - Michelson interferometer,
Types of fringes, Determination of wavelength of monochromatic source and thickness of a
thin transparent sheet - Theory of plane, circularly and elliptically polarized light - quarter
and half wave plates, production and analysis of plane, circularly and elliptically polarized
light - Photo elasticity Birefringence - effect of a stressed model in a plane polariscope
Isoclinic and isochromatic fringes Photo elastic bench

UNIT – IV QUANTUM PHYSICS  9hrs
Planck s quantum theory of black body radiation (Derivations), Photo electric effect -
Compton effect (derivation) and Experimental verification of Compton effect Schr dinger
wave equation Time independent and time dependent equations (derivation), Physical
significance of wave function, particle in a box (in one dimension) electrons in a metal.
UNIT – V LASER & FIBRE OPTICS

Einstein’s coefficients (A & B), Nd-YAG laser, He-Ne laser, CO2 laser, semiconductor laser - Homo-junction and Hetero-junction (only qualitative description) - Applications Material processing, CD-ROM & Holography (Qualitative) Optical fibre- Principle and Propagation of light in optical fibres- Numerical aperture and acceptance angle-types of optical fibres Single and Multimode, step index & graded index fibres Applications - Fibre optics communication system, Fibre optic sensors (Displacement and temperature sensors), Medical endoscope.

L: 45, T: 15 Total: 60Hrs

TEXT BOOK


REFERENCES

CHY101 ENGINEERING CHEMISTRY
(Common to all branches of Engineering and Technology)

OBJECTIVES
- To develop a sound knowledge of theoretical and modern technological aspects of applied chemistry.
- To correlate the theoretical principles with application oriented studies.

UNIT – I ELECTROCHEMISTRY 9hrs
Single electrode potential - standard electrodes (Hydrogen & calomel electrodes) - electrochemical series - Nernst equation and problems. Types of electrodes (Metal-metal ion electrode, metal-metal insoluble salt electrode, glass electrode) - determination of pH using glass electrode - application of emf measurements and problems - reversible and irreversible cell - Galvanic cell - Concentration cells - Kohlrausch law of independent migration of ions and its application - Conductometric titration - Polarization - Over voltage - Decomposition potential.

UNIT – II ENERGY STORING DEVICES 9hrs
Introduction - primary and secondary batteries (dry cells - alkaline batteries, lead acid storage cell, nickel - cadmium cell, lithium battery) - fuel cell (hydrogen and oxygen fuel cell) - photogalvanic cell.

Nuclear Energy Sources
Nuclear fission process - characteristics of nuclear fission - chain reactions - nuclear energy - nuclear reactors (light water nuclear power plant).

UNIT – III THERMODYNAMICS 9hrs
Thermodynamics - thermodynamic processes (isothermal, isobaric, isochoric and adiabatic processes) - internal energy mathematical form of first law – enthalpy - limitation of first law - statement of second law of thermodynamics (Clausius and Kelvin) - definition of entropy - entropy change for a reversible process - entropy change for an isothermal expansion of an ideal gas and problems - definition of free energy and work function - Gibbs Helmholtz equation - applications and problems – Van’t Hoff isotherm and isochore - applications and problems.

UNIT – IV SURFACE CHEMISTRY 9hrs
Adsorption: Types of adsorption - adsorption of gases on solids - adsorption isotherm (Freundlich, Langmuir isotherms) - adsorption of solutes from solutions - applications role of adsorption in catalytic reactions - ion exchange adsorption - basic principles in adsorption chromatography.

UNIT – V SPECTROSCOPY 9hrs
Beer Lambert’s Law - colorimetric analysis - principles, instrumentation (block diagram only) - estimation of concentration of a solution by colorimetry - flame photometry - theory, instrumentation (block diagram only) and application – UV – Visible & IR spectroscopy - principles, instrumentation (block diagram only) and simple applications.

Total: 45Hrs

Chairman
Board of Studies
TEXT BOOK


REFERENCES

MEC101 ENGINEERING GRAPHICS  
(Common to all branches of Engineering and Technology)  

OBJECTIVES  
- To understand the principle of orthographic projection of points, lines, surfaces and solids.  
- To understand the principle of section and development of solids.  
- To understand the principle of Isometric and Perspective projections.  
- To study the principle of free-hand sketching techniques.  

UNIT- I  PLANE CURVES, PROJECTION OF POINTS AND LINES  15hrs  
Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.  
Projections of straight lines located in first quadrant - determination of true length and true inclinations.  

UNIT -II  PROJECTIONS OF SURFACES AND SOLIDS  15hrs  
Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane. Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.  

UNIT- III  SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES  15hrs  
Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.  

UNIT -IV  PICTORIAL PROJECTIONS  15hrs  
Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.  
Perspective projection of prisms and pyramids when its base resting on the ground by vanishing point method.  

UNIT -V  FREE-HAND SKETCHING  15hrs  
Free hand sketching techniques sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning. Sketching pictorial views from given orthographic views.  

L: 30, P: 45 Total: 75Hrs  

TEXT BOOK  
REFERENCES

CSE101 PROGRAMMING WITH ‘C’
(Common to all branches of Engineering & Technology)

OBJECTIVES
- To learn the basic concepts of computing.
- To know the methodology of problem solving.
- To develop skills in programming using C language.

UNIT-I BASIS OF COMPUTERS AND PROGRAMMING LANGUAGES  9hrs
Components of a computer system – Hardware – Software - Problem solving techniques -
Program control structures – Programming paradigms – Programming languages - Generations of
programming languages - Language translators - Features of programming languages.

UNIT II C FUNDAMENTALS  9hrs
Introduction to C – Overview of compilers and interpreters – Structure of a C program –
Programming rules – Executing the program - C declarations – Introduction – C character
set – Delimiters – C key words – Identifiers – Constants – Variables – Rules for defining
variables – Data types – Declaring variables – Initializing variables – Type conversion –
Constant and volatile variables - Operators and Expressions – Introduction – Priority of
operators and their clubbing- Comma and conditional operator- Arithmetic operators-
Relational, Logical and Bitwise operators- Input and Output in C- Introduction –
Formatted and Unformatted functions- Commonly used library functions- Decision
statements – Introduction – if, if-else, nested if-else, break, continue, go to, switch ( ),
nested switch ( ), switch ( ) case and nested if statements - Loop control statements- Introduction-
for loop, nested for loop, while loop, do-while loop, do-while statement with while loop

UNIT III FUNCTIONS AND ARRAYS  9hrs
Functions – Declaration of function and function prototypes-The return statement- Types of functions-Call by value and Call by reference- Function returning more
values- Function as an argument- Function with operators - Function and decision statements-
Function and loop statements- Functions with arrays and pointers- Recursion- Pointer to
function- Storage class – Introduction- Automatic, External, Static and Register variables-
Arrays- Introduction- Array initialization – Definition of array- Characteristic of array-One
dimensional array - Predefined Streams - Two dimensional array - Three or multi-
dimensional arrays – sscanf ( ) and sprintf ( ) functions – Operation with arrays.

UNIT IV STRINGS AND POINTERS  9hrs
Working with strings and Standard functions - Introduction - Declaration and
initialization of string – Display of strings with different formats – String standard functions –
Pointers – Introduction – Features of pointers – Pointer declaration – Arithmetic operations
with pointers – Pointers and arrays – Pointers and two-dimensional arrays – Array of pointers
– Pointers to pointer – Pointers and strings – Void pointers – Dynamic memory allocation –
Dynamic memory allocation – Memory models – Memory allocation functions.
UNIT V STRUCTURE, UNION AND FILES 9hrs


L: 45, T: 15 Total: 60Hrs

TEXT BOOK


REFERENCES

GHE101 PERSONAL VALUES - I  (Common to all branches of Engineering and Technology)

UNIT – I  

UNIT – II  

UNIT- III  

Total: 15Hrs
1. Torsional Pendulum determination of rigidity modulus of wire and moment of inertia of disc.
2. Non Uniform Bending - Young modulus determination
3. Viscosity- Determination of co-efficient of Viscosity of liquid by Poiseuilles flow
4. Lee's disc- Determination of thermal conductivity of a bad conductor
5. Air wedge- Determination of thickness of a thin wire
6. Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer.
7. Determination of specific resistance of given coil of wire – Carey Foster’s Bridge.
8. Spectrometer - Determination of wavelength of Hg source using Grating
10. Determination of Band gap of semiconductor material.

Total: 45Hrs
A. CIVIL ENGINEERING

1. Carpentry
   - Study of carpentry tools
   - Preparation of T joint
   - Preparation of dovetail joint

2. Plumbing
   - Study of pipeline joints
   - Preparation of plumbing line sketches for water supply.

B. MECHANICAL ENGINEERING

1. Fitting
   - Study of fitting tools
   - Preparation of L joint
   - Preparation of square joint

2. Sheet Metal Working
   - Study of sheet metal working tools
   - Preparation of cone and tray

3. Welding
   - Study of arc welding tools and equipment
   - Preparation of butt joint

    21hrs

Group - II (Electrical & Electronics Engineering)

C. ELECTRICAL ENGINEERING PRACTICE

    12hrs

   - Basic household wiring using switches, fuse, indicator-lamp, etc.,
   - Preparation of wiring diagrams.
   - Stair case light wiring.
   - Tube light wiring
   - Study of iron-box, fan with regulator, emergency lamp and microwave oven.

Chairman
Board of Studies
D. ELECTRONIC ENGINEERING PRACTICE 12hrs

List of Experiments

1. Assembling simple electronic component on a small PCB and Testing.
2. Soldering simple electronic circuits and checking continuity.
   - DC and AC voltage measurement
   - DC and AC current measurements.
   - Resistance Measurement.
   - Continuity measurement.
4. Testing of Electronic components
   - Resistors
   - Inductors and capacitors
   - Diodes (resistance in forward bias and reverse bias)
   - Transistors
5. Study of CRO and Function generator
   - Study of Panel Controls
   - Measurement of Amplitude, Frequency, phase difference

Total: 45Hrs
LIST OF EXERCISES

1. Practice sessions on the usage of Office package.
2. To find the biggest of 3 numbers.
3. To find whether the given number is an Armstrong number.
4. To find the roots of a quadratic equation.
5. To sum the individual digits of an integer.
6. To evaluate the sine series and to generate Fibonacci series.
7. To perform matrix operations
   - Calculation of row sum and column sum
   - To find the maximum and minimum number
   - Addition and multiplication
8. To perform string operations.
9. To check whether a given number is prime or not using functions (use all function prototypes)
10. To compare two strings using pointers.
11. Mark sheet processing using files.

Total : 45Hrs
ENG102 ENGLISH FOR PRAGMATIC USAGE
(Common to all branches of Engineering & Technology)

OBJECTIVES
To impart the reading comprehension through interpretative and analytic reading exercises, provide exposure to the learners on drafting letters and filling up several applications, improve the level of competency of public speaking with special reference to academic related situations besides, giving practical exposure to professional and formal speaking.

READING COMPREHENSION
1. Exercises to examine the reading comprehension capacity
2. reading for global understanding
3. Reading for specific information
4. Reading for Reviewing (Books, Articles)

TARGETTED WRITING
5. Writing Applications
   Opening an SB account and filling bank challans for various purposes
   Applying for a Passport
   Filling applications for competitive exams
   Applying for Medical Leave
6. Drafting Job Application Letters
   Writing Resume
7. Writing Statement of Purpose for pursuing higher studies abroad
8. Preparing Notices and Circulars
9. Booking train tickets Online
10. Thematic writing

PUBLIC SPEAKING
11. Appropriate stress and tonal variation
12. Accent neutralization and pronunciation improvement
13. Welcoming a gathering
14. Proposing a Vote of Thanks
15. Compering
16. Presenting one’s perception on the picture given
17. Giving Seminars

KINESTHETICS & FORMAL SPEAKING
18. Assessing body language during presentation
19. Involving in constructive conversation
20. Assigning formal situations to enhance the style of telephonic conversation
21. Discriminating assertive and aggressive conversation
22. Power point presentations

Total: 45Hrs
TEXT BOOK


REFERENCES

MAT102 ENGINEERING MATHEMATICS II  
(Common to CE, AE, ME, MCE, AU, EEE, ECE & EIE branches) 

OBJECTIVES  
On completion of the course the students are expected  
• To understand double and triple integrations and enable them to find area and volume using multiple integrals.  
• To know the basics of vector calculus comprising gradient, divergence and curl and line, surface and volume integrals.  
• To understand analytic function and conformal mappings.  
• To know the basics of residues, complex integration and contour integration.  
• To understand about Laplace transform and its properties and to solve certain linear differential equations using Laplace transform technique.  

