



**B.E - MECHANICAL ENGINEERING
 (FOUR YEAR FULL TIME)
 CURRICULUM - 2008
 SEMESTER I**

Code No	Course Title	L	T	P	C
THEORY					
XME101	Mathematics- I	3	1	0	4
XME102	Technical English	3	1	0	4
XME103	Applied Physics	3	1	0	4
XME104	Engineering Materials and Metallurgy	3	0	0	3
XME105	Engineering Graphics	2	0	3	4
XME106	Applied Chemistry	3	1	0	4
PRACTICAL					
XME107	Applied Physics Lab	0	0	3	2
XME108	Applied Chemistry Lab	0	0	3	2
XME109	Basic Workshop Practice	0	0	3	2

Total Hours: 33

Total Credits: 29

SEMESTER II

Code No	Course Title	L	T	P	C
THEORY					
XME201	Mathematics – II	3	1	0	4
XME202	Engineering Mechanics	3	1	0	4
XME203	Fundamentals of Computing	4	0	0	4
XME204	Elements of Electrical Engineering	3	1	0	4
XME205	Manufacturing Technology 1	3	0	0	3
XME206	Thermodynamics	3	1	0	4
PRACTICAL					
XME 207	Fundamentals of Computing Laboratory	0	0	3	2
XME 208	Communication Skills Enhancement	2	0	2	3
XME 209	Electrical Machines and Drives Lab	0	0	3	2

Total Hours: 33

Total Credits: 30

SEMESTER III

Code No	Course Title	L	T	P	C
THEORY					
XME301	Mathematics-III	3	1	0	4
XME302	Environmental Science and Engineering	3	0	0	3
XME303	Elements of Electronics Engineering	3	0	0	3
XME304	Strength of Materials	3	1	0	4
XME305	Fluid Mechanics and Machines	3	1	0	4
XME306	Machine Drawing	2	0	3	4
PRACTICAL					
XME307	Strength of Materials and Fluid machinery lab	0	0	3	2
XME308	Electronics Lab	0	0	3	2

Total Hours: 29

Total Credits: 26

SEMESTER IV

Code No	Course Title	L	T	P	C
THEORY					
XME401	Probability and Statistics	3	1	0	4
XME402	Mechanics of machines-I	3	1	0	4
XME403	Thermal engineering	3	0	0	3
XME404	Metrology & Measurements	3	0	0	3
XME405	Manufacturing Technology-II	3	0	0	3
XME406	Professional Ethics and Human values (Mech)	3	0	0	3
PRACTICAL					
XME407	Thermal engineering lab	0	0	3	2
XME408	Machines Lab - I	0	0	3	2

Total Hours: 26

Total Credits: 24

SEMESTER - V

Code No	Course Title	L	T	P	C
THEORY					
XME501	Numerical methods	3	1	0	4
XME502	Mechanics of machines-II	3	1	0	4
XME503	Machine Element Design	3	1	0	4
XME504	CAD/CAM	3	0	0	3
XME505	Automobile Engineering	3	0	0	3
XME506	Total Quality Management	3	0	0	3
PRACTICAL					
XME507	Metrology and Measurements Lab	0	0	3	2
XME508	CAD/CAM lab	0	0	3	2

Total Hours: 27

Total Credits: 25

SEMESTER VI

Code No	Course Title	L	T	P	C
THEORY					
XME601	Design of Transmission systems	3	1	0	4
XME602	Heat and Mass Transfer	3	1	0	4
XME603	Gas Dynamics and Jet Propulsion	3	1	0	4
XME604	Entrepreneurial Development Management	3	0	0	3
XME605*	ELECTIVE-I	3	0	0	3
XME606*	ELECTIVE-II	3	0	0	3
PRACTICAL					
XME607	Mini Project	0	0	3	4
XME608	Heat and Mass Transfer lab	0	0	3	2

Total Hours: 27

Total Credits: 27

SEMESTER VII

Code No	Course Title	L	T	P	C
THEORY					
XME701	Operations Research	3	1	0	4
XME702	Engineering economics & cost analysis	3	0	0	3
XME703	Renewable Energy Sources	3	0	0	3
XME704	Power Plant Engineering	3	0	0	3
XME705	Mechatronics	3	0	0	3
XME706	Fluid Power Engineering	3	0	0	3
PRACTICAL					
XME707	Mechatronics Lab	0	0	3	2
XME708	Machines Lab-II	0	0	3	2

Total Hours: 25

Total Credits: 23

SEMESTER VIII

Code No	Course Title	L	T	P	C
THEORY					
XME801	Industrial Engineering & Quality Control	3	0	0	3
XME802	Social Engineering	3	0	0	3
XME803*	Elective-III	3	0	0	3
XME804*	Elective-IV	3	0	0	3
PRACTICAL					
XME805	Project Work	0	0	20	12

Total Hours: 32

Total Credits: 24

Total Credits: 218

LIST OF ELECTIVES

ELECTIVE I

* Elective Code	Course Title	L	T	P	C
605A	Refrigeration & Air conditioning	3	0	0	3
605B	Automotive Electronics	3	0	0	3
605C	Energy Conversion Systems	3	0	0	3

