

ANNA UNIVERSITY :: CHENNAI – 600 025

CURRICULUM - 2004

B.TECH. POLYMER TECHNOLOGY

SEMESTER - I

Code No.	Course Title	L	T	P	M
<b>THEORY</b>					
HS1101	<a href="#">English I</a>	3	1	0	100
MA1101	<a href="#">Mathematics I</a>	3	1	0	100
PH1101	<a href="#">Physics I</a>	3	0	0	100
CY1101	<a href="#">Chemistry I</a>	3	0	0	100
GE1102	<a href="#">Fundamentals of Computing</a>	3	0	0	100
GE1101	<a href="#">Engineering Graphics</a>	1	3	0	100
<b>PRACTICAL</b>					
PH1102	<a href="#">Physics Laboratory</a>	0	0	2	100
CY1102	<a href="#">Chemistry Laboratory</a>	0	0	2	100
GE1103	<a href="#">Engineering Practices Lab</a>	0	0	3	100
GE1104	<a href="#">Computer Practice I</a>	0	0	3	100

SEMESTER - II

Code No.	Course Title	L	T	P	M
<b>THEORY</b>					
HS1151	<a href="#">English II</a>	3	1	0	100
MA1151	<a href="#">Mathematics II</a>	3	1	0	100
PH1153	<a href="#">Physics II</a>	3	0	0	100
CY1154	<a href="#">Chemistry II</a>	3	0	0	100
GE1151	<a href="#">Engineering Mechanics</a>	3	1	0	100
EE1163	<a href="#">Electrical and Electronics Engineering</a>	3	0	0	100
<b>PRACTICALS</b>					
GE1152	<a href="#">Computer Practice II</a>	0	0	3	100
EE1164	<a href="#">Electrical and Electronics Engineering Lab.</a>	1	0	3	100

**AIM**

- To encourage learners to do participative learning of the target language (English) and help them in acquiring communication skills.

**OBJECTIVES**

- To help learners improve their vocabulary and to enable them to use words appropriately in different contexts
- To familiarise learners with different rhetorical functions of Scientific English.
- To help learners develop key techniques that could be adopted while reading texts.
- To help learners develop listening skills for academic and professional purposes
- To help learners acquire the ability to speak effectively in English in real-life situations

**1. FOCUS ON LANGUAGE****10 + 3**

Word formation with prefixes and suffixes – synonyms and antonyms – expanding nominal compounds – framing of questions (wh – pattern, yes/no questions, tag questions) - subject - verb agreement – tenses (simple and compound tenses) – sentence structures – five major patterns (SV, SVC, SVO, SVO<sub>(i)</sub>O<sub>(d)</sub> and SVOC patterns) - impersonal passive voice – comparative adjectives (affirmative and negative) – use of prepositions - phrasal verbs – use of conditionals.

**Suggested activities**

Using prefixes and suffixes to change the grammatical functions of words – identifying the lexical and contextual meanings of words – role play - activities based on a given situation – correction of errors in the given sentences – providing a context for the use of the tenses/sentence structures – rewriting sentences into impersonal passive – using comparative forms of adjectives in affirmative / negative sentences – ‘if’ clauses – the three main types., probable condition, improbable condition and impossible condition.

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

**2. READING****8 + 3**

Predicting the content - skimming the text – understanding the gist – identifying the topic sentence and its role in each paragraph – scanning – inferring / identifying lexical and contextual meanings – transfer of information / note-making – understanding discourse coherence– sequencing of sentences.

**Suggested Activities**

Taking a quick glance at the text to predict the content – reading to identify main content and giving feedback in response to the teacher’s questions – making a thesis statement about the text - scanning for specific information – sequencing of jumbled sentences

using linguistic clues (e.g. reference words and repetitions) and semantic clues following propositional development – study reading – comprehending a passage and answering questions of varied kinds, relating to information, inference and prediction.

### **3. WRITING 10 + 3**

One-sentence definition and extended definition - description – paragraph writing (topic sentence and its role, unity, coherence and use of cohesive expressions) – process description (use of sequencing connectives eg. firstly, secondly, then, after, etc.) – comparison and contrast – classifying the data - analysing / interpreting the data - formal and informal letter writing – editing (punctuation, spelling and grammar)

#### **Suggested Activities**

Using appropriate expressions defining / describing an object / device / instrument / machine – writing a paragraph based on information provided in a tree diagram / flow chart / bar chart / pie chart / tables – formal letters – writing to officials (leave letter, seeking permission for practical training, asking for certificates, testimonials) - letter to the editor – informal letters (persuading / dissuading, thanking and congratulating friends / relatives) – sending E-mail – editing a passage (correcting the mistakes in punctuation, spelling and grammar)

### **4. LISTENING 8 + 3**

Extensive listening - listening for general content – listening to fill up information gaps - intensive listening – listening for specific information – note-taking – guided and unguided.

#### **Suggested Activities**

Gap filling activity while listening to a text – listening intently to identify the missing words in a given text – listening to a brief conversation and answering questions - listening to a discourse and filling up gaps in a worksheet – taking notes during the lecture class – inferential comprehension and literal comprehension tasks based on listening – post-listening quizzes.

Note: The listening activities can be done using a work sheet in the Language Laboratory or in the class room using a tape recorder.