UNIT – I MULTIPLE INTEGRALS  
9hrs  
Double integration – Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in cartesian coordinates – Change of variables between cartesian and polar coordinates.  

UNIT – II VECTOR CALCULUS  
9hrs  
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields - Green’s theorem in the plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.  

UNIT – III ANALYTIC FUNCTION  
9hrs  
Functions of a complex variable – Analytic function – Necessary conditions, Cauchy Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping $w = z + c$, $cz$, $1/z$ and bilinear transformation.  

UNIT – IV COMPLEX INTEGRATION  
9hrs  
Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s series expansions – Singularities – Classification – Residues – Cauchy’s residue theorem (excluding proof) – Contour integration – Unit circle and semi-circular contours (excluding poles on real axis).  

UNIT – V LAPLACE TRANSFORM  
9hrs  

L: 45, T: 15 Total: 60Hrs
TEXT BOOK


REFERENCES

PHY103 MATERIALS SCIENCE
(Common to Mechanical, Mechatronics, Aeronautical and Automobile Engineering)

OBJECTIVES
At the end of the course students would be exposed to
- Types of defects in engineering materials and mechanisms of strengthening
- Properties of conducting, super conducting, magnetic and dielectric materials.
- Properties of Semi conducting, optical and new engineering materials.

UNIT – I CONDUCTING MATERIALS 9hrs

UNIT – II SEMI CONDUCTING MATERIALS 9hrs
Origin of band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semiconductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semiconductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

UNIT – III MAGNETIC & DIELECTRIC MATERIALS 9hrs

UNIT – IV NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9hrs
UNIT – V CRYSTAL DEFECTS AND STRENGTHENING OF MATERIALS 9hrs
Crystal imperfection - point defects-line defects - planar defects - bulk-Dislocations-
Edge dislocation Screw dislocation Burger Vector Dislocation climb-slip, twinning –
multiplication of dislocations. Strengthening mechanisms for the improvement of
mechanical properties- cold working precipitation hardening, solute hardening and
diffusion hardening-Fracture-Mechanism of brittle fracture (Griffith’s theory ) and
Ductile fracture - difference between brittle and ductile fracture - fatigue failure and its
prevention - creep different stages in creep curve-Factors affecting mechanical properties
Grain size and heat treatment Mechanical test Tensile, compression, hardness, impact
creep, fatigue and stress.

Total : 45Hrs

TEXT BOOKS
S.Chand & Company Ltd, New Delhi, 2005.
Delhi, 2003.

REFERENCES
Company Limited, New Delhi, 2005
3. Kenneth G. Budinski, Michel K. Budinski, Engineering Materials Properties and
5. Arumugam M, Materials Science 3rd Edition, Anuradha Agencies, Kumbakonam,
2003.
OBJECTIVES
To impart a sound knowledge of theoretical and modern technological aspects of fuels and combustion, specialty materials, water technology, corrosion studies, phase equilibria and powder metallurgy as required for the mechanical and related engineering students.

UNIT- I   FUELS         11hrs
Classification of fuels, coal varieties, analysis of coal – proximate and ultimate analysis - coke manufacture (Otto-Hoffman by product coke oven method) - characteristics of metallurgical coke - cracking - thermal cracking and catalytic (fixed bed & fluidized bed), synthetic petrol – polymerization - thermal - catalytic methods (Fischer Tropsch method, Bergius process), knocking - octane number - antiknock characteristics - diesel - cetane number - gaseous fuels (production composition and uses of producer gas, water gas and natural gas).
**Combustion** - gross and net calorific value - determination of calorific value by bomb colorimeter - explosive range- spontaneous ignition temperature - flue gas analysis (Orsat apparatus).

UNIT- II   MECHANICAL ENGINEERING MATERIALS   11hrs
**Abrasives:** Moh’s scale of hardness - natural abrasives (diamond, corundum, emery, garnets and quartz) - artificial abrasives (silicon carbide, boron carbide).
**Refractories:** characteristics, classification (acid, basic and natural refractories), properties (refractoriness, refactoriness under load, dimensional stability, porosity thermal spalling) - manufacture of refractories (general methods) - preparation, properties and uses of high alumina bricks, magnesite and zirconia bricks only.
**Lubricants:** functions - classification with examples - properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point) - greases (calcium based, sodium based, lithium based only) - solid lubricants (graphite, molybdenum sulphide). **Engineering plastics** - polymer blends and alloys - properties with examples - polyamide, poly carbones polyurethanes and thermocole.

UNIT-III CORROSION SCIENCE      8hrs
Corrosion - principles of electrochemical corrosion difference between chemical and electrochemical corrosion - factors influencing corrosion - types of corrosion - galvanic corrosion, differential aeration corrosion – (soil (microbial) corrosion, pitting corrosion, water line corrosion) - stress corrosion - corrosion control (cathodic protection - sacrificial anode) - Protective Coatings – Paint, Electroplating of Copper.

UNIT- IV  WATER TECHNOLOGY      8hrs
Boiler feed water - requirements - formation of deposits in steam boilers and heat exchangers - disadvantages (wastage of fuel, decrease in efficiency, boiler explosion) - prevention of scale formation - external treatment (ion exchange method) - internal treatment (phosphate, calgon, carbonate, colloidal) - caustic embrittlement - boiler corrosion - priming and foaming - desalination by reverse osmosis – Treatment of Domestic water.
UNIT- V    PHASE RULE
Phase rule - condensed phase rule -construction of phase diagram - thermal analysis -
simple eutectic system (Ag-Pb system only) - applications of phase rule.

POWDER METALLURGY
Preparation of metal powders (mechanical pulverization, atomization, chemical
reduction, electrolytic process, decomposition) - mixing and blending - compacting -
sintering - advantages and limitations of powder metallurgy.

Total: 45Hrs

TEXT BOOKS
2. Dara S.S., A text book of Engineering Chemistry, S. Chand Co. (P) Ltd., New Delhi,
   2003.

REFERENCES
2. Dr.P.S.Syed Shabudeen Chemistry II, Inder publications, Coimbatore 2009(revised
   edition)
3. Derek Pletcher and Frank C Walsh, "Industrial Electrochemistry", Blackie Academic
MEC102  ENGINEERING MECHANICS
(Common To CE, AE, ME, MCE, AU, TXT, FT & BIO branches)

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

OBJECTIVES

- To understand the concept of equilibrium of particles and rigid bodies.
- To understand the concept of first and second moment of area.
- To understand the concept of various types of frictions.
- To understand the principle of work energy method, Newton’s law and impact of elastic bodies.

UNIT -I  BASICS & STATICS OF PARTICLES  12hrs

UNIT- II  EQUILIBRIUM OF RIGID BODIES  12hrs
Moment of a force about point – Varignon’s theorem– Moment of a couple-Resolution of force in to force couple system-Resultant of coplanar non concurrent system - Types of supports and their reactions- Requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions.

UNIT- III  PROPERTIES OF SURFACES AND SOLIDS  12hrs
First moment of area and the Centroid of sections Rectangle, circle, triangle, T section, I section Angle section and Hollow section. Second and product moments of plane area Rectangle, triangle, circle. T Section, I section, Angle section and Hollow section, Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia.

UNIT- IV  FRICTION  12hrs
Frictional force-Law of coloumb friction, simple contact friction, Rolling resistance and Belt friction, Ladder friction, Wedge friction.

UNIT- V  DYNAMICS OF PARTICLES  12hrs
Kinematics: Rectilinear & Curvilinear motion of particles, Displacements Velocity and acceleration.

L: 45, T: 15, Total: 60Hrs

TEXT BOOKS

REFERENCES

MEC103 MANUFACTURING TECHNOLOGY – I
(Common to Mechanical and Automobile Engineering)

OBJECTIVES

- To understand the concept and basic mechanics of metal cutting, sheet metal forming and bulk deforming processes.
- To understand the basic concepts and working of different metal casting and welding processes.

UNIT- I METAL CASTING PROCESSES 9hrs

UNIT- II FABRICATION PROCESS 10hrs

UNIT- III BULK DEFORMATION PROCESSES 9hrs

UNIT -IV SHEET METAL FORMING PROCESSES 8hrs

UNIT- V METAL CUTTING (TURNING) PROCESS 9hrs
Lathe – specifications, types – mechanisms and major Sub-assemblies – operations performed – work holding and supporting devices – working principle of single and multi-spindle automats.

Total : 45Hrs
TEXT BOOKS

REFERENCES
OBJECTIVES
Should be Conversant with the theoretical principles and experimental procedures for quantitative estimations and hands on experience in using analytical equipments.

PREPARATION OF SOLUTIONS (STANDARD)
1. Preparation of molar and normal solutions of the following substances - oxalic acid, sodium carbonate, sodium hydroxide, hydrochloric acid.

WATER TESTING
3. Determination of total hardness, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content by Winkler s method.
5. Determination of alkalinity in a water sample.
6. Determination of chloride content of water sample by argentometric method.

ELECTRO CHEMICAL ANALYSIS
7. To find out the strength of given hydrochloric acid by pH meter.
8. Conductometric titration of mixture of acids.
9. Conductometric precipitation titration using BaCl₂, Na₂SO₄.
10. Redox titration Iron Vs. dichromate.

PHOTOMETRY
11. To determine the iron content of an unknown solution (1, 10 phenanthroline / Thiocyanate method)
12. To determine sodium and potassium in water

VISCOMETRY

Total : 45Hrs

REFERENCE S
CSE451  ADVANCED PROGRAMMING LABORATORY  
(For all branches other than CSE & IT)

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Programs  
UNIX & C

The following programs are to be executed in Linux environment. C programs are expected to employ pointers wherever possible.

1. Create a file which contains the student details and perform the following operations.
   a. Display the contents of a file on the screen.
   b. Rename the file
   c. Create a new directory and move the above file into it.
   d. Copy the contents of two files into a third file.

2. Create a file which contains the employee details such as Employee No., Employee Name, Employee Salary, Employee Designation and perform the following operations.
   e. Search for a particular employee.
   f. Create a file containing details of employees with salary greater than 5000 using pipes.

3. List the files and directories created and change the access rights of the employee file as follows.
   g. Only readable
   h. Only writable

4. Write a C program to find the roots of a quadratic equation of the form \( ax^2 + bx + c = 0 \). The roots can be calculated using the formula \( -b \pm \sqrt{b^2 - 4ac} \).  

Write a function to calculate the roots of the given equation. The function must use three formal parameters to receive the coefficients a, b and c and two pointer parameters to send the roots to the calling function.

5. Write a C program to find the sum of two (nxn) matrices and to print the resultant matrix using pointers.

6. Write a C program to count
   a. No. of characters.
   b. No. of words.
   c. No. of lines / sentences in a given text file.

7. Write a C program that compares two text files and returns 0 if they are identical and 1 if they are not identical.
MATLAB PROGRAMS

8. Matrices – Addition, subtraction, multiplication, Inverse and Determinant of a matrix calculation.
10. Polynomial curve fitting.

Total : 45 Hrs
MEC402  MANUFACTURING TECHNOLOGY LAB – I
(Common to Mechanical and Automobile Engineering)

1. Facing, plain and step turning
2. Taper turning using compound rest
3. Taper turning using taper turning attachment
4. Single start V thread cutting and knurling
5. Boring and internal thread cutting
6. Mould with solid and split patterns
7. Mould with loose-piece pattern
8. Mould with Core
9. Testing of moulding sand – Grain fineness number, Green strength, Permeability
10. Arc Welding of Lap and T- joints
11. Gas Welding of a joint
12. MIG Welding of a joint
13. Conversion of round rod in to square rod
14. Conversion of round rod in to hexagonal bolt head

Total : 45Hrs
GHE102  PERSONAL VALUES - II

UNIT – I  
5hrs
Theory & practice – physical exercises – Completion – Meditation III stage (Thuria
Initiations)

UNIT – II  
5hrs
Harmony between body, mind & soul – physical well being – Exercises practical
benefits - Benefits of meditations – benefits of Kaya Kalpa – Applying the practices in
Life –

UNIT – III  
5hrs
Personal values – Identifications – Adaptations – Implementations – practices & Benefits
– Exercises, Meditation and Kaya Kalpa practices – perceptions.

