ANNA UNIVERSITY : : CHENNAI – 600 025

CURRICULA & SYLLABI

FOR THE

FIRST YEAR B.E. / B.TECH. DEGREE PROGRAMMES

UNDER ANNUAL PATTERN

with effect from 2006-2007 onwards

(as revised by the Syllabi Sub-Committee met on 01.04.2006

and as approved by the Standing Committee held on 02.04.2006)

Curriculum & Syllabi for I year B.E / B.Tech programmes
(Annual Pattern with effect from 2006-2007)

Curriculum for _____ Engineering Programme

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
	Basic Engineering and/or	4	0	0	100
	Core subject(s) of the concerned branch	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. CIVIL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
CE1X01	Construction Materials	2	0	1	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. MECHANICAL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EE1X02	Basic Electrical and Electronics Engg	3	0	0	100
ME1X01	Manufacturing Technology I	2	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. PRODUCTION ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EE1X02	Basic Electrical and Electronic Engg.	3	0	0	100
PR1X01	Production Technology I	2	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. AUTOMOBILE ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EE1X02	Basic Electrical and Electronics Engg.	3	0	0	100
PR1X02	Production Technology	2	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. MECHATRONICS ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X12	Electronics Devices and Circuit	2	0	2	100
MH1X01	Engineering Materials and Metallurgy	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. AERONAUTICAL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EE1X02	Basic Electrical and Electronics Engg.	3	0	0	100
PR1X02	Production Technology	2	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. METALLURGICAL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
MY1X01	Extractive Physical Metallurgy	3	0	0	100
PR1X02	Production Technology	2	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. MARINE ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
EE1X02	Basic Electrical and Electronic Engg.	3	0	0	100
MV1X01	Seamanship, Navigation and Safety Practices	4	0	0	100
MV1X02	Basics for Marine Engineering	4	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. ELECTRICAL & ELECTRONICS ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
CE1X11	Solid and Fluid Mechanics	3	1	0	100
EE1X01	Electric Circuit Analysis	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. ELECTRONICS & INSTRUMENTATION ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
CE1X11	Solid and Fluid Mechanics	3	1	0	100
EE1X01	Electric Circuit Analysis	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. INSTRUMENTATION & CONTROL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
CE1X11	Solid and Fluid Mechanics	3	1	0	100
EE1X01	Electric Circuit Analysis	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X01	Electron Devices	3	0	0	100
EC1X02	Circuit Analysis	3	0	2	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. COMPUTER SCIENCE AND ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X11	Electron Devices & Circuits	3	0	2	100
EE1X11	Electrical Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. INFORMATION TECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X11	Electron Devices & Circuits	3	0	2	100
EE1X11	Electrical Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.E. BIOMEDICAL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
EC1X04	Electron Devices	3	0	2	100
BM1X01	Human Anatomy	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. CHEMICAL ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
CH1X01	Principles of Chemical Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. TEXTILE TECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
TT1X01	Polymer Science & Textile Fibre Production	4	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. TEXTILE TECHNOLOGY (TEXTILE CHEMISTRY)

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
TT1X01	Polymer Science & Textile Fibre Production	4	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. POLYMER TECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
EE1X12	Electrical and Electronics Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. BIOTECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
BT1X01	Biochemistry - I	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. PETROLEUM ENGINEERING

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
PE1X01	Petroleum Thermodynamics	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X03	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. TEXTILE TECHNOLOGY (FASHION TECHNOLOGY)

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
FT1X01	Fashion Art & Design	3	1	0	100
FT1X02	Yarn Manufacture	3	1	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X06	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. RUBBER AND PLASTICS TECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
EE1X12	Electrical and Electronics Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X06	Engineering Practices Laboratory	0	0	2	100

CURRICULUM 2004

FIRST YEAR – ANNUAL PATTERN

B.Tech. FOOD TECHNOLOGY

(To be followed from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
HS1X01	Technical English	3	0	0	100
MA1X01	Engineering Mathematics - I	3	1	0	100
PH1X01	Engineering Physics	3	0	0	100
CY1X01	Engineering Chemistry	3	0	0	100
GE1X04	Engineering Mechanics	3	1	0	100
CH1X01	Principles of Chemical Engineering	3	0	0	100
GE1X01	Engineering Graphics	3	0	0	100
GE1X02	Computer Programming	2	0	2	100
PRACTICAL					
PC1X01	Physics & Chemistry Laboratory	0	0	3	100
GE1X06	Engineering Practices Laboratory	0	0	2	100

HS1X01	TECHNICAL ENGLISH	L	T	P	M
	(Common to all branches of B.E / B.Tech)	3	0	0	100

Aim

- To encourage learners to involve in participative learning of the target language (English) and help them acquire proficiency in technical communication and the related sub-skills.

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts.
- To familiarize learners with different rhetorical functions of Technical English.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak effectively in English in real-life and career-related situations.
- To train learners in organized academic and professional writing.

Unit – I Focus on Language (20)

Word formation with prefixes and suffixes - synonyms and antonyms - nominal compounds – subject - verb agreement - tenses (simple present, present continuous, present perfect, simple past, past continuous, past perfect, simple future) - impersonal passive - comparative adjectives – purpose and function cause and effect – imperatives – gerund - preposition

Suggested Activities

- Using prefixes and suffixes to change the grammatical functions of words – giving synonyms and antonyms
- Expansion of noun + noun phrases - correction of errors in the given sentences.
- Providing a context for the use of the tenses - rewriting the sentences in the impersonal passive form.
- Using comparative forms of adjectives in sentences giving a pair of purpose and function statements to be linked with expressions like to / in order to / so as to (Eg: He wanted to check the oil in the engine. He used a dipstick. He used a dipstick in order to check the oil in the engine).
- Giving pairs of cause and effect statements to be linked with expressions like *as / since / because* - rewriting imperative sentences

using '*should*'- (e.g.: Store the cylinders in upright position. – The cylinders should be stored in upright position).

- Rewriting infinitive forms as gerunds (eg: To modernize sick industries is difficult - Modernizing sick industries is difficult.) - fill in the blanks with appropriate prepositions.

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

Unit – II Reading I (14)

Predicting the content – skimming the text for the gist – identifying the topic sentence – guessing the meaning of words from contexts – scanning for specific information - transfer of information – cloze reading.

Suggested Activities

- Taking a quick glance at the text to predict the content – reading to identify the main content
- Identifying the topic sentence in a paragraph – providing suitable titles for paragraphs – matching the titles with the paragraphs.
- Guessing the contextual meaning of words – comprehending a passage and answering questions of varied kinds.
- Transferring of information from a text to graphical representations like tree diagram / flow chart / bar chart / pie chart/ tables.
- Filling the gaps with appropriate missing words from the given list.

Unit – III Reading II (16)

Note – making, guided and open: providing a suitable title – identifying main and supporting ideas – listing ideas using a numbering scheme – understanding the organization of text – understanding discourse coherence – sequencing of sentences.

Suggested Activities

- Making notes based on a passage in the format given.
- Using an appropriate format to make notes from a given passage.
- Providing a suitable title after reading the passage.
- Identifying main and supporting ideas by scanning.
- Sequencing of jumbled sentences using linguistic clues (e.g.: reference words).

Unit – IV Writing I (22)

Writing definitions and descriptions – paragraph writing (topic sentence and its role, unity, coherence and use of cohesive expressions) - Formal letters: seeking permission for practical training, application for a job with biodata, letter to the editor of a newspaper). - Business letters: calling for quotations, asking for clarification, placing order, letter of complaint – sending an E-Mail.

Suggested Activities

- Using appropriate expressions to define / describe an object / device / process.
- Writing paragraphs on different scientific discourse patterns like classification, comparison and problem / solution – identifying the topic sentence.
- Using unity, cohesion and coherence in paragraph writing.
- Writing formal and business letters using the appropriate format.
- Note – taking (guided and open).
- Summarizing and writing paragraphs based on listening tasks in the prescribed textbooks.

Unit – V Writing II (18)

Making recommendations by using modal auxiliary verbs like *should, must, ought to* etc. – preparation of checklists – giving instructions – essay writing.

Suggested Activities

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

L = 90 Periods

TEXT BOOKS

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

REFERENCES

1. V.R. Narayanaswami, Strengthen Your Writing, 3rd Edition, Orient Longman, 2005.

2. Andrea J. Rutherford, Basic Communication Skills for Technology, 1st Edition, Pearson Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.

3. Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001.

MA1X01	ENGINEERING MATHEMATICS - I	L	T	P	M
	(Common to all branches of B.E / B.Tech)	3	1	0	100

Aim

The course is aimed at developing the basic Mathematical skills of Engineering students that are imperative for effective understanding of Engineering subjects. 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 identify algebraic eigenvalue problems from practical areas and obtain the eigensolutions in certain cases.
- to diagonalize a matrix which would render the eigensolution procedure very simple.
- to understand effectively the geometrical aspects of curvature, maxima and minima concept as elegant applications of differential calculus.
- to solve differential equations of certain types, including systems of differential equations that they might encounter in the same or higher semesters.
- to understand double and triple integration and enable them to handle integrals of higher orders.
- to know the basics of vector calculus comprising of gradient, divergence & curl and line, surface & volume integrals along with the classical theorems involving them.
- to understand analytic functions and their interesting properties.
- to know conformal mappings with a few standard examples that have direct application.
- to grasp the basics of complex integration and the concept of contour integration which is important for evaluation of certain integrals encountered in practice.
- to have a sound knowledge of Laplace transform and its properties.
- to solve certain linear differential equations using the Laplace transform technique which have applications in other subjects of the current and higher semesters.

UNIT - I MATRICES AND DIFFERENTIAL CALCULUS (18+6)

Eigenvalue problem – Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem (excluding proof) - Similarity transformation (Concept only) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Orthogonal reduction to its canonical form.

Curvature – Cartesian and Parametric Co-ordinates – Centre and radius of curvature – Circle of curvature- Maxima / Minima for functions of two variables – Method of Lagrangian multiplier – Jacobians.

UNIT – II ORDINARY DIFFERENTIAL EQUATIONS (ODE) AND APPLICATIONS (18+6)

Solution of second and higher order linear ODE with constant coefficients – Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients.

Solution of ODE related to electric circuits, bending of beams, motion of a particle in a resisting medium and simple harmonic motion.

UNIT – III MULTIPLE INTEGRALS AND VECTOR CALCULUS (20+6)

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Area as a double integral – Change of variables between Cartesian and polar co-ordinates – Triple integration – Volume as a triple integral.

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proof) – Simple applications.

UNIT – IV ANALYTIC FUNCTIONS AND COMPLEX INTEGRATION (18+6)

Function of a complex variable – Analytic function – Necessary conditions – Cauchy – Riemann equations – Sufficient conditions (excluding proof) – Properties of analytic function – Harmonic conjugate – Construction of Analytic functions - Conformal mapping: $w = z+a$, az, $1/z$, and bilinear transformation.

Statement and application of Cauchy's integral theorem and integral formula – Taylor and Laurent expansions – Isolated singularities – Residues - Cauchy's residue theorem. Contour integration over unit circle and semicircular contours (excluding poles on boundaries)

UNIT – V LAPLACE TRANSFORM (16+6)

Laplace Transform – Conditions for existence – Transform of elementary functions – Basic properties – Derivatives and integrals of transforms – Transforms of derivatives and integrals – Initial and final value theorems – Transforms of unit step function and impulse function – Transform of periodic functions.

Inverse Laplace transform – Convolution theorem – Solution of linear ODE of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transformation.

L+T = 90+30 = 120 Periods

TEXT BOOK

1. Grewal, B.S., Higher Engineering Mathematics, Thirty Eighth Edition, Khanna Publishers, Delhi 2004.

REFERENCES

1. Bali, N.P. and Narayana Iyengar, N.Ch.S, Engineering Mathematics, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
2. Kandasamy. P., Thilagavathy. K, and Gunavathy. K, Engineering Mathematics Volume I & II, S. Chand & Co, New Delhi, 2005.
3. Kreyszig, E, Advanced Engineering Mathematics, Eighth Edition, John Wiley and Sons (Asia) Limited, Singapore 2001.
4. Veerarajan. T., Engineering Mathematics (for first year), Fourth Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2005.
5. Venkataraman. M. K., Engineering Mathematics, Volume I and II Revised enlarged Fourth Edition, The National Publishing Company, Chennai, 2004.

PH1X01	ENGINEERING PHYSICS	L	T	P	M
	(Common to all branches of B.E / B.Tech)	3	0	0	100

Aim

- To enhance students' knowledge of 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 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
- Conducting, superconducting and dielectric materials
- Semi conducting and new engineering materials

Unit – I Acoustics, Ultrasonics and Crystal Physics (18)

Acoustics: Classification of sound – Characteristics of musical sound – Loudness – Weber-Fechner law – Decibel – Absorption coefficient – Reverberation – Reverberation time – Sabine's formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.
Ultrasonics: Ultrasonic production: Magnetostriction and piezo electric methods –Determination of velocity of ultrasonic waves (acoustic grating) – SONAR
Crystal Physics: Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures.

Unit – II Wave Optics, Lasers and Fibre Optics (18)

Wave Optics: Michelson's interferometer: Types of fringes – Determination of wave length of monochromatic source and thickness of a thin transparent sheet – Expressions for plane, circularly and elliptically polarized light (derivation) – Quarter and Half wave plates- Production and detection of plane, circularly and elliptically polarized light – Photo elasticity: Birefringence – Stress-optic law - Effect of a stressed model in a plane polariscope – Isoclinic and Isochromatic fringes (definitions) – Photoelastic bench.

Lasers: Einstein coefficients (A&B), Nd – YAG laser, CO_2 laser, semiconductor laser (homojunction) – Uses of lasers – Holography- Construction and Reconstruction of a hologram.
Fibre Optics: Principle and propagation of light in optical fibres – Numerical Aperture and Acceptance angle – Types of optical fibres (material, refractive index, mode) – Applications: Fibre optics communication system (block diagram only) – Fibre optic sensors (displacement sensor and pressure sensor).