### **5. SPEAKING 9 + 3**

Oral practice – developing confidence - introducing oneself - asking for or eliciting information - describing objects – offering suggestions and recommendations – analysing problems and providing solutions – expressing opinions (agreement / disagreement) - giving instructions

#### **Suggested Activities**

Role play activities based on real-life situations – discussing travel plan / industrial visits – giving oral instructions for performing tasks at home and at work (use of imperatives) – participating in a short classroom - discussion on a controversial topic (eg. for and against

Cloning) – oral presentation (closed and open-ended topics related to science and technology)

**L : 45 T : 15 TOTAL : 60**

**TEXT BOOK :**

1. Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Vol.1, 2<sup>nd</sup> Edition, Orient Longman Ltd., 2002.

**REFERENCES :**

1. Chellammal, V., Learning to Communicate: A Resource Book for Scientists and Technologists, Allied Pub. Pvt. Ltd., Chennai, 2003.
2. Sharon J. Gerson, Steven M. Gerson, Technical Writing – Process and Product, 3<sup>rd</sup> Edition, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2004.

**AIM**

The course is aimed at developing the skills of engineering students in the basics of chosen topics of Mathematics that are imperative for effective understanding of engineering subjects. It also lays the foundation for learning further topics of Mathematics in higher semesters in a graded manner. The learners will be enabled to appreciate the important role of mathematical concepts in engineering applications.

**OBJECTIVES**

On completion of the course the students are expected to

- Be capable of identifying algebraic eigenvalue problems from practical areas and obtain the eigensolutions in certain cases and to have acquired the technique of diagonalizing a matrix which would render the eigensolution procedure very simple.
- Have grasped the method of three dimensional analytical geometry to study the properties of lines and planes in space along with sphere as an illustrative curved surface element, providing an elegant tool for enhanced understanding of three dimensional materials which is imperative for engineers.
- Understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.
- Understand and handle functions of more than one variable, from the points of view of their differentiation, expansions and extreme values, along with differentiation under integral sign which are encountered in engineering studies.
- Have learnt the method of solving differential equations of certain types, including systems of differential equations that they might encounter in their studies of other subjects in the same or higher semesters.

**1. MATRICES****9 + 3**

Rank of a matrix – Consistency of linear system of equations – Eigenvalue problem – Eigenvalues and eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley –Hamilton theorem (without proof) – Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

**2. THREE DIMENSIONAL ANALYTICAL GEOMETRY 9 + 3**

Direction cosines and ratios – Angle between two lines – Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

**3. GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9 + 3**

Curvature – Cartesian and polar co-ordinates – Centre and radius of curvature – Circle of curvature – Involutives and evolutes – Envelopes – Properties of envelopes and evolutes – Evolute as envelope of normals.

**4. FUNCTIONS OF SEVERAL VARIABLES 9 + 3**

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

**5. ORDINARY DIFFERENTIAL EQUATIONS 9 + 3**

Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients- Homogeneous equations of Euler type – Equations reducible to homogeneous form – Method of variation of parameters.

**L + T : 45 + 15 = 60**

**TEXT BOOKS**

1. Veerarajan, T., "Engineering Mathematics ( for First Year )," Second Edition , Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2002.
2. Venkataraman, M.K., "Engineering Mathematics, Volume I," Fourth Edition, The National Pub. Co., Chennai, 2003.
3. Kreyszig, E., "Advanced Engineering Mathematics", Eighth Edition, John Wiley and Sons (Asia) Ltd., Singapore, 2001.

**REFERENCES**

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics" Volume I, Fourth Revised Edition, S. Chand & Co., New Delhi, 2000.
3. Widder, D.V. "Advanced Calculus", Second Edition, Prentice Hall of India, New Delhi, 2000.



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

**4. QUANTUM PHYSICS 9**

Planck's quantum theory of black body radiation (Derivations), Photo electric effect - Compton effect (derivation) and Experimental verification of Compton effect – Schrödinger 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.

**5. LASER & FIBRE OPTICS 9**

Einstein's coefficients (A & B), Nd-YAG laser, He-Ne laser, CO<sub>2</sub> laser, Light emitting diode, 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, Medical endoscope

**TOTAL : 45**

**TEXT BOOKS :**

1. Rajendran V. and Marikani A., Applied Physics for Engineers, 3<sup>rd</sup> Edition, Tata McGraw–Hill Publishing Company Limited, New Delhi, 2003.
2. Arumugam M., Engineering Physics, 5<sup>th</sup> Edition, Anuradha Agencies, Kumbakonam, 2003.
3. Palanisamy P.K., Physics for Engineers, Vol.1 & Vol.2, 2<sup>nd</sup> Edition, Scitech Publications, Chennai, 2003.

**REFERENCE BOOKS :**

1. Gaur R.K. and Gupta S.L., Engineering Physics, 8<sup>th</sup> edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.
2. Uma Mukherji, Engineering Physics, Narosa Publishing House, New Delhi, 2003.

**AIMS**

- To develop a sound knowledge of theoretical and modern technological aspects of chemistry
- To enable the student to correlate the theoretical principles with application oriented studies

**OBJECTIVES**

- Should be conversant with the language of thermodynamics, electrochemistry, spectroscopy, surface chemistry to solve simple problems related to different industrial processes.
- The knowledge gained will be a prerequisite for the application oriented topics to be pursued in the later semesters.