Total : 15Hrs
SEMESTER - III
MAT104 ENGINEERING MATHEMATICS III  3 1 0 4
(Common for III Semester CE, ME, MCE, EEE, EIE, ECE AUE & AE)

OBJECTIVES

• To impart analytical skills in the areas of boundary value problems and transform techniques.
• To understand the basic concepts of partial differential equations

1. PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of standard types of first order partial differential equations (excluding reducible to standard types) – Lagrange’s linear equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients.

2. FOURIER SERIES

Dirichlet’s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval’s identity – Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation (excluding insulated ends) – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

4. FOURIER TRANSFORM


5. Z –TRANSFORM

Z-transform - Elementary properties – Convolution theorem- Inverse Z – transform (by using partial fractions, residue methods and convolution theorem) - Solution of difference equations using Z - transform.

L : 45 T: 15 Total: 60hrs
TEXT BOOK:

REFERENCES:
OBJECTIVE
To expose the students the different mechanisms, their method of working, Forces involved and consequent vibration during working

1. MECHANISMS


2. FRICTION

Friction in screw and nut – Pivot and collar – Thrust bearing – Plate and disc clutches – Belt (flat and V) and rope drives. Ratio of tensions – Effect of centrifugal and initial tension – Condition for maximum power transmission – Open and crossed belt drive.

3. GEARING AND CAMS

Gear profile and geometry – Nomenclature of spur and helical gears – Gear trains: Simple, compound gear trains and epicyclic gear trains - Determination of speed and torque- Cams – Types of cams – Design of profiles – Knife edged, flat faced and roller ended followers with and without offsets for various types of follower motions.

4. BALANCING

Static and dynamic balancing – Single and several masses in different planes –Balancing of reciprocating masses- primary balancing and concepts of secondary balancing – Single and multi cylinder engines (Inline) – Balancing of radial V engine – direct and reverse crank method.

5. VIBRATION


L: 45 T: 15 Total: 60
TEXT BOOKS

REFERENCES
MEC105 ENGINEERING THERMODYNAMICS  
(Use of standard thermodynamic tables, Mollier diagram, Psychometric chart and Refrigerant property tables are permitted)

OBJECTIVES

• To understand the basic concepts and the applications of thermodynamic laws to various processes.
• To study the formation of steam and steam power cycles.

1. BASIC CONCEPTS AND FIRST LAW

9hrs

Basic concepts - concept of continuum, macroscopic approach: thermodynamic systems - closed, open and isolated: Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – SFEE - Application to closed and open systems

2. SECOND LAW AND CONCEPTS OF ENTROPY

9hrs

Second law of thermodynamics – Kelvin’s and Clausius statements of second law, Reversibility and irreversibility. Carnot cycle, reversed Carnot cycle, efficiency, COP, Carnot theorem. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy – absolute entropy (Descriptive only).

3. FORMATION OF STEAM AND VAPOUR CYCLES

9hrs

Formation of steam constant pressure, types of steam, steam tables and uses, external work done during evaporation, Internal energy of Steam, dryness fraction of steam, entropy of steam – Mollier diagram steam power cycles, standard Rankine cycle, modified Rankine cycle. Reheat and regenerative cycle (Descriptive only).
4. THERMO DYNAMIC RELATIONS

9hrs

General Aspects, fundamentals of partial differentiation, general thermodynamic relations, T-ds relations, equation for I.E. Clausius Clapeyron equations, Joule Thomson Coefficient - T-ds relations, Maxwell relations.

5. PSYCHROMETRY

9hrs


TEXT BOOKS:


REFERENCES:

MEC106 FLUID MECHANICS AND MACHINERY

OBJECTIVES

- To study and understand the properties of fluids.
- To study and understand the working of hydraulic machines.

1. BASIC CONCEPTS AND PROPERTIES

   9hrs

   Fluid – definition, distinction between solid and fluid - Units and dimensions – Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillary and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures.

2. FLUID KINEMATICS AND FLUID DYNAMICS

   9hrs

   Fluid Kinematics - Flow visualization - lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- equation of streamline - stream function - velocity potential - circulation - flow net – fluid dynamics - equations of motion - Euler's equation along a streamline - Bernoulli's equation - Applications – Venturi meter, orifice meter and pitot tube – dimensional analysis - Buckingham's p theorem- applications - similarity laws and models.

3. INCOMPRESSIBLE FLUID FLOW

   9hrs

   Viscous flow - Navier-Stoke's equation (Statement only) - Shear stress, pressure gradient relationship - Laminar flow through circular pipes (Hagen Poiseulle's) - Hydraulic and energy gradient - flow through pipes - Darcy –Weisbach’s equation - pipe roughness - friction factor- Moody's diagram-minor losses - flow through pipes in series and in parallel - power transmission.

4. HYDRAULIC TURBINES

   9hrs

5. HYDRAULIC PUMPS

9hrs


L: 45 T: 15 Total: 60

TEXT BOOKS:

REFERENCES:
MEC107 MANUFACTURING TECHNOLOGY - II 3003

OBJECTIVES

- To study the basic concepts of metal cutting.
- To study the working principle, construction details and applications of lathe, shaping machine, planning machine, drilling machine, broaching machine, grinding machine and milling machine.

1. THEORY OF METAL CUTTING 9hrs


2. LATHE, SHAPING AND PLANING MACHINES 9hrs


3. DRILLING, BROACHING AND GRINDING MACHINES 9hrs


4. MILLING AND GEAR CUTTING MACHINES 9hrs


5. NON-TRADITIONAL MACHINING 9hrs

Classification of machining processes – process selection - Ultrasonic Machining – Abrasive Jet Machining – Laser Beam Machining – EDM –Wire Cut –ECM.

Total: 45hrs

Chairman
Board of Studies
TEXT BOOKS:

REFERENCES:
Objective
To impart knowledge on the structure, properties, treatment, testing and applications of metals and on non-metallic materials so as to identity and select suitable materials for various engineering applications.

1. CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS


2. HEAT TREATMENT


3. NON-METALLIC MATERIALS

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE

4. MECHANICAL PROPERTIES AND TESTING

5. SELECTION OF MATERIALS

Criteria of selecting materials for automotive components viz cylinder block, Cylinder head, piston, piston ring, Gudgeon pin, connecting rod, crank shaft, crank case, cam, cam shaft, engine valve, gear wheel, clutch plate, axle, bearings, chassis, spring, body panel, radiator, brake lining etc.

Total: 45hrs

Text Books

References
AUE401  MACHINE DRAWING

OBJECTIVES

- To study the fits and tolerances.
- To understand the concepts of machine components assemblies.

1. BASIC CONCEPTS OF MACHINE DRAWING

3hrs


2. FASTENERS, JOINTS AND COUPLINGS

4hrs


3. FITS AND TOLERANCES

8hrs

Types of fits – types of tolerance - representation of tolerance on drawings – calculation of minimum and maximum clearances and allowances – Geometrical tolerance – form and position tolerances – symbols – indicating geometrical tolerances on drawings -

4. PRODUCTION DRAWINGS

10hrs

Surface finish, symbols and representing surface finish on drawings, Introduction to selective assembly and interchangeable manufacture, production drawing of piston, piston pin, connecting rod, single cylinder connecting rod.

5. ASSEMBLY OF MACHINE PARTS

35hrs

Plummer block — stop valve, Screw jack — Machine vice — connecting rod and piston assembly, valve train assembly, clutch plate assembly.

Total : 60hrs
TEXT BOOKS:

REFERENCES:
LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of a given Orifice meter.
2. Determination of the Coefficient of discharge of a given Venturi meter.
3. Determination of friction factor for a given set of pipes.
4. Performance Characteristic curves of centrifugal pump
5. Performance Characteristic curves of Gear pump.
6. Performance characteristics of Pelton wheel.
7. Performance characteristics of Francis turbine.

Total : 45
LIST OF EXPERIMENTS

1. Gear cutting – Spur Gear cutting
2. Step milling, Contour profile milling
3. Key way cutting using milling machine
4. Dove tail machining using shaper machine
6. V-block & Step block machining using shaping machine
7. Internal and external keyway machining using vertical slotting machine
8. Drilling, tapping and reaming
9. Cylindrical grinding of a shaft
10. Surface grinding

Total : 45
GHE 103 HUMAN EXCELLENCE – FAMILY VALUES 0 0 2 1
(Common to III Semester all Branches)

1. Family value-meaning – Introduction-values-Blessings for family peace-Restraint in family life- harmony in family-Interactive workshop.
3. Love and compassion – Greatness of womanhood – Food is medicine (healthy food habits)
4. Simple physical exercises.
5. Kayakalpa Yoga
6. Sun Rays Therapy
7. Padmasana.
8. Vajrasana.
9. Chakrasana & Viruchasana
10. Meditation
SEMESTER - IV
MAT108 NUMERICAL METHODS

(3104)

(Common for IV Semester ME, CE, MCE, EEE, AE, TXT, EIE & AUE)

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses in engineering problems.

1. NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

9hrs


2. INTERPOLATION

9hrs

Newton’s forward and backward difference formulas – Stirling’s formula – Divided differences – Newton’s divided difference formula - Lagrange’s interpolation (derivations are excluded for all methods).

3. NUMERICAL DIFFERENTIATION AND INTEGRATION

9hrs


4. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9hrs

5. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

9hrs

Finite difference solution of one dimensional heat equation by Bender Schmidt and Crank Nicholson methods – One dimensional wave equation by explicit method and two dimensional Laplace and Poisson equations.

L : 45 T: 15 Total: 60

TEXT BOOK:

REFERENCES:
MEC 109  STRENGTH OF MATERIALS  3 1 0 4

OBJECTIVES

- To study, stresses, strains and deformation in components
- To study the effect of size and shape on stress and deformation of the components

1. STRESS, STRAIN AND DEFORMATION OF SOLIDS  9hrs


2. BEAMS – LOADS AND STRESSES  9hrs

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow

3. TORSION  9hrs

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section –Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Design of helical coil springs.

4. BEAM DEFLECTION  9hrs

5. ANALYSIS OF STRESSES IN TWO DIMENSIONS

Biaxial state of stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr’s circle for biaxial stresses – Maximum shear stress – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells

L : 45 T : 15 Total : 60

TEXT BOOKS:

REFERENCES:
OBJECTIVES

- To introduce the basic concept of Electrical and Electronics theory
- To introduce the basic working principles of machines
- To introduce the basic working of fundamental Electronics circuits

1. INTRODUCTION


2. ELECTRIC MOTORS:

DC Drives -DC motors, principles of operation, torque equation, speed, torque characteristics of series, shunt and compound motors. Three phase induction motors, principle of operation, torque equation, speed, torque characteristics of series, shunt and compound motors, cage and wound rotor types, single phase induction motors. Principle of operation, method of starting, types of single phase motors. Industrial Applications: Factors to be considered for selection of motors, determination of power rating of drive motors, selection of motors for textile industry. Introduction about recent developments in the textile machinery.

3. ELECTRONIC DEVICES:

Operation of PN junction diodes, VI Characteristics, zener diode, BJT and FET - working principles and characteristics. MOSFET, types, principle of operation and characteristics. Opto Electronic Devices-Introduction, types, photo conductive, photo diode, phototransistor. Light emitting diode - Principles and Applications.
4. **ELECTRONIC CIRCUITS:**
(Qualitative analysis only) Half wave and full wave rectifier, capacitive filters, zener voltage regulator, RC coupled amplifier. Operational amplifiers, ideal op-amps characteristics, inverting and Non-inverting amplifier, difference amplifiers, op-amp applications.  

5. **DIGITAL ELECTRONICS:**
Number systems - binary, octal, hexadecimal, logic gates- AND, OR, NOT, NAND, NOR, EXOR, EXNOR, Half adder, full adder, parallel adder/subtractor, flip flops, RS, JK, JK Master slave, D and T type.  