Unit - III Conducting Materials & Quantum Physics (18)

Conducting Materials: Conduction in metals – Mobility and conductivity - Classical free electron theory of metals – Electrical conductivity - Thermal conductivity – Wiedmann Franz law – Lorentz number – Drawbacks of classical theory.
Quantum Physics: Black body radiation – Planck's theory (derivation)-Deduction of Wien's displacement law and Rayleigh - Jeans' law from Planck's theory – Compton effect - Theory and experimental verification - Schroedinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Extension to 3 dimension (no derivation) – Degeneracy.
Energy Bands in Solids: Band theory of solids (qualitative) - Classification of solids into metals, semiconductors and insulators on the basis of band theory - Fermi distribution function - Effect of temperature on Fermi function - Density of energy states - Carrier concentration in metals - Energy distribution of electrons - Work function.

Unit - IV Semiconducting and Superconducting Materials (18)

Intrinsic Semiconductors: Carrier concentration in an intrinsic semiconductor – Calculation of density of holes and electrons – Fermi level and its variation with temperature – Mobility and conductivity – Determination of band gap.
Extrinsic Semiconductors: Expression for carrier concentration in n-type and p-type semiconductors – Variation of Fermi level with temperature and impurity concentration –Hall effect – Determination of Hall coefficient.
Superconducting Materials: Superconducting phenomena – Properties of superconductors – Meissner effect and Isotope effect– Type I and Type II superconductors – High T_c superconductors (qualitative) – Uses of superconductors.

Unit - V Dielectrics, New Materials and NDT (18)

Dielectrics: Electrical susceptibility - Dielectric constant – Electronic, ionic, orientational and space charge polarizations – Frequency and temperature dependence of polarization – Internal field – Claussius-Mosotti relation (derivation) - Dielectric loss – Dielectric breakdown – Uses of dielectric materials (Capacitor and Transformer).
Introduction to New Materials: Metallic glasses – Nano materials – Shape memory alloys – Bio-materials.

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

L = 90 Periods

TEXT BOOKS

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

REFERENCE BOOKS

1. **Pillai S. O.**, "Solid State Physics", New Age International Publication, New Delhi, Fifth Edition, 2003.
2. **Palanisamy P. K.**, "Physics for Engineers", Scitech Publications (India) Pvt. Ltd., Chennai, Second Edition, 2005.
3. **Arumugam M.,** "Engineering Physics", Anuradha Agencies, Kumbakonam, Second Edition, 2005.
4. **Rajendran V.** and **Marikani A.**, "Materials Science", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004.

CY1X01 **ENGINEERING CHEMISTRY** **L T P M**

(Common to all branches of B.E / B.Tech) **3 0 0 100**

Aim

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

Objectives

The student should be conversant with

- The principles involved in corrosion and its inhibition.
- Treatment of water for industrial purposes and the concept of energy storage devices.
- Knowledge with respect to phase rule and surface chemistry applications.
- Polymer and engineering materials.
- Important analytical techniques and fuels technology.

UNIT – I **(18)**

Engineering Materials: Abrasives – Moh's scale of hardness – natural abrasives (diamond, corundum, emery, garnets and quartz) – synthetic abrasives (silicon carbide, boron carbide) – refractories – characteristics – classification (acidic, basic and neutral refractories) – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina bricks, magnesite and zirconia bricks – adhesives – adhesive action – classification with examples – epoxy resin.

Lubricants and Polymers – Classification with examples – properties (viscosity index, flash and fire points – cloud and pour point, oiliness) – solid lubricants – graphite – molybdenum sulphide – engineering plastics – PVC, teflon, polycarbonate, polyurethane and thermocole – properties – applications – compounding of plastics, moulding methods – injection moulding and compression moulding – polymer blends and alloys.

UNIT – II **(18)**

Surface Chemistry: Adsorption – types – adsorption of gases on solids – adsorption isotherm – Freundlich and Langmuir isotherms – adsorption of solutes from solutions – role of adsorbents – activated carbon in pollution abatement of air and waste water.

Phase rule: Statement and explanation of the terms involved – one component water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (Pb - Ag system only) – alloys – importance, ferrous alloys – nichrome, alnico and stainless steel, non-ferrous alloys – solder, brass and bronze – heat treatment of alloys.

UNIT – III **(18)**

Corrosion and its inhibition: Electrode potentials, electrochemical series, difference between electrolytic cells and electrochemical cells – corrosion – principles of chemical corrosion – Pilling – Bedworth rule – principles of electrochemical corrosion – difference between chemical and electrochemical corrosion – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – cathodic protection – sacrificial anodic method – corrosion inhibitors.

Protective coatings: Paints – constituents – functions – mechanism of drying – varnishes and lacquers – special paints – fire retardant paints – water repellant paints – temperature indicating paints – surface preparation for metallic coatings – electroplating and electroless plating – surface conversion coating – anodizing – phosphate coating, hot dipping.

UNIT – IV **(18)**

Water Technology: Boiler feed water – requirements – disadvantages of using hardwater in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination – reverse osmosis – domestic water treatment.

Nuclear energy and energy storage devices: Nuclear fission process – chain reactions – nuclear energy – light water nuclear power plant – secondary batteries – alkaline batteries – lead acid, Ni – Cd and Li batteries, principles and applications of solar cells.

UNIT – V **(18)**

Fuels and combustion: Proximate and ultimate analyses of coal – significances – characteristics of metallurgical coke – manufacture by Otto – Hoffman method – synthetic petrol – Bergius process – Fischer – Tropsch's process – knocking – octane number – improvement of anti knocking characteristics – cetane number, gaseous fuels – water gas, producer gas and CNG, gross and net calorific values – (definition only) – theoretical calculation of calorific values (Dulong's formula) – simple problems – calculation of minimum air requirements – simple problems – flue gas analysis – Orsat's apparatus.

Analytical techniques: Beer – Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – estimation of iron by colorimetry – flame photometry – principles – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – quantitative estimation of nickel by atomic absorption spectroscopy.

L = 90 Periods

TEXT BOOKS

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

REFERENCES

1. B.K. Sharma, Engineering Chemistry, Krishna Prakasam Media (P) Ltd., Meerut, 2001.
2. A.I. Vogel, A Text book of Quantitative Inorganic Analysis, ELBS, London - 2004.
3. Mars G. Fontana, Corrosion Engineering, Tata McGraw Hill Publishing Co., New Delhi, 2005.

GE1X01	ENGINEERING GRAPHICS	L	T	P	M
	(Common to all branches of B.E / B.Tech)	3	0	0	100

Objectives

To develop in students graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

Concepts and Conventions (2)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT - I Plane Curves and Free hand sketching (18)

Curves used in engineering practices:

Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above curves.

Free hand sketching:

Representation of Three Dimensional objects – Need for and importance of multiple views and their placement – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT- II Projection of points, lines and plane surfaces (18)

General principles of orthographic projection – First angle projection – Layout of views – Projection of points, located in all quadrant and straight lines located in the first quadrant – Determination of true lengths and true inclinations and location of traces – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT - III Projection of solids and section of solids (18)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method and change of reference plane (Auxiliary projection method) method.

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane – Obtaining true shape of section.

UNIT - IV Development of surfaces and Intersection of solids (17)

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones

Development of lateral surfaces of solids with square and cylindrical cutouts, perpendicular to the axis.

Development of lateral surfaces of two Intersecting solids – prism & cylinder, cylinder & cylinder – Axis at right angles with no offset.

UNIT - V Isometric and perspective projections: (17)

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

Perspective projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.

Computer Aided Drafting: (Demonstration only)

Demonstration of Computer Aided Drafting and dimensioning using appropriate software.

Total = 90 Periods

TEXT BOOKS

1. K.V. Nataraajan “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006.
2. M.B. Shah and B.C. Rana, “Engineering Drawing”, Pearson Education, 2005.

REFERENCES

1. N.D. Bhatt “Engineering Drawing” Charotar publishing House 46th Edition, 2003.
2. K.R. Gopalakrishnana. “Engineering Drawing” (Vol. I & II) Subhas Publications – 1998.
3. Luzadder and Duff, “Fundamentals of Engineering Drawing” Prentice Hall of India Pvt Ltd, XI Edition - 2001.
4. K.Venugopal “Engineering Graphics”, New Age International (P) Limited, 2002.

STANDARDS

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

Special points applicable to University Examinations on Engineering Graphics.

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. Whenever the total number of candidates in a college exceeds 150, the University Examination in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.

PC1X01 **PHYSICS & CHEMISTRY LABORATORY** **L T P M**
(Common to all branches of B.E / B.Tech) **0 0 3 100**

I. PHYSICS LABORATORY : LIST OF EXPERIMENTS

(Any 10 Experiments)

1. Torsional Pendulum – Determination of Moment of Inertia of disc and Rigidity Modulus of the material of a wire.
2. Non-Uniform Bending - Determination of Young's modulus.
5. Uniform Bending - Determination of Young's modulus.
4. Viscosity –Determination of co-efficient of Viscosity of a liquid by Poiseuille's flow.
5. Lees' disc – Determination of thermal conductivity of a bad conductor.
6. Air wedge – Determination of thickness of a thin wire.
7. Ultrasonic Interferometer- Velocity of ultrasonic waves in a liquid and compressibility of the liquid.
6. Spectrometer – Dispersive power of a prism.
9. Spectrometer – Determination of wavelength of Hg source using Grating.
10. Band gap determination of a Semiconductor
11. Semiconductor laser – (a) Determination of wavelength of Laser using Grating
    (b) Particle size determination.
    (c) Determination of Numerical Aperture and Acceptance angle of an Optical Fibre
12. Potentiometer - Determination of Thermo-emf using Thermo couple.

P = 45 Periods

- Physics Laboratory classes will be conducted on alternate weeks with 3 periods duration.

II. CHEMISTRY LABORATORY: LIST OF EXPERIMENTS
(Any 10 Experiments)

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

P = 45 Periods

References for Chemistry Laboratory

(1) J. Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2004.

(2) D.P. Shoemaker and C.W. Garland, Experiments in Physical Chemistry, McGraw Hill, London.

- Chemistry Laboratory classes will be conducted on alternate weeks with 3 periods duration.

Annual Examination Pattern:

The Laboratory examination is to be conducted for Physics & Chemistry groups allotting 2 hours for each group, with a break of 15 minutes. Both the examinations are to be taken together in sequence, either in the FN session or in the AN session. The maximum marks for Physics and Chemistry lab examinations will be 50 each, totaling 100 for the Lab course.

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

- Torsional Pendulum apparatus - 5 Nos.
  (With accessories)
- Non-uniform Bending apparatus - 5 Nos.
  (With accessories)
- Viscosity (Poiseuille's flow) apparatus - 5 Nos.
  (With accessories)
- Lees' disc apparatus - 5 Nos.
  (With accessories)
- Air Wedge apparatus - 5 Nos.
  (With traveling microscopes and accessories)
- Band gap apparatus/ Post office box - 5 Nos.
- Spectrometer - 5 Nos.
  (With grating, prism and accessories)
- Diode laser (2 mW power) or He-Ne laser (2mW) - 5 Nos.
  (Lycopodium powder, Optical fibre Kit and accessories)
- Thermo emf – potentiometer apparatus - 5 Nos.
  (With accessories)
- Ultrasonic interferometer - 5 Nos
  (With accessories)

List of Equipments needed for Chemistry Laboratory

(for a batch of 30 students)

1. Electronic balance - 1 No
2. pH meter - 4 Nos
3. Conductivity bridge - 4 Nos
4. Potentiometer - 4 Nos
5. Platinum electrodes - 4 Nos
6. Calomel electrodes - 4 Nos
7. Spectrophotometer - 1 No
8. Flame photometer - 1 No
9. Oswald viscometer - 10 Nos

Glassware for a batch of 30 students.

GE1X02	COMPUTER PROGRAMMING	L T P M
	(Common to all branches of B.E / B.Tech)	2 0 2 100

Aim

To impart knowledge to analyze, solve, design and code real-life problems using C language.

Objectives

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

Guidelines for Tutorial Classes

Course instructors have to plan for programming exercises to be solved independently by students during tutorial classes.

UNIT–I **(15)**

Basics of Computer and Information Technology:

Digital Computer Fundamentals –Block diagram of a computer–Component of a computer system–Hardware and Software definitions–Categories of Software–Booting–Installing and uninstalling Software–Software piracy–Software terminologies–Applications of Computers–Role of Information Technology–History of Internet–Internet Services.

Problem Solving Methodology:

Problem solving Techniques–Program–Program development cycle–Algorithm – Design – Flow chart – Program control structures – Types and generation of programming languages – Development of algorithms for simple problems.

UNIT–II **(10)**

Basic Elements of C:

Introduction to C – Lexical elements of C – Operators and expressions – Operator precedence and associativity of operators – Input and Output Functions – Simple computational problems.

Decision Making:

Control statements – Branching, looping, nested control structures, switch, break, continue, goto statements – Problems using control structures.

UNIT–III **(10)**

Functions and Program structures:

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

Arrays:

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

UNIT-IV **(15)**

Pointers:

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

Structures, Unions and File handling:

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

UNIT–V (**10)**

Linked Lists:

Singly Linked list–Creation, Insertion and Deletion of elements–Stack and Queue implementation using linked list.

L = 60 Periods

TEXT BOOKS

1. ITL Education Solutions Limited, "Introduction to Information Technology", Pearson Education (India), 2005. (Unit I)
2. Byron Gottfried, "Programming with C", II Edition, (Indian Adapted Edition), TMH publications, 2006. (Unit II, III, IV and V)

References

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Behrouz A. Forouzan and Richard. F. Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks–Cole Thomson Learning Publications, 2001.
3. Jeri R. Hanly and Elliot B. Koffman, "Problem solving and program design in C", Fourth Edition, Pearson Education India, 2005.
4. Johnsonbaugh R. and Kalin M., “Applications Programming in ANSI C”, III Edition, Pearson Education India, 2003.

GUIDELINES FOR LABORATORY COMPONENTS

The students should be taught C programming in class room session followed by programming practice in the lab session.

LIST OF EXERCISES:

Concepts	Suggested Exercises
Introduction **Application packages**	
Word	1. To create an advertisement in Word. 2. To illustrate the concept of mail merging in word.
Spread Sheet	3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts.
Power Point	4. To create the presentation for the department using Power Point.
Unit – II **C Programming Basics**	
Operators & Expressions	5. To write a simple menu driven calculator program using switch statement
IO Formatting	6. To write a program to print Pascal’s triangle.
Decision Making	7. To write a program for electricity bill preparation.

