

ANNA UNIVERSITY :: CHENNAI – 600 025

CURRICULUM - 2004

B.TECH. BIOTECHNOLOGY

SEMESTER – I

Code No.	Course Title	L	T	P	M
THEORY					
HS1101	English I	3	1	0	100
MA1101	Mathematics I	3	1	0	100
PH1101	Physics I	3	0	0	100
CY1101	Chemistry I	3	0	0	100
GE1102	Fundamentals of Computing	3	0	0	100
GE1101	Engineering Graphics	1	3	0	100
PRACTICALS					
PH1102	Physics Laboratory	0	0	2	100
CY1102	Chemistry Laboratory	0	0	2	100
GE1103	Engineering Practices Lab	0	0	3	100
GE1104	Computer Practice I	0	0	3	100

SEMESTER – II

Code No.	Course Title	L	T	P	M
THEORY					
HS1151	English II	3	1	0	100
MA1151	Mathematics II	3	1	0	100
PH1156	Physics II	3	0	0	100
BT1151	Biochemistry I	3	0	0	100
GE1151	Engineering Mechanics	3	1	0	100
EE1163	Electrical and Electronics Engineering	3	0	0	100
PRACTICALS					
GE1152	Computer Practice II	0	0	3	100
EE1164	Electrical and Electronics Engineering Lab	1	0	3	100
BT1152	Biochemistry Lab	0	0	4	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_(i)O_(d) 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, 2nd 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, 3rd 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.

AIM

- To enhance theoretical and modern technological aspects in Physics
- To enable the students to correlate the theoretical principles with application oriented studies
- To introduce fundamentals of science for engineering applications.

OBJECTIVES

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

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

1. ACOUSTICS AND ULTRASONICS**9**

Classification of sound – characteristics of musical sound, Loudness – Weber Fechner law – Decibel, Phon, Sone -Reverberation – Reverberation time, Derivation of Sabine’s formula for reverberation time (Rate of Growth and Rate of Decay) – Absorption coefficient and its determination - Factors affecting acoustics of buildings (Optimum reverberation time, Loudness, Focussing, Echo, Echelon effect, Resonance and Noise) and their remedies.

Ultrasonic production – Magnetostriction & piezoelectric methods - Detection – Thermal and Piezoelectric methods, properties, Determination of velocity of ultrasonic waves in liquid using acoustic grating - Applications – SONAR, Measurement of velocity of blood flow & movement of heart.

2. CRYSTALLOGRAPHY & NON-DESTRUCTIVE TESTING**9**

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

3. WAVE OPTICS**9**

Air wedge (theory and experiment) - testing of flat surfaces, Antireflection coatings, Interference filters. Michelson interferometer, Types of fringes, Determination of

wavelength of monochromatic source and thickness of a thin transparent sheet - Theory of plane, circularly and elliptically polarized light - quarter and half wave plates, production and analysis of plane, circularly and elliptically polarized light - Photo elasticity – Birefringence - effect of a stressed model in a plane polariscope – Isoclinic and isochromatic fringes – Photo elastic bench

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, CO₂ 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, 3rd Edition, Tata McGraw–Hill Publishing Company Limited, New Delhi, 2003.
2. Arumugam M., Engineering Physics, 5th Edition, Anuradha Agencies, Kumbakonam, 2003.
3. Palanisamy P.K., Physics for Engineers, Vol.1 & Vol.2, 2nd Edition, Scitech Publications, Chennai, 2003.

REFERENCE BOOKS :

1. Gaur R.K. and Gupta S.L., Engineering Physics, 8th 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.

TOTAL : 60

TEXT BOOK :

1. Natarajan K.V, “Engineering Drawing and Graphics”, Private Publisher, Chennai, 17th 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 : 45**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,
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
power supply | 2 each. |

HS1151

ENGLISH II

3 1 0 100

(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 (Système 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, 2nd Edition.

REFERENCES:

1. T M Farhathullah, Communication Skills for Technical Students, Orient Longman Ltd., 2002.
2. Andrea J. Rutherford, Basic Communication Skills for Technology, 1st 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 BOOK

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, 3rd edition, Tata McGraw–Hill Publishing Company Limited, New Delhi, 2003.
2. Avadhanulu M.N., Kshirsagar P.G., A Text Book of Engineering Physics, 6th edition, S.Chand & Co. Ltd., New Delhi, 2003.

REFERENCES:

1. Palanisamy, P.K., Materials Science, 2nd Edition, Scitech Publication India, Pvt. Ltd., Chennai, 2003.
2. Arumugam M., Biomedical Instrumentation, 2nd edition, Anuradha Agencies, Kumbakonam, 2003.
3. Srivastava C.M., Srinivasan C, Science of Engineering Materials, 2nd 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.

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. General guidelines for working in biochemistry lab (theory)
2. Units of volume, weight, density and concentration measurements and their range in biological measurements. Demonstration of proper use of volume and weight measurement devices.
3. Accuracy, precision, sensitivity and specificity (theory)
4. Preparation of buffer –titration of a weak acid and a weak base.
5. Qualitative tests for carbohydrates – distinguishing reducing from non-reducing sugars and keto from aldo sugars.
6. Quantitative method for amino acid estimation using ninhydrin – distinguishing amino from imino acid.
7. Protein estimation by Biuret and Lowry's methods.
8. Protein estimation by Bradford and spectroscopic methods.
9. Extraction of lipids and analysis by TLC.
10. Estimation of nucleic acids by absorbance at 260 nm and hyperchromic effect (demo).
11. Enzymatic assay: phosphatase from potato.
12. Enzymatic assay: estimation of glucose by TGO method after hydrolysis of starch with acid and specificity of the enzymatic method.

TOTAL :60**LIST OF EQUIPMENT**

Sl.No.	Description of Equipments	Quantity required
1.	pH meter	2
2.	Colorimeter	3
3.	Water bath (Dry bath 40°C - 120°C preferred)	3
4.	Balance (500 g – 0.1 g)	1
5.	Balance (0.1 mg)	1
6.	Table top Centrifuge Remi R-24	1
7.	Microfuge	2
8.	Micropipettes 20 µl - 200 µl; 1 µl – 20 µl	3 3
9.	Oven	1
10.	UV – vis spectrometer	1
11.	Vortexer	4
12.	Magnetic Stirrer	2
13.	Fume hood	1
14.	Bunsen Burner	4
15.	Microplate Reader (vis-range) (300-700 nm)	1

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.