9hrs

**TEXT BOOKS:**

**REFERENCES:**
AUE104 APPLIED THERMODYNAMICS AND HEAT TRANSFER

1. GAS POWER CYCLES

9hrs
Air standard cycles-Otto-Diesel-Dual-Work output, Efficiency and MEP calculations – comparison of the cycles for same compression ratio and heat addition, same compression ratio and heat rejection, same peak pressure, peak temperature and heat rejection, same peak pressure and heat input, same peak pressure and work output, Brayton cycle with intercooling, reheating and regeneration.

2. RECIPROCATING AIR COMPRESSORS & REFRIGERATION CYCLES

9hrs
Single acting and double acting air compressors, work required, effect of clearance volume, volumetric efficiency, isothermal efficiency, free air delivery, multistage compression, condition for minimum work. Fundamentals of refrigeration, C.O.P., reversed carnot cycle, simple vapour compression refrigeration system, T-S, P-H diagrams, simple vapour absorption refrigeration system, desirable properties of an ideal refrigerant.

3. CONDUCTION

9hrs

4. CONVECTION

10hrs
5. RADIATION

8hrs


L : 45 T : 15 Total : 60

TEXT BOOKS


REFERENCES

AUE 105 AUTOMOTIVE CHASSIS

OBJECTIVE:
Study of the Constructional details and Theory of important drive line, Structural, Steering, Braking and Suspension Systems of Automobiles. Problem–Solving in Steering Mechanism, Propeller Shaft, Braking and Suspension Systems are to be done.

1. INTRODUCTION

9hrs
Types of Chassis layout, with reference to Power Plant location and drive, various types of frames, Loads acting on vehicle frame, Constructional details and materials for frames, Testing of frames, Types of Front Axles and Stub Axles, Front Wheel Geometry, namely, Castor, Camber, King Pin Inclination and Toe–in, Condition for True Rolling Motion of Wheels during Steering, Ackerman’s and Daut’s Steering Mechanisms, Steering Error Curve, Steering Linkages, Different Types of Steering Gears, Slip Angle, Over–Steer and Under–Steer, Reversible and Irreversible Steering, Power–Assisted Steering.

2. DRIVE LINE

9hrs

3. AXLES

9hrs
Construction and Design of Drive Axles, Types of Loads acting on drive axles, Full – Floating, Three–Quarter Floating and Semi–Floating Axles, Axle Housings and Types, Types and Constructional Details of Different Types of Wheels and Rims, Different Types of Tyres and their constructional details.
4. SUSPENSION SYSTEM


5. BRAKING SYSTEM


TOTAL 45hrs

TEXT BOOKS

REFERENCES
AUE106 AUTOMOTIVE ENGINES

OBJECTIVE:
- Study of the Constructional details of automotive engines.
- Study of working of petrol engines and diesel engines.


3. COMBUSTION AND COMBUSTION CHAMBERS: Petrol engines - Ignition limits, stages of combustion, effect of engine variables, knocking and detonation - theory, parameters affecting and control, combustion chamber - different types and design. Diesel engines – Air/Fuel Ratio, stages of combustion, knocking and detonation - theory, parameters affecting and control, combustion chamber - different types.


5. SUPERCHARGING AND TURBOCHARGING: Necessity of supercharging, mechanical supercharging and turbo charging, compressors and turbines for supercharging, degree of supercharging, methods of supercharging, efficiency of supercharged engine.

ENGINE TESTING: Testing and performance characteristics of an engine.

TOTAL 45hrs
TEXT BOOKS:

REFERENCES:
7. Patent No. 20080006251, Internal combustion engine including a gas pressure container assigned to the cylinders, and method for operating the engine.
MEC405  STRENGTH OF MATERIALS AND METALLURGY LAB

OBJECTIVES

- To study and analyze the microstructure of various materials
- To study and test the hardness and wear resistance of materials

LIST OF EXPERIMENTS

STRENGTH OF MATERIALS LAB

1. Tension test on a mild steel rod
2. Torsion test on mild steel rod
3. Hardness test on metals - Brinell and Rockwell Hardness
4. Deflection test on beams
5. Compression test on helical springs
6. Impact Test.

METALLURGY LAB

1. Micro structure study on
   (i) Ferrous Materials
   (ii) Non Ferrous Materials
2. Heat Treatment - Comparison of
   (i) Unhardened specimens
   (ii) Quenched Specimens
   (iii) Quenched and tempered specimens
3. Heat Treatment - Comparison of
   (i) Un hardened
   (ii) Hardened specimens
4. Microstructure examination of
   (i) Hardened samples
   (ii) Hardened and tempered samples.

Total: 45hrs
LIST OF EXPERIMENTS
1. Verification of Ohm’s law and Kirchhoff’s laws.
2. Load test on DC shunt and compound motor.
3. Load test on DC series motor.
4. Load test on induction motor (single-phase & three-phase)
5. Load test of servo and stepper motor.
6. Study of half wave and full wave rectifiers.
7. RC coupled transistor amplifier.
8. Applications of operational amplifier.
9. Study of logic gates and implementation of Boolean functions.
10. Implementation of binary adder/ subtractor.

REFERENCE:
OBJECTIVES

- To learn the wire frame, surface and soil modeling techniques using CAD Software.
- To model and study the machine elements using CAD Software.

LIST OF EXPERIMENTS

1. 3D Part modeling – protrusion, cut, sweep, draft, loft, blend, rib
2. Editing – Move, Pattern, Mirror, Round, Chamfer
3. Assembly – creating assembly from parts – assembly constraints
4. Conversion of 3D solid model to 2D drawing – different views, sections, isometric view and dimensioning
5. Introduction to Surface Modeling
6. 3D Modeling of machine elements like universal coupling, piston connecting rod assembly, Plummer block, screw jack, etc.
GHE 104 HUMAN EXCELLENCE – PROFESSIONAL VALUES

(Common to IV Semester all Branches)

1. Personality – Concepts, definitions - 5 C’s and 5 E’s – Self development – Leadership Traits – IQ, EQ, SQ.
4. Simplified physical exercises.
5. Yoga Mudra.
6. Pachi Motasana.
7. Ustrasana.
8. Vakkarasana.
10. Meditation
SEMESTER V
AIM:
This course gives a complete procedure for designing different kinds of problems occurring in design engineering field especially in automobile engineering.

OBJECTIVES
- To familiarize the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
- To learn to use standard practices and standard data
- To learn to use catalogues and standard machine components

UNIT –I INTRODUCTION 10hrs
Classification of design - Engineering materials and their physical properties as applied to design - Selection of materials - Factors of safety in design – Endurance limit of materials - Determination of endurance limit for ductile materials

UNIT –II DESIGN OF SHAFTS AND SPRINGS 9 hrs
Introduction - Material and design stresses - Design of axles - Design of shafts on the basis of strength - Design of shaft on the basis of rigidity - Design of hollow shafts - Design of close coiled helical spring subjected to axial loading - Torsion of helical springs.

UNIT –III GEAR DESIGN 9 hrs

UNIT –IV FLYWHEELS 8 hrs
Determination of the mass of a flywheel for a given co-efficient of speed fluctuation. Engine flywheels stresses of rim of flywheels. Design of hubs and arms of flywheel - Turning moment diagram.

UNIT –V DESIGN OF BEARINGS 9 hrs
Design of journal bearings - Ball and Roller bearings - Types of Roller bearings - Bearing life - Static load capacity - Dynamic load capacity - Bearing material - Boundary lubrication - Oil flow and temperature rise.

L: 45 T: 15 Total 60 Hrs

Text Book

Reference book
AUE108-TWO AND THREE WHEELER TECHNOLOGY

OBJECTIVES
The aim of this course is to make the students to know and understand the constructional details operating characteristics and vehicle design aspects

UNIT –I THE POWER UNIT 9 hrs

UNIT –II CHASSIS AND SUB-SYSTEMS 8 hrs
Main frame, its types. Chassis and shaft drive. Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension systems. Shock absorbers. Panel meters and controls on handle bar.

UNIT –III BRAKES AND WHEELS 8 hrs

UNIT –IV TWO WHEELERS 10hrs
Case study of motor cycles, scooters and mopeds. Servicing and maintenance.

UNIT –V THREE WHEELERS 10hrs
Case study of Auto rickshaws, Pick up van, Delivery van and Trailer. Servicing and maintenance.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
OBJECTIVES
To impart knowledge to the students in the principles of operation and constructional details of various Automotive Electrical and Electronic Systems like Batteries, Starting System, Charging System, Ignition System, Lighting System and Dash–Board Instruments.

UNIT –I TYPES OF BATTERIES 9 hrs
Principle and construction of Lead Acid Battery, Nickel – Cadmium Battery, Nickel Metal, Hybrid Battery, Sodium Sulphur Battery and Aluminum Air Battery, Characteristics of Battery, Battery Rating, Capacity and Efficiency, Various Tests on Battery, Battery– Charging Techniques, Maintenance of batteries.

UNIT –II ELECTRICAL COMPONENTS 9 hrs
Requirements of Starter Motor, Starter Motor types, construction and characteristics, Starter drive mechanisms, Starter Switches and Solenoids, Charging system components, Generators and Alternators, types, construction and Characteristics, Voltage and Current Regulation, Cut –out relays and regulators, Charging circuits for D.C. Generator, A.C. Single Phase and Three – Phase Alternators.

UNIT –III IGNITION SYSTEMS 9 hrs

UNIT –IV ELECTRICAL AND ELECTRONIC IGNITION SYSTEMS 9hrs

UNIT –V WIRING, LIGHTING AND OTHER INSTRUMENTS AND SENSORS 9hrs

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
OBJECTIVES
To understand the source of automotive fuels and lubricants, their basic properties, determination of air requirement for the combustion of fuels and basic theory of lubrication.

UNIT –I MANUFACTURE OF FUELS AND LUBRICANTS 9 hrs
Fuels, Structure of petroleum, refining process, thermal and catalytic cracking, products of refining process, manufacture of lubricating oil base stocks and finished automotive lubricants.

UNIT –II FUELS FOR I.C. ENGINES 9 hrs
Types of Fuels, Liquid and gaseous fuels, heating value of fuels, higher and lower heating values, chemical structure of hydro-carbons SI Engine fuels, Volatility characteristics, desirable characteristics of SI Engine fuels, knock rating and additives, alternate fuels for SI engines. CI engine fuels, desirable characteristics, cetane rating, alternate fuels for CI engines, biodiesels.

UNIT –III COMBUSTION OF FUELS 9 hrs
Stoichiometry - calculation of theoretically correct air required for combustion of liquid and gaseous fuels, volumetric and gravimetric analysis of the dry products of combustion, mass of dry gas per kg of fuel burnt, mass of carbon in the exhaust gas, mass of carbon burnt to carbon-monoxide per kg of fuel, heat loss due to incomplete combustion, exhaust gas analysis by Orsat apparatus.

UNIT –IV THEORY OF LUBRICATION 9 hrs
Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, Hydrostatic lubrication bearing lubrication, functions of the lubrication system.

UNIT –V LUBRICANTS 9 hrs
Specific requirements for automotive lubricants, oxidation deterioration and degradation of lubricants, additives and additive mechanism, synthetic lubricants, classification of lubricating oils, properties of lubricating oils, tests on lubricants. Grease, classification, properties, testing of grease.

L: 45  T: 0  Total  45 Hrs

Text Book

Reference book
AUE 111- FINITE ELEMENT ANALYSIS

OBJECTIVES
- To understand the principles involved in discretization and finite element approach
- To learn to form stiffness matrices and force vectors for simple elements

UNIT –I INTRODUCTION 8 hrs
Historical background – Relevance of FEA to design problems, Application to the continuum –
Discretisation – Matrix approach, Matrix algebra – Gaussian elimination – Governing equations
for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method,
Galerkin method

UNIT –II ONE DIMENSIONAL PROBLEMS 12hrs
Finite element modeling – Coordinates and shape functions – Potential energy approach –
Element matrices and vectors – Assembly for global equations – Boundary conditions –
Higher order elements - Shapes functions – Applications to axial loadings of rods – Extension to plane
trusses – Bending of beams – Finite element formulation of stiffness matrix and load vectors –
Assembly to Global equations –boundary conditions – Solutions and Post processing - Example
Problems.