**1. ELECTRO CHEMISTRY****9**

Galvanic cells – reversible and irreversible cells – emf and its measurements - single electrode potential – standard electrodes ( $H_2$  & calomel electrodes) – electrochemical series – Nernst equation – problems – metal – metal ion electrode – metal – metal insoluble salt electrode – glass electrode – determination of pH using glass electrode – application of emf measurements – problems – concentration cells – applications – problems – ion selective electrodes – Kohlrausch law of independent migration of ions – applications – conductometric titration's – polarization – overvoltage – decomposition potential.

**2. THERMODYNAMICS****9**

Thermodynamic terms – definition of system – open, closed, isolated - surroundings, properties of system - state of a system - thermodynamic equilibrium – 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 - problems – entropy of phase transitions – problems - definition of free energy and work function – Gibbs Helmholtz equation - applications – problems – van't Hoff isotherm and isochore – applications – problems.

**3. CHEMICAL KINETICS****9**

Kinetics of second order reaction – characteristics of second order reactions – half life period – examples of second order reactions – hydrolysis of ester by sodium hydroxide – simple problems in second order kinetics – kinetics of opposing, parallel and consecutive reactions – examples for consecutive reactions – decomposition of dimethyl ether in gaseous phase – radioactive decay of polonium – examples of parallel reactions – reaction of ethyl bromide with caustic potash – example of opposing reaction –

dissociation of hydrogen iodide – effect of temperature on reaction rate – theory of absolute reaction rate – steady – state principle.

**4. SURFACE CHEMISTRY AND CATALYSIS 9**

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 - Catalysis – classification – characteristics of catalysts – auto catalysis – enzyme catalysis – Michaelis – Menton equation – acid base catalysis.

**5. SPECTROSCOPY 9**

Electromagnetic spectrum – absorption of radiation – electronic transition – vibrational transition – rotational transition – intensities of spectral lines – Beer – Lambert’s Law – colorimetric analysis – estimation of concentration of a solution by colorimetry – flame photometry – theory, instrument (block diagram only) and application – visible & UV spectroscopy – principles, instrument (block diagram only) and simple applications – IR spectroscopy – simple applications only.

**TOTAL : 45**

**TEXT BOOKS :**

1. Puri B.R., Sharma L.R. and Madan S. Pathania, Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., Jalandhar, 2000.
2. Jain P.C and Renuka Jain, Physical Chemistry for Engineers, Dhanpat Rai & Sons, New Delhi. 2001.

**REFERENCE BOOKS :**

1. Bahl B.S., Tuli G.D., and Arun Bahl, Essentials of Physical Chemistry, S.Chand & Company Ltd., New Delhi, 2004.
2. Kuriacose J.C. & Rajaram J, Chemistry in Engineering & Technology, Vol. 1, Tata McGraw-Hill publishing company, New Delhi, 1996.

**OBJECTIVE**

To develop graphic skills for communicating concepts, ideas and designs of engineering products and to give exposure to national standards relating to technical drawings.

**CONCEPTS AND CONVENTIONS (Not for exam) 4**

Importance of graphics in design process – visualization, communication, documentation – BIS conventions – Drafting tools – construction of curves like ellipse, parabola, cycloid and involutes.

**1. PROJECTION OF POINTS, LINES AND SURFACES 12**

General principles of presentation of technical drawings as per BIS – Naming views as per BIS – First angle projection.

Orthographic projection of points

Projections of straight lines located in first quadrant only – determination of true length and true inclination.

Projections of plane surfaces like polygonal lamina and circular lamina, located in first quadrant only.

**2. PROJECTION OF SOLIDS 8**

Projection of simple solids like prism, pyramid, cylinder and cone – Drawing views when the axis of the solid is inclined to one reference plane.

**3. SECTION OF SOLIDS AND DEVELOPMENT 12**

Sectioning of simple solids like prisms, pyramids, cylinder, cone and sphere. 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.

**4. PICTORIAL PROJECTIONS 10**

Isometric projection – Isometric scale – Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by vanishing point method.

**5. FREE-HAND SKETCHING 10**

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.

**6. DEMONSTRATION (NOT FOR EXAM) 4**

Demo of computer aided drafting and dimensioning using appropriate software.

**TEXT BOOK :**

1. Natarajan K.V, “Engineering Drawing and Graphics”, Private Publisher, Chennai, 17<sup>th</sup> Ed. 2003.
2. Venugopal K., “Engineering Graphics”, New Age International (P) Limited, 2002.

**REFERENCES :**

1. Bertoline and Wiebe, Fundamentals of Graphics Communication, Third edition, McGraw-Hill, 2002
2. Warren J. Luzadder and Jon. M.Duff, “Fundamentals of Engineering Drawing”, Prentice Hall of India Pvt. Ltd., Eleventh Edition, 2001.
3. Gopalakrishna K.R., “Engineering Drawing (Vol. I & II)”, Subhas Publications, 1998.