ELECTIVE II

* Elective Code	Course Title	L	T	P	C
606A	Finite Element Methods	3	0	0	3
606B	Optimum Utilization of Heat and Power	3	0	0	3
606C	Advanced I.C Engines	3	0	0	3

ELECTIVE III

* Elective Code	Course Title	L	T	P	C
803A	Mathematical Modeling and simulation-MATLAB	3	0	0	3
803B	Computational Fluid Dynamics	3	0	0	3
803D	Nano Technology	3	0	0	3

ELECTIVE IV

* Elective Code	Course Title	L	T	P	C
804A	Automation and Control Engineering	3	0	0	3
804B	Modern Manufacturing Technology- JIT, AMT	3	0	0	3
804C	Reliability Engineering	3	0	0	3

UNIT – I FOCUS ON LANGUAGE**15**

Word formation with prefixes and suffixes - synonyms and antonyms - nominal compounds , prepositions, homonyms, homophones and hyponyms, Part of speech, use of words as nouns and verbs, phrasal verbs, connectives, sentences patterns.

Suggested Activities

- Using prefixes and suffixes to change the grammatical functions of words – giving synonyms and antonyms, using the same words and its derivatives of different forms
- Expansion of noun + noun phrases - correction of errors in the given sentences.
- Using comparative forms of adjectives in sentences giving a pair of purpose and function statements to be linked with expressions like to in order to so as to (Eg: He used the ignition key. He started the engine. He used the ignition key in order to start the engine)
- Identification of content words in the given text.
- Learning multi functional words that can serve both nouns and verbs
- Analyzing sentences into S,V,O, C and A.

Note: All examples pertaining to this unit should preferably be related to science and technology.

UNIT – II FUNCTIONAL GRAMMAR**15**

Tense forms and voice forms, concord, degrees of comparison, conditional clause, definition of technical terms, Sentences expressing purpose and function, comparison and contrast, cause and effect constructions, imperatives, reported speeches, Modal verbs, infinitives, gerund, participles

Suggested Activities

Giving pairs of cause and effect statements to be linked with expressions like as / since / because. Rewriting imperative sentences using assertive form 'should'(Store energy and tap it when required energy should be and tapped when it is required)

- Rewriting infinitive forms as gerunds (e.g., To modernize the administrative office with computers is expensive, Modernizing the administrative office with computers is expensive) fill in the blanks with appropriate prepositions.
- Choosing sentences in a given text that use different tense forms
- Subject-verb agreement of the sentences given practical
- Providing a context for the use of the tense forms - rewriting the sentences in the impersonal passive form
- Rewriting the sentences in the reported speeches

UNIT- III READING

10

Techniques of Reading – Technical articles on invention and discoveries, Reading comprehension on biographies of eminent scientists, engineers and successful entrepreneurs, Practicing - skimming and scanning, Rhetorical functions (narrative, descriptive and argumentative) sequencing of sentences. Connective adverbs. Idioms and phrases, phrasal verbs and cloze test.

Suggested Activities

- Taking a quick glance at the text to predict the content – reading to identify the main theme.
- Identifying the topic sentence in a paragraph – providing suitable titles for paragraphs – matching the titles with the paragraphs.
- Guessing the contextual meaning of words – comprehending a passage and answering questions of varied kinds.
- Transferring of information from a text to graphical representations like tree diagram / flow chart / bar chart / pie chart/ tables.
- Filling the gaps with appropriate missing words from the given list.
- Making notes based on a passage in the format given.
- Using an appropriate format to make notes from a given passage.
- Providing a suitable title after reading the passage.
- Identifying main and supporting ideas by scanning.
- Sequencing of jumbled sentences using linguistic clues (e.g.: reference words).

UNIT - IV WRITING I

10

Framing questions and answering, (“Wh” type and “Yes or No”) type note making, (guided and open) making lists, stating problems and proposing solutions, recommendations, instructions, check lists, technical report writing, decoding from graphical representation (flow chart, pie chart, tree diagram) numerical expressions.

Suggested Activities

- Identifying the phrases used for making recommendations in given texts and employing them in making recommendations.
- Writing checklists in the appropriate format.
- Writing instructions for performing tasks at home or at work (use of imperatives).
- Summarizing the discussions and other oral practice activities like role-play in the prescribed textbooks.
- Essay writing based on discussion of scientific and technical topics given in the prescribed textbooks.

UNIT - V WRITING II

10

Paragraph writing, essay writing, technical report writing, letter writing, (personal, business, letter of application, letter to the editor) resume writing, drafting e-mails, minutes of meeting, memorandum, creative writing.

Suggested Activities

- Using appropriate expressions to define a concept / describe an object / device / process.
- Writing paragraphs on different scientific discourse patterns like classification, comparison and problem / solution – identifying the topic sentence.
- Using unity, cohesion and coherence in paragraph writing
- Writing formal and business letters using the appropriate format.
- Note – making (guided and open).
- Summarizing and writing paragraphs based on listening tasks in the prescribed textbooks.
- Making recommendations by using modal auxiliary verbs like *should*, *must*, *ought to* etc.