Looping	8. To write a program to print the *sine* and *cosine* series.
Unit – III	
Arrays	9. To write a program to perform Matrix multiplication.
	10. To write a program to prepare and print the sales report.
String manipulations	11. To write a program to perform string manipulation function like *string concatenations, comparison, find the length and string copy* without using library functions.
	12. To write a program to arrange names in alphabetical order.
Functions	13. To write a C program to calculate the mean, variance and standard deviation using functions.
	14. To write a C program to perform sequential and binary search using functions.
Recursion	15. To write a program to print the Fibonacci series and to calculate the factorial of the given number using functions.
Unit – IV	
Structures	16. To print the mark sheet of n students using structures.
Pointers	17. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.
Files	18. To write a program for inventory management using files.
Unit – V	
Dynamic Allocation	19. To write a program for creating and displaying a linked list
Command line arguments	20. To write a program to merge the given two files using command line arguments.

P = 60 Periods

TEXT BOOKS

1. Ashok N. Kamthane, Programming with ANSI and TURBO C, Pearson Education (India), 2005.

2. ITL Education Solutions Limited, "Introduction to Information Technology", Pearson Education (India), 2005.

Hardware and Software requirements:
Hardware:

1. LAN system with 36 nodes or stand alone PCs 36 Nos.
2. Printer – 1 No.

Software:

1. Operating System	:	Window / Unix clone
2. Compiler	:	C compiler
3. Application package	:	Office suite

GE1X03 ENGINEERING PRACTICES LABORATORY L T P M
(Common to all branches of BE / B.Tech) **0 0 2 100**

Objectives

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 & MECHANICAL)

I CIVIL ENGINEERING PRACTICE (12)

(a) Preparation of plumbing line sketches for (i) water supply lines (ii) sewage lines.

(b) Basic pipe connection using valves, taps, couplings, unions, reducers, elbows in household fitting.

(c) Practice in mixed pipe connections: Metal, plastic and flexible pipes used in house hold appliances.

(d) Wood Work: Sawing, Planing and making common joints.

(e) Study of pipe connections on the suction and delivery pipe layouts.

(f) Study of joints in door panels, wooden furniture.

II MECHANICAL ENGINEERING PRACTICE (18)

Welding

(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Gas welding practice.

Basic Machining

(a) Simple Turning and Taper turning
(b) Drilling practice

Machine assembly practice

(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on

(a) Smithy operations, upsetting, swaging, setting down and bending. Example - Exercise – production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley**.**

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE (12)

1. Stair-case wiring
2. Fluorescent lamp wiring
3. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
4. Calibration of ammeter and voltmeter.
5. Measurement of power using watt meter
6. Measurement of energy using single phase energy meter.

IV ELECTRONICS ENGINEERING PRACTICE (18)

Any **SIX** Experiments

1. (a) Study of Electronic components and equipment (i) Resistor colour coding (ii) usage of CRO & Multimeter.
   (b) Soldering of simple electronic components and checking the continuity.
   (c) Assembling electronic components on a PCB.
2. Characteristics of PN & Zener Diodes.
3. Measurement of ripple factor for HWR & FWR.
4. Input and output characteristics of CE transistor.
5. Characteristics of JFET.
6. Applications of operational amplifier – Inverter, adder and subtractor.
7. Study of digital circuits – logic gates, adder and decade counter.

P = 60 Periods

Annual Examination Pattern:

The Laboratory examination is to be conducted for Group A & Group B, allotting 90 minutes for each group, with a break of 15 minutes. Both the examinations are to be taken together in sequence, either in the FN session or in the AN session. The maximum marks for Group A and Group B lab examinations will be 50 each, totaling 100 for the Lab course. The candidates shall answer either I or II under Group A and either III or IV under Group B, based on lots.

Engineering Practices Laboratory
List of equipment and components
(For a Batch of 30 Students)

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 woodworking 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 house 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.

GE1X04 ENGINEERING MECHANICS 3 1 0 100

(Common to B.E. (Civil), B.Tech. (Chemical / Textile / Textile Tech (Textile Chemistry) / Polymer Tech / Biotech / Petroleum Engg/Food Tech / Rubber & Plastics Tech)

OBJECTIVE :

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

1. BASICS & STATICS OF PARTICLES 18

Introduction - Units and Dimensions - Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: addition, subtraction, dot product, cross product - Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space - Equilibrium of a particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

2. EQUILIBRIUM OF RIGID BODIES 24

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Static determinacy - Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem - Equilibrium of Rigid bodies in two dimensions – Analysis of pin jointed plane trusses - Equilibrium of Rigid bodies in three dimensions – Examples.

3. FRICTION 12

Frictional force – Laws of Coloumb friction – Simple contact friction - – Belt friction –Transmission of power through belts – Wedge Friction – Screw Jack – Rolling Resistance

4. PROPERTIES OF SURFACES AND SOLIDS 18

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem

and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia - Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

5. DYNAMICS OF PARTICLES 18

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

L : 90 T : 30 TOTAL: 120

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.

CE1X01 CONSTRUCTION MATERIALS 2 0 1 100
(Lab based theory course)

OBJECTIVE

At the end of this course the student should have learnt about the various materials, both conventional and modern, that are commonly used in civil engineering construction. Further he should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control in the use of these materials.

1. STONES – BRICKS – CONCRETE BLOCKS 12

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacture of clay bricks – Tests on bricks – Compressive Strength - Water Absorption – Efflorescence –Bricks for special use – Refractory bricks – Cement and Concrete hollow blocks – Light weight concrete blocks – Code Practices

2. LIME – CEMENT – AGGREGATES - MORTAR 12

Lime – Preparation of lime mortar – Cement. Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration - Compressive strength – Tensile strength – Soundness and consistency – Setting time – Aggregates – Natural stone aggregates – Industrial byproducts – Crushing strength – Impact strength – Flakiness – Abrasion Resistance – Grading – Sand – Bulking – Code Practices

3. CONCRETE 12

Concrete – Ingredients – Manufacture – Batching plants – RMC – Properties of fresh concrete – Slump – Flow and compaction – Principles of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – IS method – High Strength Concrete and HPC – Other types of Concrete – Code Practices

4. TIMBER AND OTHER MATERIALS 12

Timber – Market forms – Industrial timber- Plywood - Veneer – Thermocole – Panels of laminates – Steel – Aluminum and Other Metallic Materials - Composition – uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Code Practices

5. MODERN MATERIALS 12

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geosynthetics for Civil Engineering applications.

TEXT BOOKS

1. R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.
2. M. S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003.

CONSTRUCTION MATERIALS LABORATORY - List of experiments

1. TESTS ON BRICKS 6

Compressive Strength – Water Absorption – Efflorescence.

2. TESTS ON CEMENT 9

Specific gravity – Soundness – Consistency and Setting Times - Vicat – Le Chatelier's and Ve bee apparatus – Blain's apparatus.

3. TESTS ON AGGREGATES 6

Crushing Strength – Impact Resistance – CBR Value –Flakiness Index.

4. TESTS ON CONCRETE 9

Slump cone – Flow table – Cube and Cylinder strength – Modulus of Rupture.

Total Number of hours for theory 60

Total Number of hours for laboratory 30

(Equipment required for a batch of 30 students)

Sl.No.	Description of Equipments	Quantity
1.	Le Chatelier's apparatus	2
2.	Vicat's apparatus	2
3.	Mortar cube moulds	10
4.	Concrete cube moulds	6
5.	Concrete cylinder moulds	3
6.	Concrete Prism moulds	3
7.	Pycnometer	1
8.	Sieves	1 set
9.	Concrete mixer	1
10.	Slump cone	3
11.	Flow table	1

12.	Vibrator	1
13.	Trovels and planers	1 set
14.	UTM – 400 KN capacity	1
15.	Vee Bee Consistometer	1
16.	Aggregate Impact testing machine	1
17.	CBR Apparatus	1
18.	Blain’s Apparatus	1

EE1X02 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING L T P M
3 0 0 100

(Common to B.E. Mechanical, Production, Automobile, Aeronautical, & Marine)

Aim

To Provide awareness on basics of Electrical and Electronics Engineering.

Objective

To expose the students to the rudiments of electrical circuits, principles of working of measuring equipments
To expose the students to the various Electronic components and devices with their principle of operation and some of their applications.

Electrical Engineering

Unit 1: D.C. and A.C. Circuits (18)

Definition of current – potential – resistance, power, and energy –symbol and units – international system of units – Ohm's law – Kirchhoff's laws – solution of series, parallel and series parallel circuits.
Generation of alternating emf, average and rms values – form and peak factors, concept of phasor representation – complex operator "j" – AC circuits involving R, L, C parameters – reactance and impedance – power factor and power components in ac circuits – series and parallel resonances – simple problems.

Construction and principle of operation of: moving coil and moving iron instruments (only voltmeters and ammeters) – dynamometer type wattmeter – Induction type energy meter – Megger.

Unit 2: D C Machines & Transformers (18)

Construction of DC Machines – Theory of operation of DC Generators – Characteristics of DC Generators. Operating principle of DC motors – Types of DC motors and their Characteristics – Speed controls of DC motors.
Principle of operation of Transformers – Types – Equivalent circuit – Voltage regulation – Efficiency – Testing – All Day Efficiency – Principle of operation of Three phase transformers – Transformer connections.

Unit 3: Induction Machines (18)

Construction of single Phase motors – Types of single Phase motors – Double revolving field theory – Starting methods – Capacitor start Capacitor run motors – Shaded pole – Repulsion type – Universal motors – Construction – Types – Equivalent circuit – Starting and Speed control.

Principle of alternator – Construction details – Types – Equation of induced EMF – Voltage regulation. Methods of starting of synchronous motors – Torque equation - V curves – synchronous condensers.

Electronics Engineering

Unit 4: Electronic components, Devices and Power converters (18)

Active and Passive components, Introduction to transducers, Resistive, Inductive and Capacitive transducers. Basic principle and characteristics of PN diode, Zener diode, Bipolar Junction Transistor, Field Effect Transistors (JFET, MOSFET), UJT, Thyristor (SCR, Diac, Triac), photoelectric devices (LDR, photodiode, phototransistor), photovoltaic devices, operating principles of Hall and Full wave rectifiers, Bridge rectifier, Chippers, Inverters, Voltage controllers, Voltage Regulators.

Unit 5: Digital Electronics and Communications (18)

Symbol, truth table and circuit of basic logic gates, universal gates, Half adder, Full adder, flip flops – RS, JK, T and D, Basic of Counters, Shift registers.

Telecommunication system - block diagram, Principles of Modulation: AM, FM, Pulse and Digital Modulation, Data Transmission – Modem, Various communication systems like Radio, TV, Microwave, Satellite, Radar, Fiber optic and ISDN (block diagram discription only), Principle of operation of Mobile phones.

Total = 90

TEXT BOOKS:

1. B.L. Theraja, Electrical Technology Vol I & II, S. Chand & Co., 2005.
2. Edward Hughes, Electrical and Electronics Technology, Pearson Education Limited, Ninth edition, 2005.
3. Asokh Singh, Principles of Communication Engineering, S. Chand & Co, 1994.

REFERENCES:

1. B.R. Guptha, Principles of Electrical Engineering, S. Chand & Co.,2002.
2. I.J. Nagrath, Elements of Electrical Engineering, Tata McGraw Hill Publishing Co Ltd., New Delhi. 2000.
3. K.A. Muraleedharan, R. Muthusubramanian and S. Salivahanan, Basic Electrical and Electronics and Computer Engineering, Tata McGraw Hill, 1997.
4. Robert L. Boylestad & Louis Nashelsky Electronics devices and Circuit Theory, Pearson Education, 8th Edition, 2002.
5. Floyd & Jain, Digital Fundamentals, Pearson Education, 8th Edition, 2003.

ME1X01 MANUFACTURING TECHNOLOGY – I 2 0 2 100
(Lab based theory course)

OBJECTIVE

To introduce the students to the concepts of some basic manufacturing processes and fabrication techniques. Concepts of metal casting, metal joining, metal forming and plastics component manufacture are introduced.

1. METAL CASTING PROCESSES 12

Sand casting – Sand moulds - Type of patterns – Pattern materials – Pattern allowances – Types of Moulding sand – Properties – Core making – Methods of Sand testing – Moulding machines – Types of moulding machines - Melting furnaces – Working principle of Special casting processes – Shell, investment casting – Ceramic mould – Lost Wax process – Pressure die casting – Centrifugal casting – CO_2 process – Sand Casting defects – Inspection methods

2. FABRICATION PROCESS 12

Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials - Arc welding equipments - Electrodes – Coating and specifications – Principles of Resistance welding – Spot/butt, seam welding – Percusion welding - Gas metal arc welding – Flux cored – Submerged arc welding – Electro slag welding – Tig welding – Principle and application of special welding processes - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding – Diffusion welding – Flame cutting – Weld defects – Brazing and soldering process – Methods and process capabilities – Filler materials and fluxes – Types of Adhesive bonding

3. BULK DEFORMATION PROCESSES 12

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

4. SHEET METAL FORMING PROCESSES 12

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

5. FORMING AND SHAPING OF PLASTICS 12

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

TOTAL : 60

TEXT BOOKS:

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

REFERENCES:

1. Elements of Manufacturing Processes, B.S. Magendran Parashar & R.K. Mittal, Prentice Hall of India, 2003.
2. Manufacturing Technology, P.N. Rao, Tata McGraw-Hill Publishing Limited, II Edition, 2002.
3. A text book of production technology, P.C. Sharma, S. Chand and Company, IV Edition, 2003.
4. Manufacturing Process – Begman, John Wilely & Sons, VIII Edition, 1999.

MANUFACTURING TECHNOLOGY LAB – I 0 0 2 100

OBJECTIVE :

To gain hands on experience on working of general purpose machine tools on moulding practice.

1. LATHE

1.1. Facing, plain turning and step turning
1.2. Taper turning using compound rest.
1.3. Taper turning using taper turning attachment
1.4. Single start V thread, cutting and knurling
1.5. Boring and internal thread cutting.