**STANDARDS :**

1. IS 10711 - 2001 Technical Product Documentation - Sizes of drawing sheets
2. IS 9609 - 1983 Lettering on technical drawings
3. IS 10714 - 1983 General Principles of presentation of technical drawings
4. IS 11669 - 1986 General Principles of dimensioning of technical drawings

Special Points applicable to University Examination on Engineering Graphics

1. There will be five questions, of which the question No.1 will not have choice and can be from any unit of the syllabus. The other four questions will be of “Either – OR” type, from the remaining units.
2. All questions will carry equal marks of 20 each making the total of 100 marks.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit the solution within A3 size.
4. Whenever the total number of candidates in a college exceed 150, the University Exam in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of students (approx) at a time.



**REFERENCES:**

1. Allen B.Tucker et.al, "Fundamentals of Computing I", TMH New Delhi, 1998.
2. V.Rajaraman, "Fundamentals of Computers", Prentice-Hall of India, 2002.
3. Herbert Schidt, "C Made Easy", McGraw Hill.

**LIST OF EXPERIMENTS****UNIT -I****a) Word Processing**

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

**b) Spread Sheet**

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

**Unit - II Simple C Programming**

9. Data types, Expression Evaluation, Condition Statements.
10. Functions, Recursion and parameter passing mechanisms.
11. Arrays

**Unit - III**

12. Structures and Unions
13. Pointers and Functions
14. File Processing
15. Dynamic allocation & Linked List

**TOTAL : 30****HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS****Hardware**

- LAN System with 36 nodes (OR) Standalone PCs – 36 Nos.
- 1 Printer

**Software**

- OS – Windows / UNIX Clone
- Application Package – Office suite
- Compiler – C

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. Newton rings – Determination of Focal length of a lens
7. Spectrometer – Dispersive power of a prism
8. Spectrometer – Determination of wavelength of Hg source using Grating
9. Determination of wavelength of Laser using Grating and Particle size determination.
10. Thermo couple – Determination of Thermo emf using Potentiometer

**TOTAL : 30**

**List of equipments needed for Physics Laboratory  
(for a batch of 30 students)**

☞	Torsional Pendulum apparatus (with accessories)	-	6 Nos.
☞	Non uniform Bending apparatus (with accessories)	-	6 Nos.
☞	Viscosity (Poiseuilles flow) apparatus (with accessories)	-	6 Nos.
☞	Lee’s disc apparatus (with accessories)	-	6 Nos.
☞	Air Wedge apparatus (with traveling microscopes and accessories)	-	6 Nos.
☞	Newton’s Rings apparatus (with traveling microscopes and accessories)	-	6 Nos.
☞	Spectrometer (with grating, prisms and accessories)	-	6 Nos.
☞	Diode laser (2 mW power) or He-Ne laser (2mW) (with accessories and Lycopodium particles)	-	6 Nos.
☞	Thermo emf – potentiometer apparatus (with accessories)	-	6 Nos.

**AIM**

- To impart hands on experience in the use of analytical equipments

**OBJECTIVES**

- Should be conversant with the theoretical principles and experimental procedures for quantitative estimation.

**I. Weighing and preparation of standard solutions**

1. Preparation of molar and normal solutions of the following substances - oxalic acid, sodium carbonate, sodium hydroxide, hydrochloric acid.
2. Preparation of buffer solutions: borate buffer, phosphate buffer using Henderson equation.

**II. Water Analysis**

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.

**III. pH**

7. To find out the strength of given hydrochloric acid by sodium hydroxide.

**IV. Conductometry**

8. Conductometric titration of mixture of acids.
9. Conductometric precipitation titration using  $\text{BaCl}_2 - \text{Na}_2\text{SO}_4$ .

**V. Potentiometry**

10. Redox titration – Iron Vs. dichromate.

**VI. Spectrophotometry**

11. To determine the iron content of an unknown solution (1,10-phenanthroline / thiocyanate method)

**VII. Flame photometry**

12. To determine sodium and potassium in water

**VIII Viscometry**

13. Determination of molecular weight of a polymer.

**TOTAL : 30**

**REFERENCE BOOKS :**

1. A Text of Quantitative Inorganic Analysis, A.I.Vogel, ELBS, London.
2. Experiments in Physical Chemistry, D.P. Shoemaker and C.W. Garland, McGraw-Hill, London.

**List of equipments needed for chemistry Laboratory  
(for a batch of 30 students)**

☞ Electronic balance	-	1 No.
☞ pH meter	-	4 No.
☞ Conductivity Bridge	-	4 No.
☞ Potentiometer	-	4 No.
☞ Platinum electrodes	-	4 No.
☞ Calomel electrodes	-	4 No.
☞ Spectrophotometer	-	1 No.
☞ Flame photometer	-	1 No.
☞ Ostwald viscometer	-	10 No.

Glass ware for a batch of 30 students

**OBJECTIVE**

To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

**Group – A (Civil & Electrical)****1. CIVIL ENGINEERING PRACTICE 12****Plumbing**

Basic pipe connections involving the fittings like valves, taps, couplings, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

Study of Pipe Connection on the suction and delivery of pump layout.

Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

**Wood Work**

Sawing, planing, making common joints: T-Joint, Dovetail joint.

**Study**

Study of joints in door panels, wooden furniture.

Study of common industrial trusses using models.