L:45; T: 15; Total: 60

TEXT BOOKS:

1. Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Vols. I & II (Combined Edition), Orient Longman Pvt. Ltd., 2006.

REFERENCES:

1. V.R. Narayanaswami, Strengthen Your Writing, 3rd Edition, Orient Longman, 2005.
2. Andrea J. Rutherford, Basic Communication Skills for Technology, 1st Edition, Pearson Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
3. Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001.
4. "Power words in Pairs". Emerald publishers - Chennai

XME 102 MATHEMATICS – I 3 1 0 4

UNIT - I MATRICES 9

Eigen values and Eigenvectors of a real matrix – Characteristic equation Properties of Eigen values and Eigen vectors - Cayley - Hamilton theorem (excluding proof) - Similarity transformation (Concept only) – Orthogonal matrix - 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 9

Direction Cosine and Ratios – Angle between two lines – Equation of plane – Equation of Straight line – Coplanar lines – shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere

UNIT -III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9

Curvature – Cartesian and polar co – ordinates – Centre and radius of curvature – Circle of curvature – Involutives and evolutes – Envelopes – Properties of envelopes and evolutes.

UNIT -IV FUNCTION OF SEVERAL VARIABLES 9

Functions of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained maxima and minima – Lagrange's Multiplier method – Jacobians .

UNIT V ORDINARY DIFFERENTIAL EQUATIONS (ODE) AND APPLICATIONS 9

Linear equations of second order with constant and variable coefficients - Simultaneous first order linear equations with constant coefficients – Method of variation of parameters.

L:45; T:15; Total:60

TEXT BOOKS:

1. Grewal .B.S., “Higher Engineering Mathematics”, 38th Edition- Khanna Publication –Delhi, 2004.
2. Kreyszi.E., “Advance Engineering Mathematics”, 8th Edition-John Wiley & Son (Asia) Ltd, Singapore,. 2001.

REFERENCES:

1. Bali. N.P., Narayana Iyengar, and Chand.N., “Engineering Mathematics” Laxmi Publication Pvt. Ltd-New Delhi, 2003.
2. Veerarajan.T., “Engineering Mathematics (For First Year)”, 4th Edition , John Wiley & Son -Hill Publishing company Ltd, New Delhi, 2005.
3. Kandasamy. P., Thilagavathy. K, and Gunavathy. K., “Engineering Mathematics”-Volume I &II, S. Chand & Co, New Delhi, 2005.
4. Venkataraman. M. K., “Engineering Mathematics”-Volume I &II, Revised enlarged 4th Edition, The National Publishing Company-Chennai, 2004.

APPLIED PHYSICS

(Common to B.E. / B.Tech all Branches)

XME 103 APPLIED PHYSICS

3 1 0 4

SEMESTER I

UNIT-I Acoustics and Ultrasonics

9

Acoustics: Classification of sound – Characteristics of musical sound – Loudness – Weber-Fechner law – Decibel – Absorption Coefficient – Reverberation – Reverberation time – Sabine's Formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics: Production: Magnetostriction and Piezo electric methods –Applications

UNIT-II Wave Optics, Lasers and Fibre Optics

9

Wave Optics: Photo elasticity: Birefringence – Stress-optic law - Effect of a stressed model in a plane polariscope – Isoclinic and Isochromatic fringes (definitions) – Photoelastic bench.

Laser: Nd – YAG laser, CO₂ laser, semiconductor laser (homojunction) – Uses of lasers – Holography.

Fibre Optics: Principle and propagation of light in optical fibres – Numerical Aperture and Acceptance angle – Types of optical fibres (material, refractive index, mode) – Applications: Fibre optics communication system (block diagram only).

UNIT-III Crystal Physics and NDT

9

Crystal Physics: Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures.

NDT: Liquid penetrant method – Ultrasonic flaw detection – Ultrasonic flaw detector (block diagram)– X-ray Radiography: displacement method – X-Ray Fluoroscopy– Merits and Demerits of each method

UNIT- IV Conducting Materials

9

Conductors: Wiedermann Franz law - Lorentz number –Fermi distribution function – Density of energy states – carrier concentration - effect of temperature on fermi energy level

Semiconductors: Semiconductor-properties- types of semiconductor, Hall effect – Determination of Hall co-efficient.

Superconductors: Super conducting phenomena – Properties of superconductors – Meissner effect , Isotope effect – Type I and Type II superconductors– Applications – Magnetic levitation and SQUID

UNIT–V Dielectrics and New Engineering Materials

9

Dielectrics: Electrical susceptibility - Dielectric constant – Electronic, ionic, orientational and space charge polarization – Frequency and temperature dependence of polarization – Internal field – Claussius-Mosotti relation (derivation) - Dielectric loss – Dielectric breakdown – Uses of dielectric materials (Capacitor and Transformer).

Introduction to New Materials: Metallic glasses – Nano materials – Shape memory alloys – Bio-materials.

L:45; T:15; Total:60

TEXT BOOKS:

1. Avadhanulu M.N. and Kshirsagar P.G., “A Text Book of Engineering Physics”, S.Chand & Company Ltd., 7th Enlarged Revised Ed., 2005.
2. Gaur R. K. and Gupta S. L., “Engineering Physics”, Dhanpat Rai Publishers, New Delhi, 2001.