UNIT –III TWO DIMENSIONAL PROBLEMS – SCALAR VARIABLE 6 hrs
PROBLEMS
Finite element modeling – CST element – Element equations, Load vectors and boundary conditions – Assembly – Application to heat transfer - Examples

UNIT –IV TWO DIMENSIONAL PROBLEMS – VECTOR VARIABLE 10hrs
PROBLEMS

UNIT –V ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL PROBLEMS 9 hrs

L: 45 T: 15 Total 60 Hrs

Text Book

Reference book
OBJECTIVES
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.

UNIT –I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10hrs
Tool Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT –II ECOSYSTEMS AND BIODIVERSITY 14hrs

UNIT –III ENVIRONMENTAL POLLUTION 8 hrs
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 – Soil 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 –IV SOCIAL ISSUES AND THE ENVIRONMENT 7hrs
From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and

UNIT – V HUMAN POPULATION AND THE ENVIRONMENT 6hrs

Field Work
Visit to local area to document environmental assets- river / grassland / hill / mountain, visit to local polluted site- urban / rural / industrial / agricultural, study of common plants, insects, birds, study of simple ecosystems-pond, river, hill slopes etc.,

L: 45 T: 0 Total 45 Hrs

Text Book

References
1. Bharucha Erach, the Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India., 2002
LIST OF EXPERIMENTS

2. Study of Octane and Cetane Number of fuels.
3. Testing of fuels - Ultimate analysis, proximate analysis
4. ASTM distillation test of liquid fuels
5. Aniline Point test of diesel
7. Calorific value of gaseous fuel.
8. Reid vapour pressure test.
10. Copper strip Corrosion Test
11. Cloud & Pour point Test.
13. Viscosity Index of lubricants & Fuels by Saybolt Viscometer
14. Ash content and Carbon Residue Test
15. Drop point of grease and mechanical penetration in grease.

Total : 45 Hrs
AUE 406 AUTOMOTIVE ELECTRICAL & ELECTRONICS LAB

LIST OF EXPERIMENTS

AUTOMOTIVE ELECTRICAL LABORATORY

1. Testing of batteries and battery maintenance
2. Testing of starting motors and generators
3. Testing of regulators and cut – outs
4. Diagnosis of ignition system faults
5. Study of Automobile electrical wiring

AUTOMOTIVE ELECTRONICS LABORATORY

1. Study of rectifiers and filters
2. Study of logic gates, adder and flip-flops
3. Study of SCR and IC timer
4. Interfacing Sensors like RTD, LVDT, Load Cell etc.
5. Interfacing ADC for Data Acquisition
6. Interfacing DAC for Control Application
7. Interfacing A/D converter and simple data acquisition
8. Micro Processor programming and interfacing

Total : 45 Hrs

Chairman
Board of Studies
LIST OF EXPERIMENTS

AUTOMOTIVE CHASSIS LABORATORY

Study and measurement of the following chassis frames

1. Heavy duty vehicle frame
2. Light duty vehicle frame

Study, dismantling and assembling of

3. Front Axle
4. Rear Axle
5. Differential
6. Steering systems along with any two types of steering gear box

Study, Dismantling and Assembling of

8. Clutch assembly of different types
9. Gear Box

ENGINE COMPONENTS AND ASSEMBLY LABORATORY

1. Dismantling of 4 cylinder petrol engine.
3. Dismantling of 6 cylinder diesel engine.
5. Study of oil filter, fuel filter, fuel injection system, carburetor, MPFI
6. Study of ignition system components – coil, magneto and electronic ignition systems.
7. Study of engine cooling system components
8. Study of engine lubrication system components
9. Ovality and taper measurement of cylinder bore and comparison with standard specifications
10. Ovality and taper measurement of engine crank shaft and comparison with standard specification

Total : 45 Hrs
AUE 408- AUTOMOTIVE DESIGN AND ANALYSIS
LABORATORY

LIST OF EXPERIMENTS
1. Study of different commercial FEA tools used for design and analysis
2. Stress analysis of Crankshaft
3. Stress analysis of a plate with circular plate
4. Stress analysis of a rectangular L Bracket
5. Thermal analysis of cylinder liners
6. Stress analysis of leaf spring
7. Design and analysis of torsion bar
8. Stress analysis of composite body panels
9. Design and analysis of piston crown
10. Design and analysis of chassis frames

Total : 45 Hrs
1. Evolution of man – Man in society.
2. Duties and Responsibilities, Duty to self, family, society and the world.
3. Disparity among human beings.
6. Impact of science in society - social development & society upliftments by science.
8. Central message of Religions.
9. Yogasanas-I
10. Meditation-II.[Thuriatheetham]
SEMESTER VI

Chairman
Board of Studies
AUE112- CHASSIS DESIGN

OBJECTIVES
At the end of the course the student will be able to understand the fundamental principles involved in design of components of automotive chassis, the complete design exercise and arrive at important dimensions of chassis components.

UNIT –I VEHICLE FRAME AND SUSPENSION 9 hrs
Study of loads-moments and stresses on frame members. Design Of frame for passenger and commercial vehicle - Design of leaf Springs-Coil springs and torsion bar springs.

UNIT –II FRONT AXLE AND STEERING SYSTEMS 9 hrs

UNIT –III CLUTCH 9 hrs
Design of single plate clutch, multiplate clutch and cone clutch. Torque capacity of clutch. Design of clutch components, Design details of roller and sprag type of clutches.

UNIT –IV GEAR BOX 9 hrs
Gear train calculations, layout of gearboxes. Calculation of bearing loads and selection of bearings. Design of three speed and four speed gearboxes.

UNIT –V DRIVE LINE AND REAR AXLE 9 hrs
Design of propeller shaft. Design details of final drive gearing. Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings and design aspects of final drive.

L: 45 T: 15 Total 60 Hrs

Text Book

Reference book
AUE 113-AUTOMOTIVE TRANSMISSION

OBJECTIVES
The main objective of this course is to impart knowledge in automotive transmission. The detailed concept, construction and principle of operation of various types of mechanical transmission components, hydrodynamic devices, hydrostatic devices and automatic transmission system will be taught to the students. The design of clutch and gearbox will all so be introduce to the students. At the end of the course the students will have command over automotive transmission concepts and application.

UNIT –I CLUTCH AND GEAR BOX 9 hrs
Problems on performance of automobile - such as resistance to motion, tractive effort, engine speed, engine power and acceleration. Requirement of transmission system. Different types of clutches, principle, Construction and torque capacity. Determination of gear ratios for vehicles. Different types of gearboxes such as Sliding mesh gearbox, Constant mesh gearbox and Synchronmesh gearbox.

UNIT –II HYDRODYNAMIC DRIVE 9 hrs

UNIT –III PLANETARY GEAR BOXES 9 hrs

UNIT –IV AUTOMATIC TRANSMISSION APPLICATIONS 9 hrs

UNIT –V HYDROSTATIC AND ELECTRIC DRIVE 9 hrs

L: 45, T: 0

Total 45 Hrs

Text Book

Reference book
AUE 114-ENGINE DESIGN

OBJECTIVES
To make the students understand the design concept and principles of various engine components. These concepts and principles are familiarized for design of components.

Note: (Use of PSG Design Data Book is permitted in the University examination)

UNIT –I INTRODUCTION 9 hrs
Determination of engine power, Engine selection, swept volume, stroke, bore & no. of cylinders, Arrangement of cylinders stroke to bore ratio. Design procedure of theoretical analysis, Design considerations

UNIT –II DESIGN OF CYLINDER, PISTON AND CONNECTING ROD 9 hrs
Choice of material for cylinder and piston, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly. Material for connecting rod, determining minimum length of connecting rod, small end design, shank design, design of big end cap bolts.

UNIT –III DESIGN OF CRANKSHAFT 9 hrs
Balancing of I.C. engines, significance of firing order. Material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations, development of short and long crank arms. Front and rear-end details.

UNIT –IV DESIGN OF COOLING AND LUBRICATION SYSTEM 9 hrs

UNIT –V DESIGN OF VALVES AND VALVE TRAIN 9 hrs

L: 45 T: 15 Total 60 Hrs

Text Book
1. Engine Design – Giles J. G., Lliffe Book Ltd.
2. Engine Design – Crouse, Tata McGraw Publication, Delhi

Reference book
5. I.C. Engine – Litchy
6. SAE Handbooks
AUE 115-AUTOMOTIVE POLLUTION AND CONTROL

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

OBJECTIVES
To make the students to realize the impact of automobile emissions on the environment and expose student to factors affecting the formation and control of automobile pollutants.

UNIT –I INTRODUCTION 9 hrs
Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT –II POLLUTANT FORMATION IN SI ENGINES 9 hrs
Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

UNIT –III POLLUTANT FORMATION IN CI ENGINES 9 hrs
Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions. Nox formation and control. Color and Aldehyde emissions Noise pollution from automobiles, measurement and standards.

UNIT –IV CONTROL OF EMISSIONS FROM SI AND CI ENGINES 9 hrs
Design of engine, optimum selection of operating variables for control of emissions, EGR, Air injector PCV system, Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fuel cells, Two stroke engine pollution control.

UNIT –V MEASUREMENT TECHNIQUES EMISSION STANDARDS AND TEST PROCEDURE 9 hrs
NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles – USA, Japan, Euro and India. Test procedures – ECE, FTP Tests. SHED Test – chassis dynamometers, dilution tunnels.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference Book
OBJECTIVES
To understand the electronic advancements achieved in the field of automobile technology

UNIT –I  Computer Control Systems  9 hrs
Introduction to modern automotive systems and need for electronics in automobiles, Components for electronic engine management. Application areas of electronics in the automobiles, Sensors and actuators.

UNIT –II  Infotainment Systems  9 hrs
Global positioning systems, geographical information systems, navigation systems, automotive vision system, lane departure warning system, driver assistance systems such as power seats, Power windows, and Remote keyless entry systems.

UNIT –III  Electronic fuel injection & ignition system  9hrs
Introduction, feedback carburetor system, throttle body injection, advanced GDI and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, types of solid state ignition system and their principles of operation, electronic spark timing control.

UNIT –IV  Braking and Electronic Stability Control  9hrs
Vehicle motion control, collision avoidance control – cruise control, Adaptive cruise control, Electronic transmission control. Vehicle stabilization system -Antilock braking system, Traction control system, Anti slip regulation, Electronic stability program. On-board diagnosis system.

UNIT –V  Passive safety systems  9 hrs
Air bags and seat belt pretensioner systems: Sensor functions, Distributed front air bag sensing systems, Single-point sensing systems, Side-impact sensing – driver monitoring systems.

L:  45  T:  0  Total  45 Hrs

Text Book

Reference book
1. Telematics Communication Technologies and Vehicular Networks: Wireless Architectures and Applications-Chung-Ming Huang, National Cheng Kung University, Taiwan; Yuh-Shyan Chen, National Taipei University, Taiwan-ISBN: 978-1-60566-840-6
2. Active Safety and the Mobility Industry -Dr. Andrew Brown, Jr.-SAE International

Chairman
Board of Studies
ENGINE DESIGN LABORATORY
List of Experiments:
1. Design and drawing of piston, Piston pin and piston rings and drawing of these components.
2. Design of connecting rod small end and big end, shank design, design of big end cap, bolts and drawing of the connecting rod assembly.
3. Design of crankshaft, balancing weight calculations.
4. Development of short and long crank arms, front end and rear end details, drawing of the crankshaft assembly.
5. Design and drawing of the inlet and exhaust valves.
6. Design of cam and camshaft, cam profile generation, drawing of cam and camshaft.

CHASSIS DESIGN LABORATORY
List of Experiments:
7. CLUTCH
   a) Complete design of clutch components.
   b) Assembly drawing of clutch using drafting software.
8. GEAR BOX
   a) Gear train calculations.
   b) Layout of gear box.
   c) Calculation of bearing loads
   d) Selection of bearings.
   e) Assembly drawing of gear box using drafting software.
9. DRIVE LINE AND REAR AXLE
   a) Design of propeller shaft.
   b) Design details of final drive gearing.
   c) Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings
   d) Design aspects of final drive.