**2. ELECTRICAL ENGINEERING PRACTICE 9**

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.

**Group - B (Mechanical & Electronics)****3. MECHANICAL ENGINEERING PRACTICE 15****Welding**

Arc welding of butt joints, lap joints, tee joints.

Gas welding Practice.

**Basic Machining**

Simple turning, and drilling operations.

### Machine assembly Practice

Study of the following: centrifugal pump, and air-conditioners.

#### Demonstration on

- (a) Smithy operations like the production of hexagonal bolt.
- (b) Foundry operation like mould preparation for grooved pulley.

### 4. ELECTRONIC ENGINEERING PRACTICE

9

Soldering simple electronic circuits and checking continuity. Assembling electronic components on a small PCB and testing Study of telephone, FM radio, low-voltage power supplies.

**TOTAL : 45**

#### Examination Pattern

The Examination is to be conducted for both groups A & B, allotting 1½ hour for each group.

### LIST OF EQUIPMENTS AND COMPONENTS

For a Batch of 30 Students

For Engineering Practices Laboratory

#### CIVIL

- |    |  |         |
|----|--|---------|
| 1. | Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. | 15 Sets |
| 2. | Carpentry vice (fitted to work bench)  | 15 Nos. |
| 3. | Standard wood working tools  | 15 Sets |
| 4. | Models of industrial trusses, door joints, furniture joints  | 5 Each  |

#### MECHANICAL

- |    |  |           |
|----|--|-----------|
| 1. | Arc welding transformer with cables and holders                            | 5 Nos.    |
| 2. | Welding booth with exhaust facility  | 5 Nos.    |
| 3. | Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 Sets.   |
| 4. | Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.    | 2 Nos.    |
| 5. | Centre lathe   | 2 Nos.    |
| 6. | Hearth furnace, anvil and smithy tools                                     | 2 Sets.   |
| 7. | Moulding table, foundry tools  | 2 Sets.   |
| 8. | Study-purpose items : centrifugal pump, air-conditioner                    | One each. |

### **ELECTRICAL**

- |    |  |          |
|----|--|----------|
| 1. | Assorted electrical components for household wiring                  | 15 Sets  |
| 2. | Electrical measuring instruments                                     | 10 Sets  |
| 3. | Study purpose items : Iron box, fan and regulator,<br>emergency lamp | One each |

### **ELECTRONICS**

- |    |  |         |
|----|--|---------|
| 1. | Soldering guns   | 10 Nos  |
| 2. | Assorted electronic components for making circuits                     | 50 Nos  |
| 3. | Small PCBs   | 10 Nos  |
| 4. | Multimeters  | 10 Nos  |
| 5. | Study purpose items : Telephone, FM radio, low-voltage<br>power supply | 2 each. |

*(Common to all branches of Engineering and Technology)*

### AIM

- To help learners improve their English language skills – Listening, Speaking, Reading, Writing (LSRW) and the related sub skills – through a variety of participative learning activities.

### OBJECTIVES

- To provide practice in realizing the meaning potential of a text and to make the learners become familiar with different reading strategies.
- To help learners acquire interpretative and study skills, including library and Internet reference skills.
- To train learners in organised academic and professional writing
- To develop aural competence and oral fluency of learners
- To help learners achieve proficiency in the effective use of language in various authentic career-related situations.

#### 1. FOCUS ON LANGUAGE

**10 + 3**

Cause and effect expressions – indicators of purpose and function – connectives – imperatives – modal verbs – infinitives and gerunds – reporting verbs – editing – varied grammatical functions of the same word - acronyms and abbreviations - rules for writing SI (Systeme Internationale) units

#### Suggested Activities

Giving pairs of cause and effect statements to be linked with expressions such as *because, since, consequently, therefore* and *as a result of* - rewriting pairs of sentences as one sentence using indicators of purpose and function such as *to, in order to* and *so as to* – giving situational instructions (e.g. instructions for changing a punctured tyre) – rewriting instructions as recommendations (e.g. store the cylinders in an upright position → cylinders should be stored in an upright position) – rewriting infinitive forms as gerunds (e.g. to modernize sick industries is difficult → modernizing sick industries is difficult) – completing the sentences by indicating the conditions which are necessary for something to happen – reporting a quoted speech – identifying and correcting the mistakes in spelling and grammar in a given passage - expanding acronyms which are commonly used in science and technology (e.g. LASER, LAN, LCD, ICBM, NASA) – using appropriate units of measurement

#### 2. READING

**8 + 3**

Reading comprehension – guided note-making – providing a suitable title – identifying main points, supporting ideas – evaluating the style (argumentative / descriptive, etc.) – cloze reading – drawing inferences – separating facts from opinions

### **Suggested Activities**

Objective type comprehension questions - making notes based on a passage – filling the gaps with appropriate missing words after thoroughly comprehending the given text – note-making using a given outline – unguided note-making tasks – reconstructing content from notes

### **3. WRITING**

**10 + 3**

Formal letter writing (letter of application, asking for clarification, calling for quotations, placing orders, letter of complaint and resume with statement of purpose and objective) – technique of formatting, drafting and revising – structure of technical reports – industrial report (reports on visits made to industries, report on an accident in the factory) – project proposals – notices – agenda – minutes – memoranda