REFERENCES:

1. Pillai S. O., “Solid State Physics”, New Age International Publication, New Delhi, Fifth Edition, 2003.
2. Rajendran V. and Marikani A., “Materials Science”, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004.

XME 104 APPLIED CHEMISTRY 3 1 0 4

UNIT -I WATER TECHNOLOGY 9

Source and types of water – water quality parameters – definition and expression – hard water – estimation of hardness (EDTA method) and alkalinity – boiler feed water – requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination (RO method) – domestic water treatment.

UNIT -II ELECTROCHEMISTRY 9

Electrode potentials – difference between electrolytic cells and electrochemical cells – Standard electrodes (H₂ and calomel electrodes) – Determination of pH using glass electrodes – Nernst equation – problems – electrochemical series – emf – measurements and its applications – Galvanic cells – Concentration cell – problems – reversible and irreversible cells – conductometric titrations.

UNIT -III CORROSION AND ITS INHIBITION 9

Corrosion – principles of chemical corrosion – Pilling – Bedworth rule – principles of electrochemical corrosion – difference between chemical and electrochemical corrosion – types of corrosion – factors influencing corrosion – corrosion control methods – pre-treatment of metal surface – electroplating and electroless plating.

UNIT -IV NUCLEAR ENERGY AND ENERGY STORAGE DEVICES 9

Nuclear fission process – definition, mechanism and characteristics – chain reactions – nuclear energy and its calculations – types of nuclear fission reaction – atom bomb – light water nuclear power plant – breeder reactor – batteries – introduction – types of batteries – primary and secondary batteries – dry cell – lead acid, Ni-Cd and Li batteries – alkaline batteries – principles and applications of solar cells.

UNIT -V POLYMERS 9

Monomers and polymers – types of polymerization reaction – mechanism of polymerization (free radical) – engineering plastics – PVC, teflon, polycarbonate, polyurethane and thermocole – properties – applications – compounding of plastics, moulding methods – injection, compression moulding and blow moulding – polymer blends and alloys.

L:45; T:15; Total:60

TEXT BOOKS:

1. P.C. Jain and Monicka Jain, Engineering Chemistry, Dhanpat Raj Publishing Company (P) Ltd, New Delhi – 2002.
2. S.S. Dara. A Textbook of Engineering Chemistry, S. Chand & Company Ltd, New Delhi – 2003.

REFERENCES:

1. B.K. Sharma, Engineering Chemistry, Krishna Prakasam Media (P) Ltd., Meerut, 2001.
2. Mars G. Fontana, Corrosion Engineering, Tata McGraw Hill Publishing Co., New Delhi, 2005.

**XME 105 ENGINEERING GRAPHICS
(First Angle Projection only)**

UNIT- I PROJECTION OF POINTS, LINES AND PLANE SURFACES 6+9

General principles of orthographic projection – Layout of views – Projection of points, straight lines – Determination of true lengths and true inclinations and location of traces

UNIT -II PROJECTION OF SOLIDS AND SECTION OF SOLIDS 6+9

Projection of polygonal surface and circular lamina inclined to any one plane - Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to both the reference plane.

UNIT -III SECTION OF SOLIDS 6+9

Sectioning of solids in simple vertical position by cutting planes inclined to both the reference plane - Obtaining true shape of section.

UNIT- IV DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS 6+9

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones -Development of lateral surfaces of two Intersecting solids – prism & cylinder, cylinder & cylinder – Axis at right angles with no offset.

UNIT- V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+9

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

Perspective projection of regular solids -by visual ray and vanishing point methods.

LECTURE: 30

**PRACTICES 45
TOTAL 75**

NOTE:

1. Five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

TEXT BOOKS:

1. K.Venugopal “Engineering Graphics”, New Age International (P) Limited, 2002.
2. K.V. Natarajan “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006.

REFERENCES:

1. N.D. Bhatt “Engineering Drawing” Charotar publishing House 46th Edition, 2003.
2. K.R. Gopalakrishnana. “Engineering Drawing” (Vol. II) & I Subhas Publications – 1998.
3. Luzadder and Duff, “Fundamentals of Engineering Drawing” Prentice Hall of India Pvt Ltd, XI Edition - 2001.

STANDARDS:

1. IS10711 – 2001 Technical products Documentation – Size and Layout of Drawing sheets.
2. IS9609 (Parts 0 & 1) – 2001 Technical product Documentation – Lettering.
3. IS11669 – 1986 Dimensioning on Technical Drawings.
4. IS15021 (Parts 1-4) – 2001 Technical Drawings – Projection Methods.

XME202 - ENGINEERING MECHANICS**3 1 0 4****UNIT - I BASICS AND STATICS OF PARTICLES****12**

Introduction - Units and Dimensions - Laws of Mechanics –Coplanar and Non Coplaner Forces - Resolution and Composition of forces - Equilibrium of a particle - Equivalent systems of forces - Principle of transmissibility – single equivalent force.