2. SHAPER AND SLOTTER

2.1. Machining a V- block (in a Shaper)
2.2. Machining hexagonal shape (in a Shaper)
2.3. Machining internal key-way (in a slotter)

3. DRILLING

3.1 Drilling 4 or 6 holes at a given pitch circle on a plate
3.2. Drilling, reaming and tapping

4. SHEET METAL WORK

4.1. Fabrication of sheet metal tray
4.2. Fabrication of a funnel

5. PREPARATION OF SAND MOULD

5.1. Mould with solid, split patterns
5.2. Mould with loose-piece pattern
5.3. Mould with Core

TOTAL : 60 Hrs

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

1.	Centre Lathe with accessories (at least four lathes must have tape-turning attachment)	15 No.
2.	Shaping Machine	2 No.
3.	Slotting Machine	1 No.
4.	Radial Drilling Machine	1 No.
5.	Upright Drilling Machine	1 No.
6.	Sheet Metal Work facility	
	6.1 Hand Shear 300mm	1 No.
	6.2 Bench vice	3 No.
	6.3 Standard tools and calipers for sheet metal work	3 Sets
7.	Moulding Facility	
	7.1 Moulding Table	3 No.
	7.2 Moulding boxes, tools and patterns	6 Sets.

PR1X01 PRODUCTION TECHNOLOGY – I 2 0 2 100
(Lab based theory course)

OBJECTIVE :

The main objective of Production Engineering is to convert raw materials into end products. Among four production processes, Machining is the common process used for all types of production irrespective of the quantity being produced. The content of the syllabus will give an idea to the student about all the basic machining process available in any industry in order to make variety of products. Also, it helps in understanding the simple mechanisms and configuration of the different types of mechanisms. By undertaking this course, the student will be in a position to appreciate the machining process and to select the suitable machine and operation once a raw material is given.

1. LATHE 12

Introduction to production processes – types of production (job, batch and mass) – production processes – Casting, Forming, Machining and Welding, Machine and Machine Tool – Lathe – engine Lathe – block diagram – sketch – functions of each part – Work holding devices in Lathe – functions – Chuck, Centre, Dogs, Steady Rest and Follower Rest. Mechanism of Lathe – Apron, Feed, Tumbler Gear. Various operations performed in Lathe – facing, turning, chamfering, and knurling – relative positions of tool and job – Taper turning operations (three methods) – thread cutting - thread – RH and LH, single start and multi start with application – Method of thread cutting – selection and arrangement of tool and work. Problems in metric and inch thread conversion – Specifications of Lathe.

2. SHAPER, PLANER AND SLOTTER 14

Purpose of Shaping – block diagram – functions of each part. Purpose of planer – block diagram – functions of each part. Purpose of slotting machine – block diagram – functions and working principle. Operations carried out – horizontal plane, vertical plane, v type with relative position – Comparison of planer with shaper – work holding devices in shaper and planer – Quick return mechanism in shaper – mechanical and hydraulic – cross feed mechanism – Types of planer with applications – mechanism in planer – Comparison of shaping with slotting – tool holding devices in shaper, planer and slotter – Specifications of shaper, planer and slotter – simple problems to calculate the velocity – speed, feed and depth of cut.

3. DRILLING 10

Purpose of drilling – block diagram and function types of drilling machines – portable drilling – bench type – sensitive drilling – radial arm drilling – functions of parts – purpose and operation – gang milling, multiple drill head, upright drilling. Relative operations – remaining, boring, tapping, counter boring, counter sinking, trepanning and spot facing (with simple sketch, purpose and application). Work holding devices – specification – torque calculation – speed, feed and depth of out.

4. MILLING 12

Milling machine purpose – up and down milling – classification of milling machines – slot, keyway machining – methods of milling – single piece, string, rotary index, gang, progressive copy. Horizontal milling machine – block diagram – functions of each part – applications. Vertical milling machine – block diagram – functions of each part – applications. Gear cutting using milling machine – procedure with sketch – milling cutters – peripheral, face, end T slot, form etc – attachments and special accessories for milling – rotary, slotting attachment – indexing mechanism – methods of indexing – direct, plain, compound and differential indexing – problems – specifications – cutting conditions and parameters.

5. GRINDING 12

Purpose – classification – surface finish – applications – grinding wheel – types – specifications – selection – surface grinding machine – block diagram – functions of each part – cylindrical grinding – Centreless grinding – comparison – infeed, end feed and through feed. Balancing, dressing, loading and Turning of wheel – special grinding machines – specification of machine – cutting condition.

TOTAL : 60

TEXT BOOKS :

1. P.C. Sharma, "A Text Book of Production Technology", S. Chand and Company 2003.
2. W.A.J. Chapman, "Workshop Technology Part I and II ", Oxford and IBH Publishers, 1990.

REFERENCES :

1. R.K. Jain, "Production Technology", Khanna Publishers, New Delhi, 1998.
2. HMT Bangalore, "Production Technology", Tata McGraw-Hill Publishing Company Limited, New Delhi, 1990.
3. Hajra Choudhary etal, "Elements of Production Technology – Vol. II", Asia Publishing House 2001.
4. B.Kumar, "Manufacturing Technology", Khanna Publishers, New Delhi, 1993.
5. P.Radhakrishnan, "Manufacturing Technology Vol. I" Scitech Publications, 2002.

PRODUCTION TECHNOLOGY LABORATORY – I 0 0 2 100

OBJECTIVE:

The objective of the machining process lab I is to give a hands-on training on the basic machines – Lathe, Shaper and Planer. The student learns to operate the machines, the important operations and selection of cutting parameters. Also he learns the method of selecting suitable work holding device, any special attachment needed and the control mechanism. By undertaking this practical, the student will be in a position to select the suitable machine once the raw material is given with job drawing.

1. LATHE

1.6. Facing, plain turning and step turning
1.7. Taper turning using compound rest.
1.8. Taper turning using taper turning attachment
1.9. Single start V thread, cutting and knurling
1.10. Boring and internal thread cutting.

2. SHAPER AND SLOTTER

2.1. Machining a V- block (in a Shaper)
2.2. Machining hexagonal shape (in a Shaper)
2.3. Machining internal key-way (in a slotter)

3. DRILLING

3.1 Drilling 4 or 6 holes at a given pitch circle on a plate
3.2. Drilling, reaming and tapping

TOTAL : 60 Hrs

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

1.	Centre Lathe with accessories (At least four lathes must have tape-turning attachment)	15 No.
2.	Shaping Machine	2 No.
3.	Slotting Machine	1 No.
4.	Radial Drilling Machine	1 No.
5.	Upright Drilling Machine	1 No.

EC1X12 ELECTRONIC DEVICES AND CIRCUITS 2 0 2 100
(Lab based theory course)

1. **Network Theorems:** Kirchoff's laws – Thevinin's and Norton's theorems – Superposition theorem – Star Delta Conversion.

12

Two port networks: Z Parameters – Y parameters – ABCD parameters – h parameters – 2 - port networks connected in series, parallel and cascade.

2. Theory of semiconductors and semiconductor devices; energy levels – band theory – conductors, insulators and semiconductors – intrinsic and extrinsic semiconductors – PN junction – diode equation (Derivation not required) – forward and reverse bias – Diode dc and ac resistances – Zener diode – Bipolar Junction Transistor – CE, CB and CC configurations – Biasing of a transistor; fixed bias, collector feedback bias, self bias – FET – Common source and drain characteristics of JFET and MOSFET.

14

3. Application of Diodes : HW and FW rectifiers – Clippers and Clampers – Voltage Multipliers – Voltage regulators – Zener, series and shunt types.

10

4. Amplifiers and Oscillators : Small signal amplifiers – h parameter model for low frequencies – Feedback amplifiers – Oscillators – Hartley and Colpitt oscillators.

12

5. Operational Amplifiers – Ideal characteristics – Inverting, Non-inverting – summer – Comparator – Schmitt trigger – R.C. Phase shift oscillator, Wein Bridge Oscillator – Multivibrators. **12**

TOTAL : 60

TEXT BOOK

1. Electronic Devices and Circuit Theory – Sixth edition 1990 Robert L.Boylestad and Louis Nashelsky, Prentice-Hall of India Private Ltd.

REFERENCES

1. Electronic Principles – Fifth edition 1990, Albert Paul Malvino, Tata McGrew-Hill Publishing Company Ltd.
2. Electronic Devices – Fifth edition 2001, Thomas L. Floyd, Pearson Education Asia.
3. Engineering Circuit Analysis – Sixth edition 2002, William H. Hayt, Jr., Jack E. Kemmerly and Steven. M.Durban, McGraw–Hill International Editions, Electrical Engineering series.

ELECTRONICS LABORATORY

1. Characteristics of Semiconductor diode and Zener diode
2. Input and Output characteristics of BJT
3. Characteristics of JFET
4. Frequency response of CE amplifier
5. Clipper and Clamper
6. Phase shift and Wein Bridge oscillators using OP-AMP
7. Astable multivibrator using OP-AMP
8. Monostable and Bistable multivibrator using OP-AMP
9. Voltage Regulator (Zener diode, Transistor series and shunt)
10. Half-wave and Full-wave Rectifier with and without filter.

TOTAL : 60 Hrs

List of Equipments and Components for this Laboratory

Sl.No.	**Name of the Equipment**	**Quantity (No.)** For batch size 3
1.	Power supply – (0-30v)	6
2.	CRO (20 MHZ)	4
3.	Function Generator	3
4.	Voltmeter (0-25v), (0-IV)	6
5.	Ammeter (0-500 micro Amp), (0-100mA)	6
Sl.No.	**Name of the Components**	**Quantity (No.)**
1.	IC 741	10
2.	Transistors (FET BFW10, BC107)	10
3.	Breadboard	10
4.	Diodes (BY 127, IN4001, 1Z5.6)	10

MH1X01 ENGINEERING MATERIALS AND METALLURGY 3 0 0 100

OBJECTIVE:

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

1. INTRODUCTION AND CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS (20)

Crystal structure – BCC, FCC and HCP structure – unit cell – crystallographic planes and directions, miller indices – crystal imperfections, point, line, planar and volume defects – Grain size, ASTM grain size number.

constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, peritectic, eutectoid and peritectroid reactions, Iron – Iron carbide equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

2. HEAT TREATMENT (15)

Definition – Full annealing, stress relief, recrystallisation and spheroidizing – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR - Hardenability, Jominy end quench test – Austempering, martempering – case hardening, carburising, nitriding, cyaniding, carbonitriding – Flame and Induction hardening.

3. FERROUS AND NON FERROUS METALS (15)

Effect of alloying additions on steel (Mn, Si, Cr, Mo, V Ti & W) - stainless and tool steels – High strength Low Alloy steels (HSLA) – Dual phased steel – Microalloyed steels – maraging steels – Alloyed cast - Irons, Ni-hard and Ni-resist cast irons.

Copper and Copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys – Alloys of Ti, Zn, mg and Ni.

4. NON-METALLIC MATERIALS (20)

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE Polymers – Urea and Phenol formal deliydes – Engineering Ceramics – Properties and applications of Al_2O_3, SiC, SiC, Si_3, N_4, PSZ and Sialon – Fibre and particulate reinforced composites.

5. SURFACE ENGINEERING, MECH. PROPERTIES AND TESTING (20)

Mechanical surface Treatment and coating – Mechanisms of wear and corrosion – Wear and Corrosion prevention – Thermal spraying - Diffusion coating - Electroplating - Ceramic and organic coatings.
Mechanism of plastic deformation – Slip and Twinning Types of fracture – Fatigue and creep mechanisms - Testing of materials under tension, compression and shear loads – Hardness Tests (Brinell, Vickers and Rockwell) – Impact Tests – Izod and charpy – Fatigue & Creep Tests.

TOTAL : 90

TEXT BOOKS

1. Kenneth G.Budinski and Michael K.Budinski "Engineering Materials" Prentice-Hall of India Private Limited, 4th Indian print 2002.
2. Donald R. Askeland and Pradeep P. Pbule "The Science and Engineering of Materials" 4th Edition – Thomson Engineering, 2002.

REFERENCES

1. William D Callsber "Material Science and Engineering", John Wiley and Sons 1997.
2. Raghavan.V. "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd, 1999.
3. Sydney H.Avner, "Introduction to Physical Metallurgy" McGraw Hill Book Company, 1994.
4. L.H. Vanvlack, "Materials Engineering: concepts and applications", 1995.
5. Paul Dr. Garmo. E., Black .J.T. and Ronald A. Kohser, " Materials and Processes in Manufacturing" 8th Edition – Prentice Hall of India, 2005.

PR1X02 PRODUCTION TECHNOLOGY 2 0 2 100

(Lab based theory course)

(Common to B.E. Automobile, Aeronautical & Metallurgical)

OBJECTIVE

The automobile components such as piston, connecting rod, crankshaft, engine block, front axle, frame, body etc., are manufactured by various types of production processes involving casting, welding, machining, metal forming, power metallurgy etc. Hence B.E. Automobile Engineering students must study this course Production Technology.

1. CASTING 12

Casting types, procedure to make sand mould, types of core making, moulding tolls, machine moulding, special moulding processes – CO_2 moulding; shell moulding, investment moulding, permanent mould casting, pressure die casting, centrifugal casting, continuous casting, casting defects.

2. WELDING 10

Classification of welding processes. Principles of Oxy-acetylene gas welding. A.C metal arc welding, resistance welding, submerged arc welding, tungsten inert gas welding, metal inert gas welding, plasma arc welding, thermit welding, electron beam welding, laser beam welding, defects in welding, soldering and brazing.

3. MACHINING 16

General principles (with schematic diagrams only) of working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, Cylindrical grinding machine, Capstan and Turret lathe. Basics of CNC machines.

General principles and applications of the following processes: Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Plasma arc machining, Electron beam machining and Laser beam machining.

4. FORMING AND SHAPING OF PLASTICS 10

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

5. METAL FORMING AND POWDER METALLURGY 12

Principles and applications of the following processes: Forging, Rolling, Extrusion, Wire drawing and Spinning, Powder metallurgy – Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

TOTAL : 60

TEXT BOOK

1. Hajra Choudhury, Elements of Workshop Technology, Vol. I and II, Media Promoters and Publishers Pvt., Ltd., Mumbai, 2001.