### **Suggested Activities**

Reports on industrial visits (purpose of visit, preparatory measures to be undertaken for the visit, industry visited, observations made etc.) – reporting events (to think of an imaginary / real industrial accident and report it using the format : introduction comprising ‘when, where, what, how’ of the accident in 2 to 3 lines, a detailed description of the actual accident, investigation conducted, recommendations / suggestions made by the reporter) – a simple project proposal relating to a problem and suggested course of action (e.g. workers in one section of the factory not following safety precautions)

### **4. LISTENING**

**8 + 3**

Listening practice – listening for global comprehension and listening for specific information - listening to speech segments (pronunciation accent & intonation) – listening to recorded telephonic conversation, TV / radio news in English (both American and British English) – listening to short and long conversations in different domains of activity - discussing new inventions, products etc.

### **Suggested Activities**

Post-listening activities: the listening activities may be followed by writing or speaking activities. For example, the students either respond to / give the gist of / enter into a discussion on what they have listened to - listening to a discourse and retelling the content in learner’s own words – listening to instructions and drawing a geometrical figure as instructed

Note : Listening activities can be done in the language laboratory or in the class room using a tape recorder.

### **5. SPEAKING**

**9 + 3**

Oral practice activities related to professional skills (eg. Marketing, Advertising, etc.) – role play activities using different speech functions (persuasion, negotiation, giving directions and guidance) – conversational etiquette (politeness strategies, turn-taking, body language) – group discussions – mock interviews – academic skills : seminar

presentation – summarizing – presenting statistics – making speeches (compering, introducing a guest to the audience, welcome address and proposing a vote of thanks)

**Suggested Activities**

Brief classroom discussion on a topic of current interest - conducting group discussions and mock interviews – allowing students to comper association / club / department / college functions - training students to welcome the gathering, present reports and propose a vote of thanks.

**L : 45, T : 15, TOTAL : 60**

**TEXT BOOK:**

1. Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Vol.2, Orient Longman Ltd., 2002, 2<sup>nd</sup> Edition.

**REFERENCES:**

1. T M Farhathullah, Communication Skills for Technical Students, Orient Longman Ltd., 2002.
2. Andrea J. Rutherford, Basic Communication Skills for Technology, 1<sup>st</sup> Edn., Pearson Education Asia (Singapore) Pte. Ltd., Bangalore, 2001.

**AIM**

An aim of the course is to train the students in additional areas of Engineering Mathematics, necessary for grooming them into successful engineers. The topics introduced will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.

**OBJECTIVES**

On completion of the course the students are expected to

- Have learnt the methods of double and triple integration, which are needed in their studies in other areas, and gained confidence to handle integrals of higher orders.
- Have studied the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.
- Have a good grasp of analytic functions and their interesting properties which could be exploited in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- Have grasped the basics of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.
- Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform technique which have applications in other subjects of the current and higher semesters.

**1. MULTIPLE INTEGRALS****9 + 3**

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 and between Cartesian and cylindrical / spherical polar coordinates.

**2. VECTOR CALCULUS****9 + 3**

Gradient, divergence and curl – Line, surface and volume integrals – Green's, Gauss divergence and Stoke's theorems (without proof) – Verification of the above theorems and evaluation of integrals using them.

### 3. ANALYTIC FUNCTIONS

9 + 3

Function of a complex variable – Analytic function – Necessary conditions – Cauchy – Riemann equations in Cartesian coordinates – Sufficient conditions (Proof not included) – Properties of analytic function – Determination of harmonic conjugate by Milne – Thomson method – Conformal mapping –  $w = z + a$ ,  $az$ ,  $\frac{1}{z}$ ,  $z^2$  and bilinear transformation.

### 4. COMPLEX INTEGRATION

9 + 3

Statement and application of Cauchy's theorem and Cauchy's integral formula – Taylor and Laurent expansion – Singularities – Classification – Residues – Cauchy's residue theorem – Contour integration – Unit circle and semi-circular contours (excluding poles on real axis).

### 5. LAPLACE TRANSFORM

9 + 3

Laplace Transform – Sufficient conditions – Transforms of elementary functions – Basic properties – Inverse transforms – Derivatives and integrals of transforms – Transforms of derivatives and integrals – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations up to second order with constant coefficients.

**L + T : 45 + 15 = 60**

#### TEXT BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Kreyzig, E., "Advanced Engineering Mathematics", Eighth Edition, John Wiley & Sons (Asia) Pte, Ltd., Singapore, 2001.

#### REFERENCE

1. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes I and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai, 2002.



Bonded ceramics, Manufacturing methods- slipcasting - Isostatic pressing –Gas pressure bonding- Properties – Thermal, mechanical electrical & chemical ceramic fibres – ferroelectric and ferro magnetic ceramics – High Aluminum ceramics

## **5. MEDICAL PHYSICS**

**9**

Ultrasound picture of human body- Block diagram of basic pulse Echo system-A-scan, B-scan and M-scan – Psychological effect of ultrasound therapy- Phonocardiograph (PCG) – source of radioactivity for nuclear medicine – statistical aspects- Basic instrumentation (Geiger –Muller counter, Photo multiplier Tube & Scintillation detector (Renogram) and its clinical applications (Thyroid and Kidney function) - Nuclear medicine imaging devices –Gamma Camera –Positron camera

**TOTAL = 45**

### **TEXT BOOKS:**

1. Rajendran V. and Marikani A., Applied Physics for Engineers, 3<sup>rd</sup> edition, Tata McGraw–Hill Publishing Company Limited, New Delhi, 2003.
2. Avadhanulu M.N., Kshirsagar P.G., A Text Book of Engineering Physics, 6<sup>th</sup> edition, S.Chand & Co. Ltd., New Delhi, 2003.