UNIT - II EQUILIBRIUM OF RIGID BODIES**12**

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium – Equilibrium of Rigid bodies in two dimensions - Equilibrium of rigid bodies in three dimensions.

UNIT - III PROPERTIES OF SURFACES AND SOLIDS**12**

Determination of Areas and Volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorems and perpendicular axis theorems - Polar moment of inertia – Mass moment of inertia - relation to area moments of inertia.

UNIT - IV DYNAMICS OF PARTICLES**12**

Displacement, Velocity and acceleration and their relationship - Relative motion - Curvilinear motion - Newton's Law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.

UNIT - V ELEMENTS OF RIGID BODY DYNAMICS AND FRICTION**12**

Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion - Moment of Momentum Equations - Rotation of rigid Body - Work energy equation.

Frictional Force - Laws of Coulomb friction - Simple Contact friction - Rolling Resistance - Belt Friction.

L:45; T:15 Total:60**TEXT BOOKS:**

1. Beer and Johnson, " Vector Mechanics for Engineers ", Vol. 1 " Statics " and Vol. 2 " Dynamics ", McGraw Hill International Edition, 1995.
2. Merriam, "Engineering Mechanics", Vol.1 "Statics" and Vol.2 "Dynamics 2/e", Wiley International, 1988.

PHYSICS LABORATORY
(Common to all branches of B.E. / B.Tech)

XME107 APPLIED PHYSICS LAB

0 0 3 2

Semester I

LIST OF EXPERIMENTS

1. Torsional Pendulum – Determination of moment of inertia of disc and rigidity modulus of the material of a wire.
2. Non -Uniform Bending – Determination of Young's Modulus.
3. Viscosity – Determination of Co-efficient of Viscosity of a liquid by Poiseuille's flow.
4. Spectrometer – Dispersive power of a prism.
5. Air wedge - Determination of thickness of thin wire.
6. Lee's Disc – Determination of thermal conductivity of a bad conductor.
7. Spectrometer – Determination of wavelength of Hg source using Grating.
8. Band gap determination of a semiconductor.
9. Spectrometer – id curve.
10. Semiconductor laser –
 - i. Determination of wavelength of Laser using grating.
 - ii. Particle size determination.
 - iii. Determination of numerical aperture and acceptance angle of an optical fibre.

LIST OF EXPERIMENTS (Any 10 Experiments)

- 1) Determination of total hardness, temporary & permanent hardness of water by EDTA method.
- 2) Determination of alkalinity of water sample.
- 3) Determination of chloride content of water sample by argentometric method.
- 4) Determination of DO content by Winkler's method.
- 5) Estimation of copper in brass.
- 6) Determination of strength of Hydrochloric acid by pH metric method.
- 7) Conductometric titration between strong acid and strong base.
- 8) Conductometric titration of mixture of acids.
- 9) Conductometric precipitation titration using barium chloride and sodium sulphate.
- 10) Determination of strength of iron by potentiometric method using dichromate.
- 11) Estimation of iron (1,10 – phenanthroline / thiocyanate method) or Ni (DMG) in the given solution by spectrometric method
- 12) Determination of sodium and potassium ions in water sample by flame photometric method.
- 13) Determination of molecular weight of a polymer by viscometry method.
- 14) Determination of percentage of calcium in limestone by EDTA method.

References for Chemistry Laboratory

- (1) J. Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2004.
- (2) D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw Hill, London.

- A) WOOD WORK** : Sawing, Planning and making common joints like TEE, Half lap and dovetail (any two)
- B) PLUMBING** : Basic pipe connection using valves, taps, couplings, unions, reducers, elbows in household fitting - Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances Preparation of line sketches for (i) water supply lines (ii) sewage lines.
- C) DEMONSTRATION (CIVIL ENGINEERING)** : Study of pipe connections on the suction and delivery pipe layouts.
Study of joints in door panels, wooden furniture.
Bar bending -Straightening of rods and cutting- 90°, 130° bend formation - 45°, 30° crank formation-Stirrups fabrication-Binding and placing of steel reinforcement
- D) FITTING** : Square, dovetail and hemisphere fitting of metal plate of 3mm
- E) WELDING** : (i) Preparation of arc welding of butt joints, lap joints and tee joints.
(ii) Gas welding practice.

TEXT BOOKS:

1. Grewal .B.S. Higher Engineering Mathematics, Thirty eighth Edition, Khanna Publication , Delhi 2004.
2. Kreyszig, E , Advance Engineering Mathematics, Eighth Edition, John Wiley and Son (Asia) Ltd Singapore 2001.

REFERENCES:

1. Bali N.P and Narayana Iyengar, N.Chand, Engineering Mathematics Laxmi Publication Pvt, Ltd, New Delhi, 2003.
2. Veerarajan. T., Engineering Mathematics Fourth Edition , Tata McGraw Publishing company Ltd, New Delhi, 2005.
3. Kandasamy. P., Thilagavathy. K, and Gunavathy. K Engineering Mathematics Volume I , II and III S. Chand & Co, New Delhi, 2005.
4. Venkataraman. M. K., Engineering Mathematics, Volume I and II Revised enlarge Fourth Edition, The National Publishing Company, Chennai, 2004.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY 12

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 12

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION 8

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 7

Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness

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

L:45; Total :45

TEXT BOOKS:

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
3. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science.
4. Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications.