REFERENCES

1. R.K.Jain and S.C. Gupta, Production Technology, Khanna Publishers. 16th Edition, 2001.
2. H.M.T. Production Technology – Handbook, Tata McGraw-Hill, 2000.
3. Roy. A. Linberg, Process and Materials of Manufacture, PHI, 2000.
4. M.Adithan and A.B. Cupta, Manufacturing Technology, New Age, 1996,
5. Serope Kalpajian, Steven R.Schmid, Manufacturing Engineering and Technology, Pearson Education, Inc. 2002(Second Indian Reprint).

PRODUCTION TECHNOLOGY LABORATORY

OBJECTIVE:

To gain a practical knowledge of production processes such as turning, facing, thread cutting, drilling, boring, knurling, shaping, milling, cylindrical grinding ect., which are involved in the manufacturing of various automobile components.
Exercise in Lathe, Shaper, Planer, Milling and Grinding machine in the following machining operations.

1. LATHE

1.11. Facing, plain turning and step turning
1.12. Taper turning using compound rest.
1.13. Taper turning using taper turning attachment
1.14. Single start V thread, cutting and knurling
1.15. Boring and internal thread cutting.

2. SHAPER AND SLOTTER

2.1. Machining a V- block (in a Shaper)
2.2. Machining hexagonal shape (in a Shaper)
2.3. Machining internal key-way (in a slotter)

3. DRILLING

3.1 Drilling 4 or 6 holes at a given pitch circle on a plate
3.2. Drilling, reaming and tapping

4. **MILLING**

4.1. Plain Milling Exercise
4.2. Gear Milling Exercise

5. **GRINDING**

Cylindrical Grinding Exercise

TOTAL : 60 Hrs

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

1.	Centre Lathe with accessories (At least four lathes must have tape-turning attachment)	15 No.
2.	Shaping Machine	2 No.
3.	Slotting Machine	1 No.
4.	Radial Drilling Machine	1 No.
5.	Upright Drilling Machine	1 No.
6.	Horizontal Milling Machine	3 No.
7.	Cylindrical Grinding Machine	1 No.

MY1X01 EXTRACTIVE PHYSICAL METALLURGY 3 0 0 100

OBJECTIVE

To acquire knowledge about various minerals, ores and their processing and to become familiar with furnaces and metallurgical analysis techniques.

To introduce the fundamental concepts regarding the crystal structure, crystal imperfections, solidification and alloying of metallic materials in order to facilitate an understanding on the physical behavior of metals and alloys.

1. MINERALOGY AND CHEMICAL AND MECHANICAL PROCESSING 20

Physical properties of minerals, physical and chemical characteristics of industrial minerals such as magnetite, hematite, galena, chalcopyrite, sphalerite, monazite, cassiterite, chromte, baurite and limonite, economics of ore processing, mineral wealth map of India.

Chemical processing of ores-basic principles involved in leaching of ores-bio leaching, ion exchange and solvent extraction.
Crushing and grinding – jaw crushers, gyratory crushers and cone crushers, ball mills and hammer mills washing, sorting and hand picking, industrial screening, classifiers, mechanical and hydraulic, sedimentation principles.

2. ORE CONCENTRATION TECHNIQUES 10

Concentration by jigs, tables, heavy media separation, froth flotation, magnetic and electrostatic separation, thickeners and filters, use of flow sheets, specific examples from mineral processing, wet and dry sampling.

3. FURNACES AND METALLURGICAL ANALYSIS 20

Introduction, Classification, Thermal efficiency, heat balance, methods of heat recovery – recuperates and vegeneraters, burners. Melting and Heat Treatment furnaces – Construction and operation of crucible furnace, cupola, rotary furnace, electric resistance, arc and induction furnaces, batch and continuous type furnaces.

Principal of Chemical analysis, approaches for chemical analysis – ores, metals, alloys, details of specific chemical analysis techniques used in metallurgical industries (Spectrovac and spot testing).

4. CRYSTAL STRUCTURE AND CRYSTAL IMPERFECTIONS 20

Review of atomic bonding – atomic arrangement in solids – short range and long range order – unit cells – crystal system and Bravis lattice – BCC, FCC and HCP structures – packing fraction voids in BCC and FCC lattices, directions and planes in unit cells, Miller indices and miller – Bravis indices, close-packed planes and directions – interplanar spacing Bragg's law, allotropy, concepts of quasicrystals

Types of crystal imperfections – point, line, planar, surface and volume defects. Point defects – variation of vacancy concentration with temperature – Arrhenius Law – Concept of activation energy - Substitution and interstitial solutions - Grain boundaries, Grain size determination – ASTM grain size number – small angle grain boundaries – twist and tilt boundaries – stacking faults.

DISLOCATIONS

Significance of edge and screw dislocation – Burger's vector slip systems, slip directions and planes. Schmids law – critical resolved shear stress – climb and cross slip of dislocations.

5. DIFFUSION, SOLIDIFICATION AND PHASE DIAGRAMS 20

Self diffusion, diffusion in alloys – diffusion mechanisms (vacancy, interstitial and ring mechanisms) – activation energy calculations. Laws of diffusion – Ficks I law – diffusion coefficient Vs temperature – Ficks II law – interdiffusion and Kirkendall effect. Factors influencing diffusion – types of diffusion – volume, surface and grain boundary diffusion. Practical application-grain growth, diffusion bonding, powder metallurgy and heat treatment.

Solidification of metals and alloys – Cast or ingot structure – interstitial, substitutional solid solutions phase rule – Composition and amount of phases – Lever rule, solidification of pure metals and alloys – Cooling curves. Constitutional super cooling – nonequilibrium solidification – segregation and its effects, coring.

Phase diagram determination – Isomorphous eutectic and peritectie system – monotectic and syntactic systems - Peritectiod and Eutectoid System - Iron-carbon equilibrium diagram – phases and critical temperatures – composition range of steels and cast irons. – Introduction to ternary phase diagrams.

TOTAL : 90

TEXT BOOKS

1) Wills.B.A., 'Mineral Processing Technology', 3rd Edition, Pergamon Press, 1989.
2) Gupta.O.P. 'Elements of Fuels, furnace and refractories', 4th edition, Khanna Publishers, New Delhi, 2000.
3) Willard.H.H., 'Instrumental Methods of Chemical Analysis', CBS Publishers, 1996.
4) Avner, S.H. "An Introduction to Physical Metallurgy", McGraw-Hill Book Co., New York, USA, 1997.
5) Raghavan, V., "Physical Metallurgy Principles and Practice", Prentice Hall of India, New Delhi.1996.

REFERENCES

1. Jain.S.K.,'Ore Processing', Oxford and IBH, 1986.
2. Vogel.A.I.A 'Text Book of Quantitative Inorganic Analysis,' McGraw-Hill, 1983.
3. Donald R.Asteland "The Science and Engineering of Materials" Brooks Cole Engineering Division, Montercy, USA 1989.
4. William D.Callister "Materials Science and Engineering, Introduction" 4th ed. John Willey and Sons, USA, 1997.
5. Reed Hill, R.E. "Physical Metallurgy Principles" Affiliated East West Press, New Delhi, 1992.

MV1X01 SEAMANSHIP, NAVIGATION AND SAFETY PRACTICES 4 0 0 100

AIM

- To develop skill and knowledge about Navigation and Operation of ship.
- To develop self confidence and stuff ness for survival at sea.
- It is of paramount importance that the student becomes fully aware of the working condition from safely pumps of view on board the ship.
- The main aim is to make the students understand and become familiar with the causes prevention fighting of fire, on board ship.

OBJECTIVES

On completion of the course the students are expected to

- Have learnt operation of various deck machinery.
  (a) Navigation equipment
- Have sound knowledge of Navigation.
- Have learnt survival techniques at sea.
- Have learnt operation of life boats and life rafts.
- Be fully conversant with the knowledge of fire hazards on board ships causes of fire and preventing the same.
- To gain knowledge of fire protection and fighting arrangements providers.
- To have complete knowledge of construction and operation of fire fighting and life saving appliances on board ships.

To attain safety awareness for safe working on board the ships.

1. SEAMAN AND THEIR DUTIES with ROPE KNOTS AND MOORINGS 20

Ship's Department, General ship knowledge ad nautical terms like o\poop-deck forecastle, Bridge etc. Deck Equipment: Winces, windlass, derricks cranes, gypsy, capstan, Hatches and function. Navigation lights and signals: Port and Starboard, Forward and aft mast lights, Colors and location. Look out, precautions and Bad weather, Flags used on ships, Flag etiquette, Mores and semaphore signalling, Sound signals.

Types of knots. Practice of knot formation, Materials of ropes, strength, care and maintenance, use of mooring line, heaving line, rat guards, canvas and it's use. Anchors: Their use, drooping and weighing anchor, cable stopper.

2. NAVIGATION 15

General knowledge of principal stars. Sextant, Navigation compasses, echo sounder, log and uses, barometer and weather classification, G.M.T nad Zonal time, wireless Navigational Instruments, radar satellite navigation etc.

3. LIFE BOATS, LIFE RAFTS AND SURVIVAL AT SEA 25

Construction, equipment carried, carrying capacity. Davits and their operation, Launching of life rafts (Inflatable type) Embarkation into lifeboat and life raft. Survival pack, Stowage and securing arrangement, Abandon ship: Manning of lifeboat and life raft. Muster list. Radio an alarm signals, Distress signals (S.O.S) Distress Calls time and Radio frequency. Pyro – techniques.

Survival difficulties and factors, equipment available, duties of crew members, Initial action on boarding, Maintaining the craft, Practical: Knots, bends and hitches, Ropes splice, donning of life jackets, life boat drills. Lowering & hoisting of life boats (model).

4. FIRE CHEMISTRY, CAUSES OF SHIP BOARD FIRES, TYPES OF FIRE AND FIRE FIGHTING APPLIANCES 30

Fire Triangle and concept of fire, common causes, welding pratices, sources of fire in machinery spaces, bilge fire, crank case and air starting line explosion, boiler furnace blow back and up take fire.

Classification and Types of fires Methods of extinguishing fire, fire detection types of detectors extinguishing agents construction, contents, operations and performance of various portable extinguishers, fixed fire installations, fire main system and emergency fire pump, fire hoses, nozzles, couplings, hydrants, maintenance and testing.

5. LIFE SAVING APPLIANCES, EQUIPMENTS AND OPERATIONAL SAFE WORKING PRACTICES. 30

Life boat, life raft, bulk heads, water tight doors, emergency excapes blower flaps, funnel flaps, various quicks closing arrangements, remote stopping of various machines, Fire man's outfit, breathing apparatus, constructional fire safety in ships.

Guidance, need of adoption of safe practices, identification of different Hazards and dangerous.

Organizations structure of emergency organization, duties to crew members and importance of rehearsals and drills.

Equipment, protective equipments, power operated tools, maintenance lifting gears and electrical systems.

Knowledge of (a) Oils spills and leaks, (b) cleanliness of bilges (c() All idischarges and over flows (d) temperature of oil in bulker and service tanks, gas bottles, spare gear chuck.
Permit to work system, operation of emergency machinery systems and ventilation systems precautions of welding and gas cutting, battery room.

TOTAL = 120

TEXT BOOKS :

1. Graham Danton, The theory and practice of seamanship, 11th Edition, Routledge, Newyork, USA and Canada, 1996.
2. Capt. J. Dinger, Seamenship Primer, 7th Edition, Bhandarkar Publications, Mumbai 1998.
3. Frank Rush Brook, Fire Aboard, 3rd Edition, Brown, son & ferguson ltd., Glassgow 1988.
4. E.A. Stokoe, Reed's Ship Construction for Marine Students Vol.5, Fifth edition, Thomas Reed Publications, Great Britain 1999.
5. Leslie Jackson, Reed's General Engineering Knowledge for Marine Engineers Vol.8, 4th Edition, Thomas Reed publication, Great Britain, 1986.

REFERENCES:

1. A.N. Cockcroft, Seamenship and Nautical knowledge, 27th Edition, Brown son & Ferguson Ltd., Glasgow 1997.
2. M.G. Stavitskiy, V.I. Vostryakov, M.F.Kortunov, V.I. Martynenko & V.M. Sidoryok, Fire Fighting Aboard ships Vol. I & Vol. II Structural Design and Fire Extinguishing System, first edition, published by Gulf publishing company, Houston, London, 1983.
3. D.G. Shipping, Fire Fighting Appliances Rules (1969/1990), 3rd edition published by Bhandarkar Publications, Mumbai, 1996
4. IMO, SOLAS (Safety of Life At Sea) Third Edition, International Maritime Organization, London, UK, 2001.

MV1X02 BASICS FOR MARINE ENGINEERING 4 0 0 100

AIM

- To impart sound knowledge of Basic Mechanical with the special emphasis on various Energy resources and Marine power plant.
- To enhance theoretical and modern technological aspects in Chemistry.
- To enable the students to correlate the theoretical principles with application oriented studies.

OBJECTIVES

On completion of the course the students are expected to

- Have studied renewable and non renewable energy resources.
- Have a grasp of working principles of petrol and diesel engines.
- Have knowledge of refrigeration and air conditions.
- Have a understanding of different methods of power transmissions.

In addition the students would be exposed to

- Testing and treatment of water, Boiler water and Drinking Water.
- Application of ferrous and non ferrous Materials and high polymers for Marine use.
- Basic study of Marine Pollution, Environmental Protection and Protection coating
- Study of Explosives and Explosions in ships.

1. ENERGY RESOURCES AND POWER GENERATION 12

Renewable and Non-renewable resources – thermal, hydel, solar, wind, tidal, geothermal and nuclear – Indian energy scenario.
Power Plants - Steam, gas turbine, diesel, nuclear and hydel power plants – Layout, major components and working, Choice of the type of plant, Combined cycles, cogeneration, Importance of Energy storage, Environmental constraints of power generation using fossil fuels and nuclear energy.
Steam generators - Classification, working or Cochran, Babcock Wilcox, Lamont and Benson boilers, Principles and features of modern high pressure boiler – tower type boilers. (A separate study of boiler mountings and accessories are beyond the scope of this course).