### **REFERENCES:**

1. Palanisamy, P.K., Materials Science, 2<sup>nd</sup> Edition, Scitech Publication India, Pvt. Ltd., Chennai, 2003.
2. Arumugam M., Biomedical Instrumentation, 2<sup>nd</sup> edition, Anuradha Agencies, Kumbakonam, 2003.
3. Srivastava C.M., Srinivasan C, Science of Engineering Materials, 2<sup>nd</sup> edition, New Age International (P) Ltd., Pub. New Delhi, 1997.
4. Ali Omar M, Elementary Solid State Physics, Pearson Education (Singapore), Indian Branch, New Delhi, 2002.

*(Common to Chemical Engineering, Polymer Technology, Biotechnology and Fashion Technology)*

**AIM**

- To impart a sound knowledge on the principles of chemistry involved in the different applications oriented topics.

**OBJECTIVES**

- The students should be conversant with the principles involved in the bonding of molecules, the formation of polymers and their compounding into different end-use products, the chemical nature of building materials and composites.
- Treatment of water for domestic and industrial purposes.
- Types and mechanism of corrosion and control measures.
- Properties and applications of fossil fuels and combustion calculations.

**1. CHEMICAL BONDING 9**

Types of bonding: van der Waals forces, dispersion, dipole – dipole and dipole – induced dipole attraction of molecules – hydrogen bonding - the LCAO method – homo and hetero diatomic molecules, bond order, bond energy, magnetic properties – coordinate bond - crystal field theory, octahedral, square planar and tetrahedral complexes – chelates – industrial applications of co-ordination complexes – metallic bond – band theory.

**2. POLYMER CHEMISTRY 9**

Monomers – functionality – polymer – degree of polymerization – classification based on source and applications – effect of polymer structure on properties – addition, condensation, co-polymerization and co-ordination polymerization – mechanism of addition – polymerization (free radical mechanism) thermosetting and thermoplastics resins – preparation, properties and applications of polythene, polypropylene, TEFLON, polystyrene, polyvinyl chloride, PMMA, polyamides, polyesters, bakelite, epoxy resins – vulcanization of rubber – rubber blended plastics – laminated plastics – laminated glass – thermocole.

**3. CORROSION AND CORROSION INHIBITION 9**

Corrosion – causes of corrosion – principles of chemical corrosion – Pilling – Bedworth rule – principles of electrochemical corrosion – difference between chemical and electrochemical corrosion – factors influencing corrosion – types of corrosion – galvanic corrosion – differential aeration corrosion – stress corrosion – soil corrosion - pitting corrosion, water line corrosion – corrosion control – cathodic protection – sacrificial anode – selection of materials and proper designing – corrosion inhibitors, protective coatings – paints – constituents – functions – mechanism of drying – varnishes and lacquers – special paints – fire retardant, water repellent, temperature indicating and luminous paints.

#### **4. WATER TREATMENT**

**9**

Disadvantages of hard water in industries – conditioning methods – external treatment methods – zeolite and ion exchange methods - internal treatment (colloidal, phosphate, calgon, carbonate methods) – desalination (reverse osmosis and electro-dialysis) – requisites of drinking water – treatment of domestic water (screening, sedimentation, coagulation, filtration, disinfection – by chlorination, UV treatment, ozonization)

#### **5. FUELS AND COMBUSTION**

**9**

Classification of fuels (solid, liquid and gaseous) comparison – coal varieties – analysis of coal, proximate (moisture, volatile matter, ash content & carbon content) – significance – ultimate analysis (carbon, hydrogen, nitrogen, ash & oxygen) – significance – coke manufacture (Otto-Hoffman by product coke oven method) – characteristics of metallurgical coke – petroleum – refining – fractions – composition and uses – cracking – thermal and catalytic (fixed bed & fluidized bed) - synthetic petrol (polymerization – thermal and catalytic methods) – Fischer – Tropsch method – Bergius process – knocking – octane number – improvement of antiknock characteristics – diesel engine fuel – cetane number – gaseous fuels – production composition and uses of producer gas, water gas and natural gas - combustion – gross and net calorific values – theoretical calculation of calorific values (Dulong's formula) – calculation of minimum requirement of air (simple calculations) – explosive range, spontaneous ignition temperature – flue gas analysis – Orsat apparatus.

**TOTAL : 45**

#### **TEXT BOOKS:**

1. Jain P.C. and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing company (P) Ltd, New Delhi, 2002.
2. Dara S.S. A Textbook of Engineering chemistry, S.Chand & company Ltd, New Delhi, 2003.



**5. FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 12**

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction

Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

**L: 45, T: 15, TOTAL: 60**

**TEXT BOOK**

1. Beer,F.P and Johnson Jr. E.R, “Vector Mechanics for Engineers”, Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 1997.