REFERENCES:

1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media.
2. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
3. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. S.K.Dhameja, Environmental Engineering and Management, S. K. Kataria and Sons, New Delhi, 1999.

XME203 FUNDAMENTALS OF COMPUTING**4 0 0 4****UNIT- I BASICS OF COMPUTER AND PROGRAMMING****12**

Digital Computer Fundamentals –Block diagram of a computer–Component of a computer system–Hardware and Software–Categories of Software–Booting–Installing and uninstalling Software–Software piracy–Software terminologies–Applications of Computers–Algorithm – Design - Flow chart –History of Internet–Internet Services.

UNIT -II BASIC ELEMENTS OF C**12**

Introduction to C – Lexical elements of C – Operators and expressions – Operator precedence and associativity of operators – Input and Output Functions – Simple computational problems - Program Control Structures- Control statements – Branching, looping, nested control structures, switch, break, continue, goto statements – Problems using control structures.

UNIT -III FUNCTIONS AND PROGRAM STRUCTURES**12**

Prototypes and Functions–Declaring, defining and accessing functions–Parameter passing methods–Recursion–Storage classes–auto, extern, static and register–Library functions-Programs using functions.

Arrays:

Defining and processing arrays–Passing arrays to functions–Multi-dimensional arrays–Strings and basic operations on strings–Enumerated data types–Programs using simple sorting, searching and merging of arrays.

UNIT -IV POINTERS**12**

Pointer concept–Declaration–Accessing variable through pointer–Initializing pointer variable–Pointers and Functions–Pointers and Arrays–Pointers and Structures–Example programs using pointers with function, arrays and structures–Command line arguments – Dynamic memory allocation–Operations on pointers.

UNIT -V STRUCTURES, UNIONS AND FILE HANDLING**12**

Structures–User defined data types–Union–Nested structure, passing structures to functions - Self referential structures - File pointer–High level File operations–Opening and closing of file–Creating, Processing and Updation on files–Simple file handling programs.

L:60; Total: 60

TEXT BOOKS:

1. Byron Gottfried, "Programming with C", II Edition, (Indian Adapted Edition), TMH publications, 2006.
2. Yeshwant Kanethker, "Let us C", BPB Publications, 2004

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Behrouz A. Forouzan and Richard. F. Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks–Cole Thomson Learning Publications, 2001.
3. Johnsonbaugh R. and Kalin M., "Applications Programming in ANSI C", III Edition, Pearson Education India, 2003.

UNIT – I FUNDAMENTALS OF D.C AND A.C CIRCUITS**12**

D.C voltage – current and power – ohm’s law – Resistance in series and parallel circuits – current and voltage division – Kirchoff’s laws – simple problems using mesh analysis – sinusoidal voltage – R.M.S, average and peak values – phase and phase difference – phasor representation – power factor – voltage and current relation in single phase RC, RL and RLC simple series and parallel circuits – complex power – real, reactive and apparent power – three phase circuits – line and phase values of voltage / current – power measurement in three phase circuits using two wattmeters – simple problems.

UNIT – II D.C AND A.C MACHINES**12**

Constructional details and operating principles of D.C generators – e.m.f equation – type of generators – O.C.C. and load characteristics – principle and operation of D.C motors – back e.m.f. – types of motors – speed and torque equation – load characteristics of D.C motors – starting methods. Construction and operation of synchronous generators – types of synchronous machines – e.m.f equation – load characteristics – principle of operation of synchronous motors – starting methods – simple problems.

UNIT – III TRANSFORMERS**12**

Constructional details and operation of single phase transformers – types of transformers – e.m.f equation – transformation ratio – transformer on no load and load – parameters of transformers referred to primary and secondary – equivalent circuits – regulation – losses and efficiency – simple problems in single phase transformers – introduction to three phase transformers – types of three phase connections.

UNIT – IV INDUCTION MACHINES**12**

Constructional details and principle of operation of three phase induction motor – types of three phase induction motors – e.m.f equation – rotor e.m.f and current at standstill and running conditions – slip – torque characteristics – starting of induction motors- rotor resistance, auto transformer and star – delta starters – losses and efficiency – simple problems. Construction and principle of operation of single-phase induction motors – starting methods – split phase and shaded pole types.

UNIT – V MEASUREMENTS AND MEASURING INSTRUMENTS**12**

Deflecting torque, controlling torque and damping torque in indicating instruments - construction and operating principles of moving coil and moving iron instruments – voltmeters and ammeters – construction and operating principles of induction type energy meters and dynamo meter type wattmeters – types of errors.

Total:60

TEXT BOOKS:

1. D.P.Kothari and I.J.Nagrath, 'Basic Electrical Engineering', Second Edition 2002, Tata McGraw-Hill Publishing Company Limited.
2. V.K. Metha and Rohit Metha, "Principles of Electrical Engineering", 2003, S.Chand and Company Ltd., New Delhi 110055.