2. I.C. ENGINES AND REFRIGERATION & AIR CONDITIONING 24

Classification, Working principles of petrol and diesel engines - two stroke and four stroke cycles, functions of main components, Carburetion - Single jet Carburetor, mixture strength, Ignition system of petrol engine, Fuel pump and injector of diesel engine, Cooling system – necessity, air and liquid cooling,

optimum cooling, Lubrication system – purpose and methods of lubrication, lubrication oil classification and selection.

Refrigeration – application and types, Vapour compression refrigeration system – working principles and features, working fluids.
Air conditioning – requirement of conditioned air, summer and winter air conditioning, layout of a typical window air conditioner, Thermoelectric cooling.

3. a. METAL FORMING, METAL JOINING PROCESSES 12

Metal forming – Principles of forging – mechanical power hammers – Hot and Cold forging processes – rolling, drawing and extrusion, Metal joining processes – flexible and permanent, Principles of welding – Fundamentals of arc welding, gas welding and gas cutting, Brazing and Soldering

3. b. POWER TRANSMISSION: 12

Brief introduction to belt and rope drives. Simple and compound gear trains.
Machine Tool Engineering - Main Components and functions of lathe, drilling, shaping, planning and milling machines.
Introduction to CAD, CAM, CIM and ROBOT.

APPLIED CHEMISTRY

4.a. TECHNOLOGY OF WATER 15

Water and its impurities – hardness, units of hardness, estimation of hardness by EDTA method, Treatment of hardness – Lime, soda process (Problems of Lime and soda requirements), Zeolite and demineralization process, Boiler feed water – treatment methods, Treatment of domestic water supply – desalination of water, Reverse Osmosis and Electrodialysis.

4. b. CHEMISTRY OF ENGINEERING MATERIALS AND POLYMERS 15

Industrial Silicate Refractory, Abrasives.
Metallurgy: Materials for Marine use – Properties of Copper, Nickel, Bronze, Gun metal, White metal, Stainless steel, Low carbon alloys, High carbon steel.
High polymers: Homo and hetero chain polymers – types of Polymerization – addition polymerization, condensation polymerization. Effect of polymer structure on properties – strength. Plastic and thermo setting plastics – Celluloses, PVC, polyethylene, Bakelite, Advantages of plastics, Fabrication of molding of plastics, Synthesis ropes, foam compounds.

5. a. MARINE POLLUTION, ENVIRONMENTAL PROTECTION AND PROTECTIVE COATING **15**

Water and oil pollution – sources and treatment, determination of BOD and COD, treatment of domestic sewage, Types of industrial wastes. Air pollution, Green house effect, Ozone depletion – acid rain. International standards for water and air quality – regulations. Ships wasters and sewage treatment.
Chemical Toxicology: Bio – chemical effects of Lead, Mercury, Carbon monoxide, Nitrogen oxides, Sulphur dioxide, Ozone and Cyanide.
Inorganic – Surface conversion process – Anodizing, Vitreous coating, Phosphating, Chromising, Treatment of metal surfaces – Hot dipping, Electroplating, Cladding Organic coating – Paints - Ingredients and their functions – Varnishes – Lacquers – Channels, Epoxy resin coating – Paints for Marine use.

5. b EXPLOSIVES AND RISK OF EXPLOSION IN SHIPS **15**
Smoke bomb, Rocket flares, Rocket parachute and chemistry of pyrotechnics. Phase rule – definition – explanation of terms – examples – applications – One component and two component eutectic systems.

Total: 120 Hrs

TEXT BOOKS:

1. Duraivelu. K., Richard. S., Basic Mechanical Engineering, 2nd Edition, DeaR Publication, Chennai, 2001.
2. Shanmugam.G, Palanichamy. M.S., Basic Civil and Mechanical Engineering 3rd Edition, TATA McGraw-Hill, New Delhi, Year 2000.
3. Jain.P.C. and Monika Jain, Engineering Chemistry, 4th Edition, Dhanpat Rai & Sons, New Delhi, 2002.
4. A.K. De., Environmental Chemistry, 2nd Edition, Wiley Eastern Ltd, 1990.

REFERENCES:

1. K. Venugopal, Basic Mechanical Engineering, Fourth Edition, Anuradha Agencies, Chennai, Year 1994.
2. Ramalingam.K.K., Internal Combustion Engines – Theory and Practice, Scitech Publications, Chennai, 1999.
3. Sharma.P.C., A Text book of Production Technology, S.Chand & Co Ltd, New Delhi, 1996.
4. Rattan. S.S., Theory of Machines, Tata McGraw Hill Publishing Co Ltd, New Delhi, 1998
5. Uppal. M.M., A Text book of Engineering Chemistry, 7th Editions, Khanna Publishing, 1988.
6. Puri. B.R. and Sharma. L.R. Principles of Physical Chemistry, 1st Edition, Shoban Lal Nargin Chand & Co, New Delhi, 2001.
7. Daimont, The Chemistry of Building Materials, Business Books Ltd, London, 1970.

CE1X11 SOLID AND FLUID MECHANICS 3 1 0 100

(Common to B.E. EEE, EIE & ICE)

1. EQUILIBRIUM, STRESS, STRAIN AND DEFORMATION OF SOLIDS 18

Stability and equilibrium of plane frames – perfect frames – types of trusses – analysis of forces in truss members – method of joints

Rigid bodies and deformable solids – Tension, Compression and sheer stresses – Deformation of simple and compound bars – Elastic constants – stresses at a point stresses on inclined planes – principal stresses and principal planes.

2. BENDING OF BEAMS AND TORSION 18

Beams – Types and transverse loading on beams – sheer force and bending moment in beams – Cantilevers – Simply supported beams and over-hanging beams.

Theory of simple bending – Analysis of stresses – load carrying capacity – Proportioning sections – leaf springs – Shear stress distribution.

Stresses and deformation in circular and hollow shafts – stresses in helical springs – Deflection of springs

3. FLUID CONCEPTS,KINEMATICS AND DYNAMICS 18

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

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

4. INCOMPRESSIBLE FLUID FLOW 18

Viscous flow - Navier-Stoke's equation (Statement only) - Shear stress, pressure gradient relationship - laminar flow between parallel plates - Laminar flow through circular tubes (Hagen poiseulle's) - Hydraulic and energy gradient - flow through pipes - Darcy -weisback's equation - pipe roughness -friction factor- Moody's diagram-minor losses - flow through pipes in series and in parallel - power transmission - Boundary layer flows, boundary layer thickness, boundary layer separation - drag and lift coefficients.

5. HYDRAULIC TURBINES AND PUMPS 18

Fluid machines: definition and classification - exchange of energy - Euler's equation for turbo machines - Construction of velocity vector diagrams - head and specific work - components of energy transfer - degree of reaction.

Hydro turbines: definition and classifications - Pelton turbine - Francis turbine - propeller turbine - Kaplan turbine - working principles - velocity triangles - work done - specific speed - efficiencies -performance curve for turbines.

Pumps: definition and classifications - Centrifugal pump: classifications, working principle, velocity triangles, specific speed, efficiency and performance curves - Reciprocating pump: classification, working principle, indicator diagram, work saved by air vessels and performance curves - cavitations in pumps - rotary pumps: working principles of gear and vane pumps

L : 90 T:30 TOTAL : 120

TEXT BOOKS

1. Junarkar S.B, 'Mechanics of Structures', Vol. 1, 21ST edition, Charotar Publishing House, Anand, India, 1995.
2. Kazimi S.M.A., 'Solid Mechanics', Tata McGraw Hill Publishing Company, New Delhi, 1981.
3. Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd, New Delhi (7th edition), 1995.
4. Bansal, R.K., "Fluid Mechanics and Hydraulics Machines", (5th edition), Laxmi publications (P) Ltd, New Delhi, 1995

REFERENCES

1. William A.Nash, Theory and problems of strength of materials, Schaum's Outline Series, McGraw-Hill International Editions, Third Edition, 1994
2. Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw-Hill, 1983.
3.. White, F.M., "Fluid Mechanics", Tata McGraw-Hill, 5th Edition, New Delhi, 2003.
4. Som, S.K., and Biswas, G., "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw-Hill, 2nd Edition, 2004.

EE1X01 **ELECTRIC CIRCUIT ANALYSIS** **3 0 0 100**

(Common to B.E. EEE, EIE & ICE)

AIM

To expose basic circuit concepts, circuit modelling and methods of circuit analysis in time domain and frequency domain for solving simple and multi dimensional circuits including coupled circuits and three phase circuits.

OBJECTIVE

i. To understand the concept of circuit elements, lumped circuits, waveforms, circuit laws and network reduction.

ii. To analyse the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.

iii. To understand the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits.

iv. To solve the electrical network using mesh and nodal analysis by applying network theorems.

v. To know the basic concepts of coupled circuits, three phase loads and power measurement.

1. BASIC CIRCUIT CONCEPTS **15**

Lumped circuits: Circuit elements, ideal sources (independent and dependent), linear passive parameters R, L and C; V-I relationship of circuit elements; sinusoidal voltage and current, RMS value, form factor; Kirchoff's Laws; analysis of series and parallel circuits: Network reduction; voltage and current division, source transformation, star/delta transformation.

2. TRANSIENT ANALYSIS OF FIRST & SECOND ORDER CIRCUITS **20**

Source free response of RL and RC circuits; forced (step) response of RL and RC circuits; source free response of RLC series circuit; forced (step) response of RLC series circuit; forced response of RL, RC and RLC series circuit to sinusoidal excitation; time constant and natural frequency of oscillation of circuits. Laplace Transform application to the solution of RL, RC & RLC circuits: Initial and final value theorems and applications, concept of complex frequency, driving point and transfer impedance, poles and zeros of network function.

3. SINUSOIDAL STEADY STATE ANALYSIS **20**

Concept of phasor and complex impedance / admittance; analysis of simple series and parallel circuits: Active power, reactive power, apparent power (volt ampere), power factor and energy associated with these

circuits; concept of complex power; phasor diagram, impedance triangle and power triangle associated with these circuits. Resonance in series and parallel circuits: Q factor, half-power frequencies and bandwidth of resonant circuits.

4. MULTI DIMENSIONAL CIRCUIT ANALYSIS & NETWEORK THEOREMS 20

Node voltage analysis of multi node circuit with current sources, rules for constructing nodal admittance matrix [Y] for solving matrix equation [Y] V=I; Mesh-current analysis of multi node circuits with voltage sources, rules for constructing mesh impedance matrix[Z] for solving matrix equation [Z]I=V. Super position theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Compensation theorem, Tellegen's theorem, Millman's theorem, maximum power transfer theorem for variable resistance load, variable impedance load and variable resistance and fixed reactance load.

5. COUPLED CIRCUITS AND THREE PHASE CIRCUITS 15

Coupled circuits: mutual inductance, coefficient of coupling, dot convention; analysis of simple coupled circuits. Three phase circuits: three phase balanced / unbalanced voltage sources, symmetrical components, analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads (balanced & unbalanced), phasor diagram of voltages & currents, power and power factor measurements in three phase circuits.

L = 90 Total = 90

TEXT BOOKS

1. William H.Hayt Jr, Jack E.Kemmerly, and Steven M.Durbin, 'Engineering Circuit Analysis', Tata McGraw Hill Publishing Co Ltd, New Delhi, 2002.
2. Joseph A.Edminister, Mahmood Nahvi, 'Electric Circuits', Schaum's Series, Tata McGraw Hill publishing Co. Ltd., New Delhi 2001.

REFERENCE BOOKS

1. R.C. Dorf, 'Introduction to Electric Circuits', John Wiley & Sons Inc, New York, Second Edition, 2003.
2. Charles K.Alexander, Mathew N.O. Sadiku, 'Fundamentals of Electric Circuit', McGraw Hill, N.Y, 2003.

EC1X01 ELECTRON DEVICES 3 0 0 100

AIM

The aim of this course is to familiarize the student with the principle of operation, capabilities and limitation of various electron devices so that he will be able to use these devices effectively.

OBJECTIVE

On completion of this course the student will understand

- The basics of electron motion in electric field and magnetic field, and passive circuit components.
- Mechanisms of current flow in semi-conductors.
- Diode operation and switching characteristics.
- Operation of BJT, FET, MOSFET, metal semiconductor ohmic contacts, power control devices and optoelectronic devices.
- Functions of transducers and the process of IC fabrication.

UNIT I PASSIVE CIRCUIT COMPONENTS and ELECTRON BALLISTICS 18

Passive circuit components: Resistors: Fixed and Variable – Tolerance - Colour coding; Capacitors: Fixed and Variable – Dissipation factor – Characteristics and applications of various types of capacitors; Inductors: Fixed and Variable – Energy stored in a magnetic field – Q factor – Mutual coupled coils.

Electron Ballistics: Charged particles – Force, field intensity, potential and energy – Two dimensional motion of electron – Force in magnetic field – Motion in a magnetic field – parallel and perpendicular electric and magnetic fields – Electrostatic deflection and Magnetic deflection in a Cathode Ray Tube – Principles and applications of CRO.

UNIT II SEMICONDUCTOR DIODES AND SPECIAL DIODES 18

Semiconductor diodes: Classification of semiconductors – Conductivity of semiconductors – Carrier concentration in intrinsic semiconductor – Mass-Action Law – Properties of intrinsic semiconductors – Variation in semiconductor parameters with temperature – Drift and diffusion currents – Carrier life time – Continuity equation – Theory of PN junction diode – Energy band structure of open circuited PN junction – Quantitative theory of PN diode currents – Diode current equation – Diode resistance – Transition or space charge capacitance – Diffusion capacitance – Effect of temperature on PN junction diodes – Junction diode switching characteristics – Breakdown in PN junction diodes – PN diode applications – Clipper – Clampers.

Special diodes: Zener diode – Backward diode – Varactor diode – Step recovery diode – Point-contact diode – Tunnel diode – PIN diodes – Laser diode; Photoconductive sensors – Photovoltaic sensors – Photoemissive sensors – Light emitters – Liquid crystal display (LCD) – Nixie tube – Alphanumeric displays – Optocoupler.

UNIT III BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 18

Bipolar Junction Transistors: Construction – Transistor Biasing – Operation of NPN transistor – Operation of PNP transistor – Types of configuration – Breakdown in transistors – Ebers-Moll model – Transistor switching times.