Total: 45 Hrs
ENGINE PERFORMANCE AND EMISSION TESTING LABORATORY

LIST OF EXPERIMENTS

1. Study and use of IC engine testing Dynamometers.
2. Study of 2 and 4 wheeler chassis Dynamometers.
3. Study and use of Pressure pickups, charge amplifier, storage oscilloscope and signal analysers used for IC engine testing.
4. Performance study of petrol engine at full throttle and part throttle conditions.
5. Performance study of diesel engine both at full load and part load conditions.
6. Morse test on petrol and diesel engines.
7. Determination of compression ratio, volumetric efficiency and optimum cooling water flow rate in IC engines.
8. Head balance test on a Automotive diesel engine.
10. Testing of 2 and 4 wheelers using chassis dynamometers.
11. Study of NDIR Gas Analyser and FID.
12. Study of Chemiluminescent NOx analyzer.
14. Diesel smoke measurement.

Total : 45 Hrs
Globalization has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the Industry environment, thus rendering them as prospective assets to Industries. The course will equip the student with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES
* To equip students of engineering and technology with effective speaking and listening skills in English.
* To help them develop their soft skills and people skills, which will make the transition from college to workplace smoother and help them to excel in their jobs.
* To enhance students’ performance at Placement Interviews, Group discussions and other recruitment exercises.

PC based session (Weightage - 40%) 24 periods
A. English Language Lab (18 Periods)
1. **Listening Comprehension** 6hrs
   Listening – Listening and sequencing of sentences – Filling in the Blanks – Listening and answering the question
2. **Reading Comprehension and Vocabulary** 6hrs
   Filling in the blanks – Cloze Exercises – Vocabulary building – Reading and Answering questions
3. **Speaking: (6)**
   **Phonetics:**
   Intonation – Ear Training – Correct Pronunciation – Sound Recognition exercises – Common Errors in English
Conversations:
Face to face Conversation – Telephone conversation - Role play Activities (Students take on roles and engage in conversation) B. Career Lab (6 Periods)

(Samples are available to learn and practice in the class room session)

1. Resume / Report Preparation / Letter Writing (1)
   Structuring the resume / report – Letter writing / E-mail communication – Samples

2. Presentation Skills (1)
   Elements of an effective presentation – Structure of a presentation – Presentation Tools – Voice Modulation – Audience analysis – Body Language

3. Soft Skills (2)
   Time Management – Articulateness – Assertiveness – Innovation and Creativity – Stress Management & Poise

4. Group Discussion (1)
   Why is GD part of selection process? – Structure of a GD- Moderator-led and Other GDs – Strategies in GD – team work – Body Language –Mock GD

5. Interview Skills
   Kinds of Interviews – Required Key Skills – Corporate culture- Mock Interviews

II. Class Room Session (weightage-60%) 24 periods

1. Resume / Report Preparation / Letter writing:
   Students prepare their own resume and report. (2)

2. Presentation Skills: Students make presentations on given topics. (8)

3. Group Discussion: Students participate in group discussions (8)

4. Interview Skills: Students participate in Mock Interviews. (8)

   Note: Classroom sessions are practice sessions

REFERENCES BOOKS:
5. Customize yourself to corporate life Dr. K. Devadoss & P. Malathy Inder

CD’s
2. BEC Series.
3. Look Ahead by Cambridge University Press.
The objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems.

GUIDELINES:

1. Selection of a topic or project title in consultation with a staff member.
2. Develop a project planning strategy.
3. If it is an industry – sponsored project, a concurrent letter from industry is required.
4. A maximum of 4 students per group will do the project.
5. The project may be done in one of the labs under the supervision of a guide or in the selected industry.
6. At the end of the project, a report will be written and a technical presentation along with demonstration will be made by the students.
7. The report, project demonstration and technical presentation will be evaluated by the internal and external examiners.

TOTAL: 45Hrs
2. Emerging India-its glory today- Global perspective-other view about India.
3. Indian culture and its greatness.
4. India and Peace.
5. India and Spirituality- Great spiritual leaders.
6. India’s message to the world – its role in global peace.
7. Service and sacrifice-Unity in diversity – case studies-live examples.
9. Yogasanas -II.
10. Meditation III. [Nithyanandam& Nine Centre Meditation]
SEMESTER VII
AUE 117- VEHICLE DYNAMICS

OBJECTIVES
When the vehicle is at dynamic condition more vibration will be produced. It is essential to study about vibrations and how to reduce the vibration under different loads, speed and road conditions in order to improve the comfort for the passengers and life of the various components of the vehicle. In this subject these aspects have been given.

UNIT –I INTRODUCTION
Fundamentals of vibration, single degree of freedom, two degree of freedom, multidegree freedom, free, forced and damped vibrations, modeling and simulation studies, model of an automobile, magnification factor, transmissibility, vibration absorber.

UNIT –II STABILITY OF VEHICLES
Load distribution, calculation of acceleration, tractive effort and reactions for different drives, stability of a vehicle on a curved track, slope and a banked road.

UNIT –III MULTI DEGREE FREEDOM SYSTEMS
Closed and far coupled system, eigen value problems, orthogonality of mode shapes, modal analysis, forced vibration by matrix inversion.

UNIT –IV SUSPENSION, TYRES AND VEHICLE HANDLING
Requirements, sprung mass frequency, wheel hop, wheel wobble, wheel shimmy, choice of suspension spring rate, calculation of effective spring rate, vehicle suspension in fore and aft, roll axis and vehicle under the action of side forces, tyre, dynamics, ride characteristics power consumed by a tyre. Oversteer, under steer, steady state cornering, effect of braking, driving torques on steering, effect of camber, transient effects in cornering.

UNIT –V NUMERICAL METHODS
Approximate methods for determining fundamental frequency, Dunkerleys lower bound, Rayleighs upper bound, Holzer method for closed coupled system and branched systems.

L: 45 T: 15 Total 60 Hrs

Text Book

Reference book
AUE118-VEHICLE BODY ENGINEERING

L | T | P | C
3 | 0 | 0 | 3

OBJECTIVES
At the end of the course, the students will be able to have a sound knowledge for the design of the vehicles body to give maximum comfort for the passengers and exposed to the methods of stream lining the vehicles bodt to minimize drug.

UNIT –I CAR BODY DETAILS 9 hrs

UNIT –II VEHICLE AERODYNAMICS 9 hrs
To make the students understand the design concept and principles of various engine components. These concepts and principles are familiarized for design of components.

UNIT –III BUS BODY DETAILS 9 hrs
Types: Mini bus, single decker, double decker, two level, split level and articulated bus – Bus body lay out – Constructional details: Types of metal sections used – Regulations – Conventional and integral type construction.

UNIT –IV COMMERCIAL VEHICLE DETAILS 9 hrs
Different types of commercial vehicle bodies – Light commercial vehicle body types – Construction details of flat platform body, Tipper body & Tanker body – Dimensions of driver’s seat in relation to controls – Drivers cab design.

UNIT –V BODY MATERIALS, TRIM AND MECHANISMS 9 hrs

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
AUE119 OFF ROAD VEHICLES

OBJECTIVES
At the end of the course, the students will be able to understand the various Off road vehicle and their systems and feature.

UNIT – I CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES
Construction layout, capacity and applications. Power Plants, Chassis and Transmission, Multiaxle vehicles.

UNIT – II EARTH MOVING MACHINES
Earthmovers like dumpers, loaders - single bucket, Multi bucket and rotary types - bulldozers, excavators, backhoe loaders, scrappers, drag and self powered types, Bush cutters, stumpers, tree dozer, rippers etc. – Power and capacity of earth moving machines.

UNIT – III SCRAPPERS, GRADERS, SHOVELS AND DITCHERS

UNIT – IV FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES
Power take off, special implements. Special features and constructional details of tankers, gun carriers and transport vehicles.

UNIT – V VEHICLE SYSTEMS, FEATURES

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book

Chairman
Board of Studies
List of Experiments:

1. Study on automotive systems simulation
2. Simulation and analysis of Rigid Axle Suspension system
3. Simulation and analysis of Independent Suspension system
4. Simulation and analysis of hydraulic brake system
5. Simulation and analysis of air brake system
6. Simulation of steady state cornering characteristics of vehicle
7. Modeling of tires and analysis of cornering characteristics
8. Roll stability and Rollover threshold analysis
9. Simulation of a half car model for pitch and bounce
10. Simulation of Quarter car model for sprung mass response for road inputs

Total: 45 Hrs
AUE 411 VEHICLE MAINTENANCE & RECONDITIONING
LABORATORY

List of Experiments:
1. Study and Layout of Automobile Repair Shop.
2. Study and Preparation of Workshop Statements.
3. Minor and Major Tuning of Diesel and Petrol Engines.
4. Fault Diagnosis of Ignition, Starting and Charging System.
5. Fault Diagnosis of Petrol and Diesel Fuel System and Filters & Air Cleaners.
6. Hand Brake and Steering Wheel.
8. Removal of Tyre & Tube.
11. Adjustment of Head Lights.
13. Valve grinding, valve lapping. Setting the valve angle and checking for valve leakage
14. Calibration of fuel injection pump
15. Wheel alignment – Testing of camber, caster.

Total : 45 Hrs
5. Emergence of monoculture – solution.
7. Economic marginalization and solution – it’s impact in the globe.
8. Man is the cause and man is the solution.
9. All Meditations.
10. All Yogasanas.
ELECTIVES
OBJECTIVES
1. To study the importance and functions of management in an organization
2. To study the importance of planning and also the different types of plan
3. To understand the different types of organization structure in management
4. To understand the basis and importance of directing and controlling in management
5. To understand the importance of corporate governance and social responsibility.

UNIT –I MANAGEMENT CONTEXT 9 hrs
Evolution of Classical, Behavioral and Contemporary management thoughts.

UNIT –II PLANNING 9 hrs
Forecasting – Purpose – Steps and techniques. Decision-making – Steps in decision making

UNIT –III ORGANISING 9 hrs

UNIT –IV DIRECTING & CONTROLLING 9hrs
Nature & Purpose – Manager Vs. Leader - Motivation - Theories and Techniques of Motivation.
Leadership – Styles and theories of Leadership.

UNIT –V CONTEMPORARY ISSUES IN MANAGEMENT 9hrs
Corporate Governance Social responsibilities – Ethics in business – Recent issues.

L: 45  T: 0  Total 45 Hrs

Text Book

REFERENCES

Chairman
Board of Studies
**OBJECTIVES**
1. To study the factors affecting Entrepreneurship growth and their problems.
2. To understand the importance of Entrepreneurial Development programmes.
3. To study the projects identification, selection and formulation.
4. To understand the role of government in entrepreneurial development.
5. To understand the basis of intellectual property rights in India.

**UNIT –I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**

**UNIT –II ECOSYSTEMS AND BIODIVERSITY**
Entrepreneurial promotion: Motivation: Theories and factors – Entrepreneurial development programmes – need, objectives, phases and evaluation - Training and developing - occupational mobility - factors in mobility - Role of consultancy organizations is promoting entrepreneurs.

**UNIT –III ENVIRONMENTAL POLLUTION**

**UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT**

**UNIT –V HUMAN POPULATION AND THE ENVIRONMENT**

**References**
4. S.S.Khanka “Entrepreneurial Development” S.Chand & Company Ltd.,
OBJECTIVES
1. To understand the fundamentals of Macro Economics and National Income of India.
2. To study the importance of planning and economic growth in India.
3. To understand the importance of infrastructural development in the economy.
4. To know the causes of unemployment and different employment schemes for educated and uneducated.
5. To study the basis of Indian Banking system and its importance.

UNIT –I Fundamentals of Macro-economics 9hrs

UNIT –II Planning and Economic Growth 9hrs

UNIT –III Infrastructure of Indian Economy 9 hrs

UNIT –IV Labour and Unemployment 10hrs

UNIT –V Indian Banking System and Credit 9hrs
Reserve Bank of India: its basic functions – commercial banks – its functions: deposit acceptance and lending – types of deposit – types of loans and advances –other banking services.