**REFERENCES**

1. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000
2. Ashok Gupta, Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM), Pearson Education Asia Pvt., Ltd., 2002
3. Palanichamy, M.S., Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill, 2001.
4. Irving H. Shames, Engineering Mechanics - Statics and Dynamics, IV Edition - Pearson Education Asia Pvt. Ltd., 2003
5. Rajasekaran, S, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 2000

**1. ELECTRICAL CIRCUITS 5**

Ohms Law - Kirchoff's Laws - steady state solution of DC circuits - Introduction to AC circuits - Waveforms and RMS value - power and power factor, single phase and 3 phase-balanced circuits.

**2. DC MACHINES AND AC MACHINES 9**

Construction – EMF and torque – circuit model – armature reaction commutation – methods of excitation – characteristics of generators – characteristics of motors – starting and speed control – testing and efficiency – parallel operation. Transformers (single phase and three phase) -Synchronous Machines - 3 Phase and single phase Induction motors - (op. principles).

**3. ELECTRICAL MEASUREMENTS 4**

Moving coil and moving iron instruments (Ammeter and Voltmeter) Dynamometer type watt meters and energy meters (op. principles).

**4. SEMICONDUCTORS AND RECTIFIERS 9**

Classification of solids based on energy band theory – intrinsic semiconductors- Extrinsic semiconductors – P type; and n type –Pn junction – VI characteristic of Pn junction diode – Zener diode characteristic – Half wave and full wave rectifiers – voltage regulation.

**5. TRANSISTORS AND AMPLIFIERS 9**

Bipolar junction transistor– CB, CE, CC – configurations and characteristics – Elementary treatment of voltage amplifier – Class A, B and C power amplifiers – principles of tuned amplifiers.

**6. SIGNAL GENERATORS AND LINEAR ICS 9**

Sinusoidal oscillators – Positive feed back RC phase shift - Hartley, Colpit's Wien bridge oscillators – Multivibrators – Operational amplifier – Adder, Multiplier, integrator and differentiators – Integrated circuits.

**TOTAL : 45**

**TEXT BOOKS**

1. V.N. Mittle, ' Basic Electrical Engineering', TMH Edition, New Delhi, 1990.
2. R.S. Sedha, 'Applied Electronics'.

**REFERENCES**

1. Jimmie J. Cathey and S.A. Nasar, ' Basic Electrical Engineering', Schaurn outline series in Engineering. McGraw Hill Book Co. 1987.
2. V.K. Mehta, "Principles of Electronics", S. Chand and company Ltd., 1994.

**LIST OF EXPERIMENTS**

**1.      UNIX COMMANDS**

- (i)    Study of Unix OS - Basic Commands - Process Management Commands - Unix Editor

**2.      SHELL PROGRAMMING**

- (i)    Simple Shell program - Conditional Statements - Testing and Loops  
(ii)   Commands line substitution

**3.      C PROGRAMMING AND FILE MANAGEMENT**

- (i)    C Program to implement Unix Commands

**4.      PROCESS MANAGEMENT AND SIGNAL HANDLING**

- (i)    Programs in C for signal handling and Process management

**TOTAL : 45**

**HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**

**Hardware**

- 1 UNIX Clone Server
- 36 Nodes (thin client or PCs)
- 1 Printer

**Software**

- OS                                    –      UNIX Clone (36 user license or License free Linux)
- Compiler                            -      C

**Group A**

1. O.C.C. on DC generator
2. Load test on DC generator
3. Load test on DC shunt motor
4. Load test on Single phase induction motor
5. Load test on 3-phase cage induction motor
6. Load test on 3-phase slip ring induction motor
7. Load test on single phase transformer.

**Group B**

1. Characteristics of diode and Zener diode
2. Half-wave and full-wave rectifier – study of wave forms and regulations
3. Transistor I/P and O/P characteristics in CE configuration.
4. FET characteristics
5. RC phase shift oscillator
6. Operational amplifier circuits – Inverter, Multiplier, Divider, Adder, Subtractor, Integrator and Differentiator.
7. Study of logic gates – AND, OR, INVERTER, NAND, NOR
8. half adder and full adder

A total 8 experiments (4 from Group A and 4 from Group B) may be done in the laboratory.

**Laboratory Requirements**

*(for a batch of 15 students)*

S.No.	Name of the Equipment	Quantity required
1.	3 phase Induction motor	2 Nos.
2.	Single phase transformer	6 Nos.
3.	DC shunt motor	2 Nos.
4.	DC generator	3 Nos.
5.	Biopolar junction transistor	Min. 15 each
6.	Common emitter	Min. 15 each
7.	Logic gate	Min. 15 each
8.	Diode	Min. 15 each
9.	Rectifier circuit	Min. 15 each
10.	Ammeter	Min. 15 each
11.	Voltmeter	Min. 15 each
12.	Wattmeter	Min. 15 each
13.	Auto transformer	Min. 15 each

14.	Tachometer	Min. 15 each
15.	Resistive load	Min. 15 each
16.	Rheostat	Min. 15 each
17.	DPSI & SPSI switch	Min. 15 each
18.	Load bank	2 Nos.