REFERENCES:

1. Stephen J.Chapman, 'Electric Machinery Fundamentals', Third Edition, 1999, McGraw-Hill.
2. K.Murugesh Kumar, 'Basic Electrical Science & Technology', First Published 2002, Vikas Publishing House Private Limited.
3. T.Thyagarajan, K.P.Sendur Chelvi and T.R.Rangaswamy, 'Engineering Basics', Third Edition, 2002, New Age International (P) Limited, Publishers.

XME 205 - MANUFACTURING TECHNOLOGY -I

3 0 0 3

UNIT – I METAL CASTING PROCESSES

9

Type of patterns – Pattern materials – Pattern allowances – Types of Moulding sand – Properties – Sand casting – Sand moulds - Core making – Methods of Sand testing – Moulding machines – Types of moulding machines - Melting furnaces – Working principle of Special casting processes – Sand Casting defects – Inspection methods.

UNIT - II WELDING

9

Welding process – Types of welding – Equipment used – Flame characteristics – Filler and Flux materials for Gas welding – Arch welding equipments – electrodes – Coasting and specifications – Principles and types of Resistance welding – Gas metal arc welding – Flux cored – Submerged arc welding – Electro slag welding – Tig welding – Principle – Flux cored – Submerged arc welding – Electro slag welding – Tig welding – Principle and application of special welding process – Plasma arc welding – Thermit welding – Electron beam welding – Friction welding – Diffusion welding – Flame cutting – Weld defects – Brazing and soldering process – Methods and process capabilities – Filler materials and fluxes – Types of Adhesive bonding

UNIT - III BULK DEFORMATION PROCESSES

9

Hot working and cold working of metals – Forging processes – Open and close die forging – Characteristics of the process – Types of Forging Machines – Typical forging operations – Rolling of metals – Flat strip rolling – Types of Rolling mills – Shape rolling operations – Tube piercing – Defects in rolled parts – Principles of Extrusion – Types of Extrusion – Hot and Cold extrusion – Principle of rod and wire drawing – Equipments used

UNIT - IV SHEET METAL FORMING PROCESSES

9

Sheet metal characteristics - Typical shearing operations, bending and drawing operations – Stretch forming operations — Formability of sheet metal – Test methods – Working principle and application of special forming processes - Hydro forming – Rubber pad forming – Metal spinning – Explosive forming – Magnetic pulse forming – Peen forming – Super plastic forming – Process characteristics

UNIT - V FORMING AND SHAPING OF PLASTICS

9

Types of plastics - Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of - Injection moulding – Plunger and screw machines – Blow moulding – Rotational moulding – Film blowing – Extrusion - Typical industrial applications – Thermoforming – Processing of Thermosets – Working principles and typical applications - Compression moulding – Transfer moulding – Bonding of Thermoplastics – Fusion and solvent methods – Induction and Ultrasonic methods

Total:45

TEXT BOOKS:

1. Hajra Choudhury, Elements of Workshop Technology, Vol. I and II, Media Promoters Pvt Ltd., Mumbai, 2001
2. Serope Kalpajian, Steven R.Schmid, Manufacturing Engineering and Technology, Pearson Education, Inc. 2002(Second Indian Reprint).

REFERENCES:

1. Elements of Manufacturing Processes, B.S. Magendran Parashar & R.K. Mittal, Prentice Hall of India, 2003.
2. Manufacturing Technology, P.N. Rao, Tata McGraw-Hill Publishing Limited, II Edition, 2002.
3. A text book of production technology, P.C. Sharma, S. Chand and Company, IV Edition, 2003.

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UNIT – I ENGINEERING THERMODYNAMICS

Systems, Zeroth Law, First Law - Heat and work transfer in flow and non-flow processes, Second law, Kelvin- Planck statement - Clausius statement - concept of entropy - Clausius inequality - entropy change in non-flow Processes

UNIT – II GAS LAWS, AIR CYCLES AND COMPRESSORS**9**

Properties of gases and vapours - Otto, Diesel, Dual combustion and Brayton combustion cycles - Air standard efficiency - Cycle comparisons - Mean effective pressure - Engine performance parameters – reciprocating compressors - Multistage - Minimum work - Effect of clearance - Volumetric efficiency.

UNIT – III STEAM AND ONE DIMENSIONAL FLUID FLOW**9**

Steady flow energy equation - Continuity and energy equation - Properties of steam - Rankine cycle – Isentropic flow of ideal gases through nozzles - Simple jet propulsion system - Thrust rocket motor - Specific impulse

UNIT – IV REFRIGERATION AND AIR CONDITIONING**9**

Principles of refrigeration, Air conditioning - Heat pumps - Vapour compression - Vapour absorption types - Coefficient of performance, Properties of refrigerants

UNIT – V HEAT TRANSFER**9**

Conduction in parallel, radial and composite wall - Convective heat transfer with laminar and turbulent flows - Overall heat transfer coefficient - Flow through heat exchangers, Fundamentals of radiative heat transfer

L:45; T:15; Total:60**TEXT BOOKS:**

1. Nag. P.K., " Engineering Thermodynamics ",Tata McGraw Hills Co., Ltd., Seventh Edn., 1993

REFERENCES:

1. Mayhew, A. and Rogers, B., " Engineering Thermodynamics ", Longman Green & Co. Ltd., London, E.L.B.S. Edition, 1990
2. Van Wylen, G.J. and Sonntag, R.E., " Fundamentals of Classical Thermodynamics (S.I.Version) ", Second Edition, 1986.
3. Bacon, D.H., " Engineering Thermodynamics ", Butterworth & Co., London, 1989.
4. Saad, M.A., " Thermodynamics for Engineers ", Prentice-Hall of India Pvt. Ltd., 1989.
5. Reynolds, " Thermodynamics ", Int. Student Edn., McGraw Hill Book Co., Ltd., 1990

INTRODUCTION

Application Packages

1. Word
2. Spread sheet
3. Power point

C PROGRAMMING

1. Programs using Operators and Expressions
2. Programs using IO Formatting
3. Programs using Control Structures
4. Programs using Looping Structures
5. Programs using Arrays and String manipulations
6. Programs using Functions and Recursion
7. Programs using Structures and Unions
8. Programs using Pointers
9. Programs using Files
10. Programs using Command line arguments

UNIT – I EXTENSIVE LISTENING**12**

Listening and typing –Listening and sequencing of information – Filling in the blanks – Listening and answering the question. Cloze Exercises- Vocabulary building – Dictionary habits a brief note on Thesaurus.

Listening to specific speeches, discussions, interviews, debates, lectures. (Instructional Aids: Audio cassettes, Tape recorders, Language Software.

Suggested Activities

- Gap filling activities while listening to a text
- Listening and identifying the missing words in a given text
- Listening to a brief conversation and answering questions orally
- Listening to commentaries on television or radio to improve listening skills
- Paying attention to speaker's appearance, expressions, body movements and posture that convey meaning to his/her words.

UNIT – II INTENSIVE LISTENING**12**

Listening for specific information – note taking-guided and open – listening comprehension- listening to specific speeches-interviews –debates lectures.

Suggested Activities

- Taking notes during lectures.
- Listening to a discourse and filling up gaps in a work sheet.
- Informational comprehension and literal comprehension tasks based on listening- post listening quiz.
- Listening to a passage preferably technical and answering questions choosing appropriate options (multiple choice)

Note : These listening activities can be done using a work sheet in a language laboratory or in the class room using a tape recorder.

UNIT III SPEAKING

12

Oral practice –developing confidence-introducing oneself-asking for or eliciting information-offering suggestions and recommendations.

Analysing problems and providing solutions- expressing opinions (agreement and disagreement) Role of idioms in Spoken Communication Pronunciation Practice-Stress intonation, accent, questions for oral discussions, describing objects, presenting information, Process description, narrating events, giving introduction, welcome speech and proposing a vote of thanks.

Suggested Activities

- Introducing oneself and others
- Role play activities based on real –life situations
- Discussing travel plan / industrial visit
- Giving oral instructions for performing tasks at home, at class-room and at work place
(use of imperatives)
- Participating in a short classroom-discussion on a controversial topic (eg. For and against reservation policy in educational institutions)
- Oral presentation on topics related to science and technology.

UNIT IV CONVERSATION

12

Face to Face conversation- Telephonic conversation- Role play activities (Students take on roles and engage in conversation) participating in an interview situational dialogues.

Suggested Activities

- Making either telephonic conversations or face to face conversation- making request- Asking questions-making recommendations using modal verbs-Giving instructions using imperatives – Expressing purpose and function-obligation and preference- Accepting and offering counseling .

Resume/ Report preparation / Letter writing

Structure the resume/ report letter writing/ E-mail communication samples

Presentation skills

Elements of an effective presentation – structure of presentation- presentation tools- voice modulation- audience analysis – body language- video samples.

Soft skills

The management- articulation – assertiveness – psychometrics- innovation and creative – stress management and poise- video samples

Group discussion

Why is GD part of selection process?- Structure of GD- moderator – led and other GDs – Strategies in GD- Team spirit- Body language(gestures)- Mock GD- Video samples.

Interview skills

Kinds of interviews- required key skills – corporate culture – mock interview- video samples.

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L:30; P:30;Total: 60

TEXT BOOKS:

1. Meenakshi Raman, Sangeetha Sharma: Technical Communication Principles and Practice, Oxford University Press.

REFERENCES:

1. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley: Speaking Effectively, Cambridge University Press.
2. Jayashree Balan; Spoken English, Vijay Nicole Imprints Private Ltd., Chennai.
3. Jean Naterop and Rod Revell (1988) Telephoning in English (Cambridge University Press David Martur (1994), Tough Talking, University Press, Hyderabad.

OBJECTIVE

To expose the students the operation of electric drives and gives them hands on experience.

LIST OF EXPERIMENTS

1. Load test on D.C. shunt motor.
2. Speed control of D.C. shunt motor.
3. Swinburne's test
4. Load test on three-phase induction motor.
5. No load and blocked rotor tests on three-phase induction motor.
6. Load test on single-phase induction motor.
7. No load and blocked rotor tests on single phase induction motor.
8. Load test on Synchronous motors
9. Performance characteristics of Stepper motors.
10. Performance characteristics of single-phase transformer.

Total: 45