L: 45  T: 0  Total 45 Hrs

Text Book

References
OBJECTIVES
On completion of the course the students are expected
• To be aware of optimization of resources.
• To understand and apply operations research techniques to industrial operations.
• To know how to formulate and solve Linear Programming Problems using various
techniques.
• To solve transportation and assignment problems.
• To analyse CPM and PERT networks and evaluate projects.
• To solve replacement problems of different types.
• To solve sequencing problem.
• To know various queueing models and to solve queue problems.

UNIT –I LINEAR PROGRAMMING PROBLEM 9hrs
The phases of OR study – formation of an L.P model – graphical solution – simplex
algorithm – artificial variable technique: Big M Method, Two-phase method.

UNIT –II TRANSPORTATION AND ASSIGNMENT PROBLEM 9hrs
Initial basic solution by North West corner method – least cost method – Vogels
approximation method – optimality test – MODI method. Unbalanced transportation

UNIT –III NETWORK MODELS 9 hrs
Shortest route – minimal spanning tree – maximum flow models – Project network: CPM
and PERT network.

UNIT –IV REPLACEMENT AND SEQUENCING MODELS 10hrs
Replacement of items that deteriorate with time – value of money changing with time –
Not changing with time – optimum replacement policy – individual and group
replacement. Sequencing problem: models with n jobs with 2 machines – problem with n
jobs with 3 machines.

UNIT –V QUEUING THEORY 9hrs
Queueing models – queueing systems and structures – notation – single server and
multi server models – Poisson input – exponential service – constant rate
service.

L: 45 T: 0 Total 45 Hrs

Text Book

References
New Delhi.
S.Chand and Co., New Delhi.
Delhi.
of India, New Delhi.
AUE121-ALTERNATE FUELS AND ENERGY SYSTEMS

OBJECTIVES
At the end of the course, the student will be able to acquire knowledge of alternate fuels and the changes in the engine design for handling them and understand various energy systems for use in the automobiles.

UNIT –I INTRODUCTION 6 hrs

UNIT –II ALCOHOLS 9 hrs

UNIT –III NATURAL GAS, LPG, HYDROGEN AND BIOGAS 9 hrs
Availability of CNG, properties, modification required to use in engines – performance and emission characteristics of CNG and LPG in SI & CI engines. Performance and emission for LPG – Hydrogen – Storage and handling, performance and safety aspects.

UNIT –IV VEGETABLE OILS 10hrs
Various vegetable oils for engines – Esterification – Performance in engines – Performance and emission characteristics.

UNIT –V ELECTRIC AND SOLAR POWERED VEHICLES 11hrs

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
2. Alcohols and motor fuels progress in technology, Series No.19, SAE Publication USA 1980
3. SAE Paper Nos.840367, 841156, 841333, 841334.
AUE122-AUTOMOTIVE SAFETY

OBJECTIVES
At the end, the student will have good exposure to Automotive safety aspects including safety equipments.

UNIT – I INTRODUCTION 9 hrs
Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

UNIT – II SAFETY CONCEPTS 9 hrs
Active safety: driving safety, conditional safety, perceptibility safety, operating safety passive safety: exterior safety, interior safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

UNIT – III SAFETY EQUIPMENTS 9 hrs
Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety.

UNIT – IV COLLISION WARNING AND AVOIDANCE 9 hrs
Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.

UNIT – V COMFORT AND CONVENIENCE SYSTEM 9 hrs
Steering and mirror adjustment, central locking system, Garage door opening system, tyre pressure control system, rain sensor system, environment information system

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
AUE123-HYDRAULICS AND PNEUMATICS SYSTEMS

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

OBJECTIVES
This course will give an appreciation of the fundamental principles, design and operation of hydraulic and pneumatic machines, components and systems and their application in recent automation revolution.

UNIT –I INTRODUCTION 6 hrs
Introduction to fluid power, properties - hydraulic fluids, air. Selection of hydraulic fluids, comparison between hydraulics and pneumatics. Symbols of pneumatic elements and hydraulic elements.

UNIT –II PNEUMATIC SYSTEMS 12hrs

UNIT –III HYDRAULIC SYSTEMS 12hrs

UNIT –IV ADVANCED TOPICS IN HYDRAULICS AND PNEUMATICS 6hrs
Electro pneumatics, ladder diagram. Servo and Proportional valves - types, operation, application. Hydro-Mechanical servo systems. PLC-construction, types, operation, programming.

UNIT –V AUTOMOTIVE APPLICATIONS 6hrs
Hydraulic tipping mechanism, power steering, forklift hydraulic gear, hydro-pneumatic suspension, air brake and maintenance and trouble shooting of pneumatic circuits.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
AUE124-RUBBER TECHNOLOGY FOR AUTOMOBILES

UNIT –I INTRODUCTION

UNIT –II STRUCTURE-PROPERTY RELATIONSHIP OF RUBBER
Resilience, creep, hysteresis and damping, stability, set and stress relaxation, behaviour in dynamic applications.

UNIT –III VIBRATION AND RUBBER SPRING

UNIT –IV FLUID SEALINGS AND FLEXIBLE COUPLINGS AND HOSES

UNIT –V COMPOUNDING AND MANUFACTURE
Types of couplings – specification and selection – torque vs deflection relationships – brake fluid / hydraulic hoses, materials and manufacture.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
1 Hobel,E.F., Rubber Springs Design.
2 Blow,C.M. and Hepburn,C., Rubber Technology and Manufacture.
OBJECTIVES
Study of the theory, construction and operation of different measurement technology, instruments transducers and their application

UNIT – I LINEAR MEASUREMENT 9 hrs
Units and standards, terminology and measurement errors. Linear measuring instruments, dial gauges, comparators and linear measuring machines. Angular measuring instruments- measurement of straightness flatness and surface finish. Profilographs.

UNIT – II PRESSURE MEASUREMENT 9 hrs
Bourdon tube, diaphragm, bellows and pressure capsules: Transducers used in pressure measurement- potentiometer, strain gauges, LVDT, capacitive and variable reluctance type transducers. Dynamic pressure measurement piezoelectric and piezo resistive transducers. Farnboro engine indicator. Low pressure measurement Mc leod gauge, Pirani gauge., thermal conductivity type pressure measurement.

UNIT – III FLOW MEASUREMENT 9 hrs

UNIT – IV TEMPERATURE MEASUREMENT 9hrs

UNIT – V FORCE AND TORQUE MEASUREMENT 9 hrs

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
AUE126-COMPUTER SIMULATION OF IC ENGINE PROCESSES

UNIT –I INTRODUCTION 10hrs

UNIT –II SI ENGINE SIMULATION WITH AIR AS WORKING MEDIUM 10hrs
Deviation between actual and ideal cycle – Problems, SI engine simulation with adiabatic combustion, temperature drop due to fuel vaporization, full throttle operation – efficiency calculation, part-throttle operation, super charged operation.

UNIT –III PROGRESSIVE COMBUSTION 9 hrs
SI Engines simulation with progressive combustion with gas exchange process, Heat transfer process, friction calculation, compression of simulated values, validation of the computer code, engine performance simulation, pressure crank angle diagram and other engine performance.

UNIT –IV SIMULATION OF 2-STROKE SI ENGINE 7 hrs
Intake, Exhaust, Charging and Combustion Simulation

UNIT –V DIESEL ENGINE SIMULATION 9 hrs
Zero, one and multi zone model for combustion, different heat release and heat transfer models, equilibrium calculations, simulation of engine performance.

L: 45  T: 0  Total 45 Hrs

Text Book

Reference book
AUE127-MICROPROCESSOR APPLICATION IN AUTOMOBILES

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

OBJECTIVES
The main objective of this course is to impart knowledge in 8085 microprocessor along with its interface circuits. At the end of the course the students will have command over writing assembly level programs for automotive application.

UNIT –I  ARCHITECTURE OF 8085 MICROPROCESSOR 9 hrs
8085 architecture - Functional block diagram - pin function - Registers, ALU, Bussystems - Timing and control signals, stack.

UNIT –II  ASSEMBLY LANGUAGE PROGRAMMING 8 hrs
Instruction format - addressing modes - instruction set - Construct of the language programming - Assembly directive - programs like addition, subtraction, multiplication, division, code conversion, lookup tables etc.

UNIT –III  I/O INTERFACING INTERRUPTS 8 hrs
Simple I/O ports - Programmable peripheral interface (8255) - Interfacing of switch, LED's, ROM and RAM, keyboard - display. Interrupt feature - Need for interrupts - Characteristics and Types of interrupts - Interrupt structure - Methods of servicing interrupts - Development of interrupt service subroutines - DMA.

UNIT –IV  SIGNAL CONDITIONING 10hrs
Need - Analog to Digital and Digital to Analog converter - selection criteria for ADC/DAC - Interfacing ADC0801- DAC0800.

UNIT –V  APPLICATIONS 10hrs
Data acquisitions - temperature control - stepper motor control - engine control – Case studies

L: 45  T: 0  Total 45 Hrs

Text Book

Reference book
OBJECTIVES
To introduce the concept of fuel cells for use in automobiles, analyse the performance characteristics of the various components and compare them with the other powering devices.

UNIT –I INTRODUCTION TO FUEL CELLS 9 hrs
Introduction – working and types of fuel cell – low, medium and high temperature fuel cell, liquid and methanol types, proton exchange membrane fuel cell solid oxide, hydrogen fuel cells – thermodynamics and electrochemical kinetics of fuel cells.

UNIT –II FUEL CELLS FOR AUTOMOTIVE APPLICATIONS 9 hrs

UNIT –III FUEL CELL COMPONENTS AND THEIR IMPACT ON PERFORMANCE 9 hrs
Fuel cell performance characteristics – current/voltage, voltage efficiency and power density, ohmic resistance, kinetic performance, mass transfer effects – membrane electrode assembly components, fuel cell stack, bi-polar plate, humidifiers and cooling plates.

UNIT –IV FUELING 9 hrs

UNIT –V FUEL CYCLE ANALYSIS 9 hrs
Introduction to fuel cycle analysis – application to fuel cell and other competing technologies like battery powered vehicles, SI engine fueled by natural gas and hydrogen and hybrid electric vehicle.

Text Book
OBJECTIVES
To illustrate the electric and hybrid vehicles and their operation and controls

UNIT I  INTRODUCTION TO ELECTRIC VEHICLES  9 hrs
Layout of an electric vehicle, performance of electric vehicles – traction motor characteristics, tractive effort, transmission requirements, vehicle performance, energy consumption, advantage and limitations, specifications, system components, electronic control system.

UNIT II  HYBRID VEHICLES  8 hrs
Concepts of hybrid electric drive train, types, architecture of series and parallel hybrid electric drive train, merits and demerits, series and parallel hybrid electric drive train design.

UNIT III  ELECTRIC PROPULSION SYSTEMS, GENERATORS, MOTOR CONTROLLERS AND CONTROL SYSTEMS  10 hrs
DC motors, AC motors, permanent magnet motors, brushless DC and reluctance motors, characteristics, regenerative braking.
DC generators, AC generators, voltage and frequency regulations.
Control system principles, speed and torque control – DC motors and AC motors.

UNIT IV  ENERGY STORAGES  9 hrs
Electromechanical batteries- types of batteries –lead acid batteries, nickel based batteries, lithium based batteries, electrochemical reactions, thermodynamic voltage, specific energy, specific power, energy efficiency, ultracapacitors.

UNIT V  FUEL CELLS & SOLAR CARS  9 hrs
Fuel cell, construction, working, equations, possible fuel sources, fuel reformer, design.
Solar cars- photovoltaic cells, tracking, efficiency and cost comparison

L: 45  T: 0  Total 45 Hrs

Text Book
OBJECTIVES

- At the end of the course, the students will be able to apply basic principles of aerodynamics for the design of vehicle body.

UNIT –I INTRODUCTION 9hrs
Scope, historical developments, fundamental of fluid mechanics, flow phenomenon related to vehicles, external and Internal flow problem, resistance to vehicle motion, performance, fuel consumption and performance potential of vehicle aerodynamics, engine cooling requirement, air flow to passenger compartment, duct for air conditioning, cooling of transverse engine and rear engine.