Field Effect Transistors: Construction of N-Channel JFET – Operation of N-Channel JFET – Characteristic parameters of the JFET – Expression for saturation drain current – Slope of the transfer characteristics at IDSS – Comparison of JFET and BJT – Applications of JFET – Metal oxide semiconductor field effect transistor (MOSFET) – Enhancement MOSFET – Depletion MOSFET – Comparison of MOSFET with JFET – Handling precautions for MOSFET – Comparison of N-with P-Channel MOSFETs – Comparison of N-with P-Channel.

UNIT IV INTEGRATED CIRCUIT Fabrication 18

Introduction to Mass Technology - Manufacturing process – Construction of a Biploar transistor – Monolithic diodes – Integrated resistors – Monolithic capacitors – Inductors – Thin and Thick film technology - Definition of LSI, MSI, VLSI circuits -VLSI Design rules and layout technique – Introduction to fast VLSI circuits

UNIT V METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES *18*

Metal Semiconductor Contacts: Energy band diagram of metal semiconductor junction - Schottky diode and ohmic contacts – GTO.

Power control devices: PNPN diode (Shockley diode) – SCR – Thyristor ratings – LASCR (Light Activated SCR) – TRIAC – DIAC - Characteristics and equivalent circuit of UJT - intrinsic stand-off ratio.

TOTAL : 90

TEXT BOOKS

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, TMH, 1998.
2. Jacob Millman & Christos C.Halkias, Electronic Devices and Circuits, Tata McGraw–Hill, 1991 .

REFERENCES

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A. Neaman, Semiconductor Physics and Devices 3rd Ed., Tata McGraw-Hill 2002.
3. Ben G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.
4. S.M. Sze, Semiconductor Devices – Physics and Technology, 2nd Edn. John Wiley, 2002.
5. David A. Bell, Electronic Devices and Circuits, 4th Edition, Prentice Hall of India, 2003.
6. Douglas A. Pucknell & Kamran Eshraghian, “Basic VLSI design” 3rd Edition PHI,(Original Edition 1994) 2005.

EC1X04 ELECTRON DEVICES 3 0 2 100

AIM

The aim of this course is to familiarize the student with the principle of operation, capabilities and limitation of various electron devices so that he will be able to use these devices effectively.

OBJECTIVE

On completion of this course the student will understand

- The basics of electron motion in electric field and magnetic field, and passive circuit components.
- Mechanisms of current flow in semi-conductors.
- Diode operation and switching characteristics.
- Operation of BJT, FET, MOSFET, metal semiconductor ohmic contacts, power control devices and optoelectronic devices.
- Functions of transducers and the process of IC fabrication.

UNIT I PASSIVE CIRCUIT COMPONENTS and ELECTRON BALLISTICS 18

Passive circuit components: Resistors: Fixed and Variable – Tolerance - Colour coding; Capacitors: Fixed and Variable – Dissipation factor – Characteristics and applications of various types of capacitors; Inductors: Fixed and Variable – Energy stored in a magnetic field – Q factor – Mutual coupled coils.

Electron Ballistics: Charged particles – Force, field intensity, potential and energy – Two dimensional motion of electron – Force in magnetic field – Motion in a magnetic field – parallel and perpendicular electric and magnetic fields – Electrostatic deflection and Magnetic deflection in a Cathode Ray Tube – Principles and applications of CRO.

UNIT II SEMICONDUCTOR DIODES AND SPECIAL DIODES 18

Semiconductor diodes: Classification of semiconductors – Conductivity of semiconductors – Carrier concentration in intrinsic semiconductor – Mass-Action Law – Properties of intrinsic semiconductors – Variation in semiconductor parameters with temperature – Drift and diffusion currents – Carrier life time – Continuity equation – Theory of PN junction diode – Energy band structure of open circuited PN junction – Quantitative theory of PN diode currents – Diode current equation – Diode resistance – Transition or space charge capacitance – Diffusion capacitance – Effect of temperature on PN junction diodes – Junction diode switching characteristics – Breakdown in PN junction diodes – PN diode applications – Clipper – Clampers.

Special diodes: Zener diode – Backward diode – Varactor diode – Step recovery diode – Point-contact diode – Tunnel diode – PIN diodes – Laser diode; Photoconductive sensors – Photovoltaic sensors – Photoemissive sensors – Light emitters – Liquid crystal display (LCD) – Nixie tube – Alphanumeric displays – Optocoupler.

UNIT III BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 18

Bipolar Junction Transistors: Construction – Transistor Biasing – Operation of NPN transistor – Operation of PNP transistor – Types of configuration – Breakdown in transistors – Ebers-Moll model – Transistor switching times.

Field Effect Transistors: Construction of N-Channel JFET – Operation of N-Channel JFET – Characteristic parameters of the JFET – Expression for saturation drain current – Slope of the transfer characteristics at IDSS – Comparison of JFET and BJT – Applications of JFET – Metal oxide semiconductor field effect transistor (MOSFET) – Enhancement MOSFET – Depletion MOSFET – Comparison of MOSFET with JFET – Handling precautions for MOSFET – Comparison of N-with P-Channel MOSFETs – Comparison of N-with P-Channel.

UNIT IV INTEGRATED CIRCUIT Fabrication 18

Introduction to Mass Technology - Manufacturing process – Construction of a Biploar transistor – Monolithic diodes – Integrated resistors – Monolithic capacitors – Inductors – Thin and Thick film technology - Definition of LSI, MSI, VLSI circuits -VLSI Design rules and layout technique – Introduction to fast VLSI circuits

UNIT V METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES *18*

Metal Semiconductor Contacts: Energy band diagram of metal semiconductor junction - Schottky diode and ohmic contacts – GTO.

Power control devices: PNPN diode (Shockley diode) – SCR – Thyristor ratings – LASCR (Light Activated SCR) – TRIAC – DIAC - Characteristics and equivalent circuit of UJT - intrinsic stand-off ratio.

TOTAL : 90

TEXT BOOKS

1. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, TMH, 1998.
2. Jacob Millman & Christos C.Halkias, Electronic Devices and Circuits, Tata McGraw–Hill, 1991 .

REFERENCES

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices – Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A. Neaman, Semiconductor Physics and Devices 3rd Ed., Tata McGraw-Hill 2002.
3. Ben G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.
4. S.M. Sze, Semiconductor Devices – Physics and Technology, 2nd Edn. John Wiley, 2002.
5. David A. Bell, Electronic Devices and Circuits, 4th Edition, Prentice Hall of India, 2003.
6. Douglas A. Pucknell & Kamran Eshraghian, "Basic VLSI design" 3rd Edition PHI,(Original Edition 1994) 2005.

ELECTRON DEVICES LAB

AIM

To make students familiar with characteristics and parameters of various solid state electronic devices.

OBJECTIVE

1. To obtain and study the characteristics of signal devices, special devices and semiconductor power devices.
2. To obtain the performance parameters of simple electronic devices.

List of Experiments:

1. PN Diode characteristics
2. Voltage regulator Characteristics of Zener diode
3. Transistor Characteristics in CB, CC
4. Transistor Characteristics in CE and computation of hybrid parameters
5. Characteristics of FET
6. Characteristics of UJT
7. Characteristics of SCR
8. Characteristics of DIAC
9. Characteristics of TRIAC

List of equipments for a batch of 30

0 – 30 V RPS - 12
0 – 50 V RPS - 3
0 – 50mA Ammeter - 7
0 – 100mA Ammeter - 3
0 – 10mA Ammeter - 3
0 – 1 V Voltmeter - 4
0 – 10 V Voltmeter - 1
0 – 30 V Voltmeter - 6
0 – 50 V Voltmeter - 3
Diode - 10
Zener diode - 10
Transistor - 20
FET - 10
UJT - 10
SCR - 10
DIAC - 10
TRIAC - 10

Required passive components

EC1X02 CIRCUIT ANALYSIS 3 0 2 100

UNIT 1 BASICS OF CIRCUIT ANALYSIS 18

Charge - Current – Voltage – Power – Voltage source – Current source- resistor – Network – Circuit – Ohm's Law - Kirchoff's current law – Kirchoff's voltage law – Single loop circuit – Single node pair circuit – series and parallel connected sources – resistors in series and parallel – Voltage and current division – nodal analysis – mesh analysis – linearity and superposition - Source transformation – Thevenin and Norton equivalent Circuits – Maximum power transfer – delta wye conversion.

UNIT 2 COMPLEX CIRCUITS ANALYSIS 18

Capacitor – inductor – energy storage – duality – RL and RC Circuits- their DC transient and steady state response – RLC Circuits – Over damped, Critically damped and Under damped response – their DC transient and steady state response – Laplace transform in solving differential equations for complete response in RL, RC and RLC Circuits.

UNIT 3 SINUSOIDAL STEADY – STATE ANALYSIS 18

Characteristics of sinusoids – forced response to sinusoidal functions – Complex forcing functions - Phasor – Phasor relationship for R, L and C – impedance – admittance – nodal and mesh analysis – Use of Superposition, Thevenin's and Norton's theorems – Phasor diagram – AC power circuit analysis – instantaneous power – average power – effective values of current and voltage – apparent power and power factor –
Complex power.

UNIT 4 MAGNETICALLY COUPLED CIRCUITS, RESONANCE AND TWO PORT NETOWORKS 18

Self inductance – Mutual inductance – Coupling coefficient- linear transformer – T and Π equivalent networks – ideal transformer – turns ratio – impedance matching- series resonance – parallel resonance – their frequency response, bandwidth and quality factor – other resonant forms.
One port and two port networks – impedance parameters – admittance parameters – hybrid parameters – transmission parameters.

UNIT 5 LAPLACE AND FOURIER TRANSFORMS IN CIRCUIT ANALYSIS 18

Definition of Laplace transform – Transform of simple time functions – inverse transform techniques – basic theorems – initial and final value theorems – nodal

and mesh analysis in the S-domain – poles, zeros and transfer functions – convolution – complex frequency plane – natural response and the S-Plane.

Fourier series – trigonometric and complex forms – definitions of Fourier transform – Properties – transform pairs – transform of a general periodic time function – systems function and response in frequency domains.

TOTAL : 90

TEXT BOOK

1. William H.Hayt, Jv: Jack E.Kemmerly and Steven M. Durbin – Engineering Circuits Analysis – Tata Mc.Graw – Hill - 6th edition- 2002.

REFERENCES:

1.Schaum's series – Basic Circuit Analysis – Mc.Graw – Hill - 1998
2. K.V.V. Murthy and M.S Kamath – Basic Circuit Analysis – Jaico Publishing House, 1999
3.Norman Balabanian – Electrnic Circuits – Mc Graw – Hill Intenational edition – 1994
4.David E. Johnson: Johnny R.Johnson; John L.Hilliburn and Peter D. Scott – Electric Circuit Analysis – Prentice Hall International -Third Edition – 1997.

CIRCUIT ANALYSIS LAB

AIM:

• To construct passive electronic circuits for verifying circuit theory laws.

OBJECTIVE:

• To verify various theorems of Electric Circuits.
• To study the behaviour and obtain the characteristics of coupled circuits.
• To study the working of Wheatstone bridge.

List of Experiments:

1. Verification of Kirchoff's Laws.
2. Verification of Thevenin's Theorem
3. Verification of Reciprocity Theorem
4. Verification of Super position Theorem
5. Verification of Maximum Power Transfer Theorem
6. Frequency Response of Series and Parallel resonance circuits
7. Transient analysis of RL and RC circuits.
8. Frequency Response of single tuned coupled circuits
9. Study of Wheat stones bridge

List of equipment for a batch of 30

1. 0 – 030 V RPS - 9
2. 0 – 30 Voltmeter - 7
3. 0 – 30 mA Ammeter - 5
4. 0 – 100 mA AC Ammeter - 1
5. 0 – 200 mV AC Voltmeter - 1
6. Audio Oscillator - 4
7. CRO (30 MHz) - 3
8. Required passive components

EC1X11 ELECTRON DEVICES AND CIRCUITS 3 0 2 100

(Common to B.E. Computer Science & Engineering & B.Tech. Information Technology)

AIM:

The aim of this course is to familiarize the student with the principle of operation, capabilities and limitation of various electronic devices so that he will be able to use these devices effectively.

OBJECTIVE:

On completion of this course the student will understand

Semiconductor Physics and PN junction
Application of diodes and transistors
Theory of special semiconductor devices and its application
Technology and application of Integrated Circuits

Unit I: Semiconductor Physics and PN Junction 18

Conduction in semiconductors – Holes and electrons in intrinsic semiconductor – Carrier concentration in intrinsic semiconductor. Fermi level in intrinsic semiconductor; Impurities and Fermi levels in impure semiconductor; Diffusion. PN junction diode theory – Band structure – Current components – Volt-Ampere characteristics; Transition and diffusion capacitance – Switching, storage and transition time. Zener diodes – Tunnel Diodes. Diode applications – Half wave and Full wave rectifications – Clippers, Clampers and Voltage multiplier.

Unit II: Bipolar and Field Effect Transistors 18

Transistor construction, Operation and characteristics – Transistor current components, Analytical expressions for transistor characteristics, Transistor switching times. JFET – Pinch off voltage – Volt-Ampere characteristics – FET small signal model. Insulated Gate FET (MOSFET) types - Construction, Operation and Characteristics. Operation point of Bipolar transistors - Fixed bias circuits – Load line analysis – Collector to Base bias – Emitter stabilized bias circuit – Self bias – Stability factor – Thermal runaway – Biasing for FET – Fixed bias – Source self bias – Biasing against device variation. Biasing for depletion types and enhancement types MOSFETs.

Unit III: Electronic Circuits 18

Common emitter and Common collector amplifiers – Common source amplifier – Source follower – Equivalent circuit – Gain and frequency response. Differential amplifiers, Negative feedback – Characteristics, Feedback topologies, Analysis of Series shunt feedback amplifier. Stability and Oscillators – Phase shift, Colpitts and Crystal Oscillator. Transistor bistable and astable multivibrators.