UNIT –II AERODYNAMIC DRAG OF CARS 9 hrs
Cars as a bluff body, flow field around car, drag force, types of drag force, analysis of aerodynamic drag, drag coefficient of cars, strategies for aerodynamic development, low drag profiles.

UNIT –III SHAPE OPTIMIZATION OF CARS 9 hrs
Front end modification, front and rear wind shield angle, boat tailing, hatch back, fast back and square back, dust flow patterns at the rear, effects of gap configuration, effect of fasteners.

UNIT –IV VEHICLE HANDLING 9 hrs
The origin of forces and moments on a vehicle, lateral stability problems, methods to calculate forces and moments – vehicle dynamics under side winds, the effects of forces and moments, characteristics of forces and moments, dirt accumulation on the vehicle, wind noise, drag reduction in commercial vehicles.

UNIT –V WIND TUNNELS FOR AUTOMOTIVE AERODYNAMICS 9 hrs
Introduction, principle of wind tunnel technology, limitation of simulation, stress with scale models, full scale wind tunnels, measurement techniques, equipment and transducers, road testing methods, numerical methods.

L: 45  T: 0  Total 45 Hrs

Text Book

Reference book
AUE131-ROBOTICS

OBJECTIVES
- At the end of the course, the students will be able to understand about the basics of robots.
- Understanding the usage of Robots in Automotive Industries

UNIT –I  FUNDAMENTALS OF ROBOT 7hrs

UNIT –II  ROBOT DRIVE SYSTEMS AND END EFFECTORS 10hrs

UNIT –III  SENSORS AND MACHINE VISION 10hrs

UNIT –IV  ROBOT KINEMATICS AND ROBOT PROGRAMMING 10hrs
Forward Kinematics, Inverse Kinematics and Differences – Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – DH matrices - Deviations and Problems.
Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands, and Simple programs

UNIT –V  IMPLEMENTATION AND ROBOT ECONOMICS 8 hrs
RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method

L: 45  T: 0  Total 45 Hrs

Text Book

Reference book

Chairman  
Board of Studies
AUE132-SPECIAL TYPE OF VEHICLES

OBJECTIVES
The main objective of this course is to introduce the concept and principle of operation of special vehicles such as Bulldozers, Ditchers, Bucket excavators, farm equipments, military vehicles etc. At the end of the course, the students can have a better understanding of the application of the special types of vehicles in the excavation of earth.

UNIT –I EARTH MOVING AND CONSTRUCTIONAL EQUIPMENTS 10hrs
Construction layout, capacity and applications of earthmovers for dumpers, front-end loaders, bulldozers, excavators, backhoe loaders, scrappers, motor graders etc. criteria for selection of prime mover fro dumpers and front end loaders based on vehicle performance characteristics.

UNIT –II POWER TRAIN CONCEPTS 7 hrs

UNIT –III VEHICLE SYSTEMS, FEATURES 14hrs

UNIT –IV SPECIAL PURPOSE VEHICLES FOR INDUSTRIAL APPLICATIONS 5 hrs

UNIT –V FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES 9 hrs
Ride and stability characteristics, power take off, special implementations. Special Features and constructional details of tankers, gun carriers and transport vehicles. Harvesting vehicles.

L: 45 T: 0 Total 45 Hrs

Text Book & References
OBJECTIVES

- At the end of the course, the students will be able to apply and introduce the modern developments in vehicle technology with their advancements, comfort, and security, etc.

UNIT –I ENGINE MANAGEMENT SYSTEMS 9hrs
Electronically controlled SI and CI engine fuel injection systems, related hardware and software. Closed loop ignition system. Catalytic converters and particulate traps.

UNIT –II CHASSIS 9 hrs
Active suspension control, Pneumatic suspensions, Power train monitoring, safety views-Modern development in Chassis management of vehicles.

UNIT –III HEATING AND AIR CONDITIONING 9 hrs

UNIT –IV COMFORT AND CONVENIENCE 9 hrs
Adaptive cruise control, car entertainment, power windows, navigation system, adaptive noise control, electric seats, driver information system. Power windows, power steering.

UNIT –V SAFETY AND SECURITY SYSTEMS 9 hrs
Airbags, seat belt tightening system, collapsible and tiltable steering column, Anti theft system, anti lock braking system, electronic stability control system/traction control system, roll over protection system.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
OBJECTIVES

- At the end of the course, the students will be able to understand the need of microcontroller 8 bits and 16 bits in a device/instrument development.
- This course aims in developing the students with adequate knowledge about microprocessors and its importance in Automobile sector.

UNIT –I INTRODUCTION

Need for microprocessor based system design – Design cycle – dimensions of the design problem – Hardware design and software design – System integration.

UNIT –II INPUT AND OUTPUT ALGORITHMIC PROCESSES


UNIT –III TROUBLESHOOTING SYSTEMS – LOGIC ANALYSERS


UNIT –IV 8086/8088 BASED MULTIPROCESSING SYSTEM


UNIT –V SYSTEM DESIGN APPLICATIONS


L: 45 T: 0 Total 45 Hrs

Text Book& References

OBJECTIVES

- To Study the basics of nano technology and nano science.
- Understand interdisciplinary nature of this field.
- Recognize that the rules of nano science are fundamentally different than those we experience & Study the basic fabrication strategies of nano science.

UNIT –I INTRODUCTION 10hrs

UNIT –II PREPARATION METHODS 10hrs
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT –III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES 5 hrs
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma/reactive ion) etching, Etch resists-dip pen lithography.

UNIT –IV PREPARATION ENVIRONMENTS 10hrs
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working Practices, Sample cleaning, Chemical Purification, and Chemical and Biological contamination, Safety Issues, Flammable and Toxic Hazards, Biohazards.

UNIT –V CHARACTERISATION TECHNIQUES 10hrs

L: 45  T: 0  Total 45 Hrs

Text Book

References
OBJECTIVES

- To understand the principles, functions and design practices of Jigs, Fixtures and dies for press working
- To understand the Principles of jigs and fixtures design, locating principles, locating elements and clamping Devices.

UNIT –I PURPOSE TYPES AND FUNCTIONS OF JIGS AND FIXTURES


UNIT –II JIGS

Drill bushes –different types of jigs-plate latch, channel, box, post, angle plate, angular post, turnover, pot jigs-Automatic drill jigs-Rack and pinion operated. Air operated Jigs components. Design and development of Jigs for given components.

UNIT –III FIXTURES

General principles of boring, lathe, milling and broaching fixtures- Grinding, planning and shaping fixtures, assembly, Inspection and welding fixtures- Modular fixtures. Design and development of fixtures for given component.

UNIT –IV PRESS WORKING TERMINOLOGIES AND ELEMENTS OF DIES AND STRIP LAY OUT


UNIT –V DESIGN AND DEVELOPMENT OF DIES

Design and development of progressive and compound dies for Blanking and piercing operations. Bending dies – development of bending dies-forming and drawing dies-Development of drawing dies. Design considerations in forging, extrusion, casting and plastic dies.

L: 45 T: 0 Total 45 Hrs

Text Book


References

AUE137-COMPUTATIONAL FLUID DYNAMICS

OBJECTIVES
- This course aims to introduce numerical modeling and its role in the field of heat and fluid flow;
- It will enable the students to understand the various discretisation methods and solving methodologies and to create confidence to solve complex problems in the field of heat transfer and fluid dynamics.

UNIT –I  GOVERNING DIFFERENTIAL EQUATION AND FINITE DIFFERENCE METHOD  10hrs
Classification, Initial and Boundary conditions – Initial and Boundary Value problems – Finite difference method, Central, Forward, Backward difference, Uniform and nonuniform grids, Numerical Errors, Grid Independence Test.

UNIT –II  CONDUCTION HEAT TRANSFER  10hrs
Steady one-dimensional conduction, two and three dimensional steady state problems, Transient one-dimensional problem, Two-dimensional Transient Problems.

UNIT –III  INCOMPRESSIBLE FLUID FLOW  10hrs

UNIT –IV  CONVECTION HEAT TRANSFER AND FEM  10hrs

UNIT –V  TURBULENCE MODELS  5hrs
Algebraic Models – One equation model, K – ε Models, Standard and High and Low Reynolds number models, Prediction of fluid flow and heat transfer using standard codes.

L: 45 T: 0 Total 45 Hrs

Text Book

References
OBJECTIVES

- At the end of the course, the students will be able to understand the fabrication, analysis and design of composite materials & structures.

UNIT –I    STRESS STRAIN RELATION    6hrs

UNIT –II    METHODS OF ANALYSIS    12hrs

UNIT –III   LAMINATED PLATES    12hrs
Governing differential equation for a general laminate, angle ply and cross ply laminates. Failure criteria for composites.

UNIT –IV    SANDWICH CONSTRUCTIONS    8 hrs
Basic design concepts of sandwich construction - Materials used for sandwich construction - Failure modes of sandwich panels.

UNIT –V    FABRICATION PROCESS    7 hrs

L: 45    T: 0    Total 45 Hrs

Text Book

Reference book
OBJECTIVES

- After completion of this course the students are able to manage a transport fleet and their related activities for minimizing operational cost.

UNIT –I INTRODUCTION 9hrs
Personnel management, objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests.

UNIT –II TRANSPORT SYSTEMS 9hrs
Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. Chain of responsibility, forms of ownership by state, municipality, public body and private undertakings.

UNIT –III SCHEDULING AND FARE STRUCTURE 9hrs
Principal features of operating costs for transport vehicles with examples of estimating the costs. Fare structure and method of drawing up of a fare table. Various types of fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling.

UNIT –IV MOTOR VEHICLE ACT 9hrs
Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, Power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

UNIT –V MAINTENANCE 9hrs
Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

L: 45 T: 0 Total 45 Hrs

Text Book

Reference book
AUE140-FLEET MANAGEMENT

OBJECTIVES

UNIT – I MANAGEMENT TRAINING AND OPERATIONS 10hrs
Basic principles of supervising. Organising time and people. Job instruction training –
Training devices and techniques – Drive and mechanic hiring – Driver checklist – Lists
for driver and mechanic – Trip leasing – Vehicle operation and types of operation.

UNIT –II VEHICLE MAINTENANCE 8hrs
Scheduled and unscheduled maintenance – Planning and scope – Evaluation of PMI
programme – Work scheduling – Overtime – Breakdown analysis – Control of repair
backlogs – Cost of options.

UNIT –III VEHICLE PARTS, SUPPLY MANAGEMENT AND
BUDGET 10hrs
Cost of inventory – Balancing inventory cost against downtime – Parts control – Bin tag
systems – Time management – Time record keeping – Budget activity – Capital
expenditures – Classification of vehicle expenses – Fleet management and data
processing – Data processing systems – Software. Models – Computer controlling of
fleet activity – Energy management.

UNIT –IV SCHEDULING AND FARE STRUCTURE 10hrs
Route planning – Scheduling of transport vehicles – Preparation of timetable, Costs, fare
structure – Methods of fare collection – Preparation of fare table.

UNIT –V MOTOR VEHICLE ACT 7 hrs
Schedules and sections – Registration of motor vehicles – Licensing of drivers – Control
of permits – Limits of speed – traffic signs – Constructional regulations – Description of
goods carrier, delivery man, tanker, tipper, Municipal, fire fighting and break down
service vehicle.

L: 45  T: 0  Total 45 Hrs

Text Book

Reference book
UNIT –I ENGINE COMPONENTS  
10hrs

UNIT –II TRANSMISSION COMPONENTS-I  8 hrs

UNIT –III TRANSMISSION COMPONENTS-II  8 hrs
Continuous casting of propeller shaft, extrusion of propeller shaft, extrusion dies, heat treatment and surface hardening of propeller shaft, composite propeller shaft manufacturing. Forging of rear axles, casting of rear axle casing, wheels, brake drum, tyre manufacturing

UNIT –IV BODY COMPONENTS  10hrs

UNIT –V SURFACE COATINGS AND ELECTRICAL COMPONENTS:  9 hrs
Chemical vapour deposition, physical vapour deposition, sol-gel processing, spraying, plating, painting in paint booth.
Starter motor, alternator, regulator, battery, lamps, control switches, electronic gauges.

L: 45 T: 0 Total 45 Hrs

Text Book