Unit – IV: Special Semiconductor Devices and Applications 18

Silicon controlled rectifier – Construction, Operation and Characteristics – Phase controlled rectifiers using SCRs. Gate turn off switch, DIAC, TRIAC, AC Voltage regulator using DIAC and TRIAC. UJT – Characteristics, UJT relaxation oscillator. Opto isolators – Light emitting diodes – Seven segment displays, LCD – Photo diode and transistor, Solar Cell. Power MOSFET – Application in SMPS.

Unit V: Integrated Circuits and Applications 18

Fabrication of monolithic integrated circuits – Epitaxy and Diffusion process. Monolithic operational amplifiers – Characteristics and Specifications. Applications – Inverting, Non inverting and Difference Amplifiers. Differentiator and Integrator, Voltage to Current converter, Wein bridge oscillator, Active low pass and band pass filter, Precision rectifiers, Schmitt trigger and astable multivibrator. Monolithic timer IC 555 – Applications as astable and monostable multivibrator.

TOTAL : 90

TEXT BOOK:

1. Sedra. A.S., Smith. K.C ., Microelectronic Circuits, Oxford University Press, 2004

REFERENCES:

1. Robert L. Boylestad, Louis Nashelsky – Electronic Devices and Circuit Theory, Prentice Hall of India Pvt. Ltd., Sixth Edition-2000.
2. David A. Bell – Electronic Devices and Circuits - Prentice Hall of India Pvt. Ltd., Fourth Edition-2003.
3. Jaeger.R.C and Blalock.T.N., Microelectronic Circuit Design, Tata McGraw Hill, 2006.

ELECTRONIC DEVICES AND CIRCUITS LAB

AIM:

To make students familiar with characteristics of various solid state electronic devices.
To study the behaviour of simple electronic circuits involving discrete components and ICs.

OBJECTIVE

1. To obtain and study the characteristics of diodes, transistors and other semiconductor devices.
2. To obtain the performance parameters of simple electronic circuits involving discrete components.
3. To study the application of integrated circuit timers and operational amplifiers.

List of Experiments:

1. PN Junction Diode Characteristics
2. Zener Diode Characteristics
3. Half Wave and Full Wave Rectifier
4. Zener Regulator
5. CE Transistor Characteristics
6. UJT Characteristics
7. FET Characteristics
8. SCR Characteristics
9. Frequency Response of CE, CB, and CC Amplifier with self-bias, fixed bias and controller to feedback bias.
10. Applications of 555 Timer
11. Applications of Operational Amplifier
12. RC and LC Oscillators

List of equipments for a batch of 30

RPS (0-30V) - 13
RPS (0-50V) - 1
0 - 50 MA Ammeter - 8
0 - 50 µA Ammeter - 2
0 – 1 V Voltmeter - 3
0 – 30 V Voltmeter - 8
0 – 10 V Voltmeter - 1
0 – 50 V Voltmeter - 1
5V RPS - 1
± 15V RPS - 1
CRO 30 MHZ - 5
Audio Osc. - 3
Diode - 6
Zener diode - 5
Transistor (NPN + PNP) - 10
UJT - 10
FET - 10
SCR - 10
555 Timer - 10
Required passive components

EE1X11 ELECTRICAL ENGINEERING 3 0 0 100

(Common to B.E. Computer Science & Engineering & B.Tech. Information Technology)

Unit – I DC & AC circuits (15)

Basics of electricity – Electric Energy and Power –Circuit Elements and Sources - Kirchoff's laws – Series and parallel combination of resistances – Mesh analysis – Nodal analysis – Network Theorems.

Sinusoidal excitation – RMS, average and peak values - Phasor representation – RC, RL and RLC circuits - Complex power – Resonance – Three phase circuits - Line and phase values.

Unit – II Magnetic Circuits (15)

Magnetic effects of electric current – Magnetic circuits – Magnetization characteristics of materials – Electromagnetic induction and force – Self and mutual inductance – AC operation of magnetic circuits and energy losses.

Unit – III (20)

D.C. Machines – Constructional features – EMF and Torque – Circuit Model – Characteristics of D.C. Motors – Speed Control.

Transformers – Constructional features – Transformer operation – Circuit model of transformer – Voltage regulation – Efficiency – Introduction to 3 phase transformers.

Unit – IV A.C. Machines (20)

Synchronous machines – Circuit model – Armature leakage reactance – Synchronous reactance – Voltage regulation – Synchronizing to mains – Operating characteristics.

Induction machines – Construction – Circuit model – Power across airgap, Torque and power output – Torque-slip characteristic – Starting arrangements – Speed control of induction motor.

Single phase induction motors – A.C. series motor

Unit – V Control Systems (20)

Introduction to Control Systems – Closed loop control – Examples – Mathematical models of simple physical systems – Transfer function –Control Components – D.C. & A.C. Servo motors – Potentiometers – Encoders - Stepper motors – Time response of first and second order systems – Desirable pole locations of transfer functions and system stability.

Simple problems in all the units.

Total = 90 Hrs

TEXT BOOKS:

1. D.P.Kothari and I.J.Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill Ltd., Second Edition, 2002.
2. I.J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International Publishers, Third Edition, 2002.

REFERENCES:

1. T.K. Nagsarkar and M.S. Sukhija, “Basic Electrical Engineering”, Oxford Express,
   2005.
2. B.L. Theraja & A.K. Theraja, “ A Textbook of Electrical Technology” Volume I & II,
   S.Chand, 2005
3. L.F Adams, “ Engineering Instrumentation and Control IV”, English Language Book
   Society, U.K., 1982
4. M.Gopal “Control Systems – Principle and Design”, McGraw Hill Publishing Company Ltd, second edition, 2003.

BM1X01 HUMAN ANATOMY 3 0 0 100

AIM:

To provide the students necessary exposure of Human Anatomy so as to understand functioning of Bio- Medical equipment in future semester curriculum.

OBJECTIVE:

At the end of the course, students will have a clear understanding of Anatomy of every vital organ.

1. Cell-Structure and Organelles Description. Circulatory system - Heart, Pericardium, Chambers, Major Blood Vessels, Blood Supply. **18**
2. Digestive System – GI Tract, parts, Stomach, Intestine, Liver and Panchreas. Respiratory System - Trachea and Lungs. **18**
3. Excretory and Urogenital System –Parts, Reproductive System – Male and Female Reproductive Organs. Nervous System – Functions of Neurons, Synapse, Reflexes and Receptors, Brain, Brainstem, Ventricles and Spinal Cord. Peripheral and Automatic Nervous System. **18**
4. Musculo Skeletal System-Muscle Tissue, Types, Structure of Skeletal Muscle, Types of Muscle, Types of Joints, Major Muscles of Limbs and their actions. **18**
5. Eye, Ear, Endocrine Glands. **18**

TOTAL : 90 hrs

TEXT BOOK:

1. Ranganathan T.S, “Text Book of Human Anatomy”, S.Chand & Co., Ltd, Delhi, 1996.

REFERENCES:

1. Tobin C.E., “Basic Human Anatomy”, McGraw-Hill Publishing Co., Ltd., Delhi 1997.
2.Gibson .J, “Modern Physiology & Analomy for nurses”, Blackwell SC Publishing 1981.

CH1X01 PRINCIPLES OF CHEMICAL ENGINEERING 3 0 0 100

(Common to B.Tech. Chemical Engineering & B.Tech. Food Technology)

AIM :

To introduce basic concepts in Chemical Engineering operations.

OBJECTIVES :

To be conversant with theorital principles and definitions of various functions of Chemical Engineering process and equipments.

Note : Qualitative treatment only – Question paper for the University Examinations contain simple problem from units for marks not exceeding five marks.

1. Unit operations – basic laws – units and dimensions, energy equivalent mass, electro chemical processes humidity and saturation. **15**

2. Material balances, energy balances, nature of fluid, fluid flow, viscosity, conservation of mass and energy, frictional losses, laminar flow and turbulent flow, fluidization, pumping of fluids. **15**

3. Heat transfer: conduction, convection and radiation, Flow arrangement in heat exchangers, heat transfer equipment, evaporators, crystallizes. **15**

4. Mass transfer: diffusion, mass transfer operations, boiling point diagram vle, absorption, distillation, reflux, mccabe-thiele method, plate efficiency. **15**

5. Gas fluid operators: equipment for gas fluid operations, selection and use, liquid-liquid extraction, distribution coefficient, triangular diagram. Single stage equilibrium extraction, multistage extraction, industrial liquid – liquid extraction. **15**

6. Humidification, dehumidification, drying, drying equipment, classification and uses, absorption equipment, isotherms and its uses. **15**

TOTAL = 90

TEXT BOOKS :

1. Introduction to chemical engineering by S.K. Ghosal, S.K.Sanyal and S.Dutta, TMH Publications, 1998.
2. Introduction to Chemical Engineering by W.L.Badger and J.T. Banchero, McGraw-Hill Edition

TT1X01 POLYMER SCIENCE & TEXTILE FIBRE PRODUCTION 4 0 0 100

(Common to Textile Technology and Textile Technology (Textile Chemistry)

1. POLYMERIZATION – MECHANISM, TECHNIQUES & CHARACTRIZATION 18

Polymer: Definition, Classification, Polymerization Mechanisms: Chain (Ionic, radical and co-ordination -Ziegler Natta) and Step (Condensation) polymerizations, Co-Polymerization (Ionic, Radical and Condensation). Polymerization Techniques – Bulk, Solution, Suspension, Emulsion, Solid and Gas Phase, Polycondensation Technique-Melt, Solution and Interfacial Characterization of polymers: Degree of polymerization, Different average molecular weights (Viscosity, Number, Weight and Z-average), Determination of weight average by light Scattering, number average by Gel permeation chromatography and Osmometry and viscosity average by Ubbelhode Viscometer, Molecular weights of polymers – theoretical and experimental details. Thermal Characterization: Principle and working of Differential Scanning Calorimetry and Thermo Gravimetric Analysis.

2. POLYMER PRODUCTION: 18

Criteria for fibre forming polymers, Polymer Production, Properties and Applications : Polyester and Polyamides (Nylon 6, Nylon 6,6), Polypropylene, Polyacrylonitrile (Acrylic and Modacrylic), Polyurethane Polyethylene, Polycarbonate, Polyvinyl chloride , Carbon fibres: source, generation, properties and applications. Conducting and super absorbing polymers – typical examples, preparation, properties and uses.

Manufacture of Viscose and Acetate rayon, Modified high wet modulus-Polynosic yarn, Lyocell - super high wet modulus yarn

3. SPINNING OF POLYMERIC FIBRE & ITS STRUCTURE 20

Melt, Wet, Dry, Dry Jet Wet, Liquid Crystal and Gel Spinning of polymeric fibres. Melt spinning line: Features of Extruder-single and multi screw extruder, Basic operations, zones and design features of extruder, Static and Dynamic Mixer, Pre-filter, melt manifold, spinpack, quenching system, Take up winding- High speed winder. Solution spinning Line – Dope, candle filter, gadgets , coagulation bath Dryer and winder Structural principles of polymeric fibres , Structure-property relationships in polymers – tacticity - polymer morphology – crystallinity – phase transitions (first and second order), factors affecting first order and second order transitions – Solubility of polymers – Mechanical, optical, thermal, electrical, chemical and weather resistant characteristics.

4. POST SPINNING OPERATIONS 18

Spin finishes: Need and composition of spin finish, spin finish application technique, spin finish for filament and staple fibre production, Drawing: Need for Drawing, Drawing unit, spin Draw process, Draw warping, Heat setting, Need for heat setting, stability and measurement of degree of set, crimping and Texturisation: Need, principles, types, functioning. Tow to Top and Tow to yarn Converters : Stretch breaking, Cutting Method

5. NATURAL FIBRES 16

Cotton: Cultivation, varieties, practices, grading and baling. Silk- Pre and post cocoon operations, varieties of silk and their properties, wool shearing, grading, varieties of wool and properties, Bast fibes-Jute cultivation, Fibre extraction and properties

TOTAL = 90

TEXT BOOK AND REFERENCES

1. V. R. Gowariker, N.V. Viswanathan, and Jayadev Sreedhar," Polymer Science" , New age Publication Ltd, New Delhi 1986.
2. Raymond B Seymour, C.E. Carraher Jr, Structure-property relationship in polymers", Plenum Press, New York, 1984.
3. Buchholz ACS, " Super absorbent polymers" Oxford University Press, 1994
4. Srinivasamurthy HB, "Introduction of Textile Fibres", Textile Association, India, 1987.
5. Vaidya A. A., "Production of Synthetic Fibres", Prentice Hall of India Pvt. Ltd., New Delhi, 1988.
6. Gupta V. B. and Kothari V. K. (Editors), " Manufactured Fibre technology"., Kluwer Academic Publisher, 1997, ISBN 0412-54030-4
7. Cook J. G., " Handbook of Textile Fibres: Vol. 1:Natural Fibres", The Textile Inst., 5th ED, 1984, ISBN: 1855734842
8. Cook J. G., " Handbook of Textile Fibres: Vol. 1:Man Made Fibres", The Textile Inst., 5th ED, 1984, ISBN: 1855734850
9. Wray G. R., "Modern Yarn Production", Columbine Press , Manchester,1960

EE1X12 ELECTRICAL AND ELECTRONICS ENGINEERING 3 0 0 100

(Common to B.Tech. Polymer Tech & B.Tech. Rubber & Plastics Tech)

1. ELECTRICAL CIRCUITS 15

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 15

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 15

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

4. SEMICONDUCTORS AND RECTIFIERS 15

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 15

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 15

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 : 90

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.

BT1X01 BIOCHEMISTRY - I 3 0 0 100

1. INTRODUCTION TO BIOMOLECULES 12

Overview – Basic principles of Organic Chemistry, Types of Biomolecules, Chemical nature, Biological role, Biological buffers, Water and its importance in Biochemistry.

2. STRUCTURES & PROPERTIES OF CARBOHYDRATES, PROTEINS 20

Carbohydrates (Mono, Di, Oligo)- forms of Isomerism, Physiological importance, Polysaccharides – Starch- glycogen- Cellulose and their derivatives- Chitin- Peptidoglycons- Glycoaminoglycons- Glycoconjugates, Test for Carbohydrates.

Classification of Amino acids and Proteins, Structure of Proteins- Primary- Secondary- Tertiary and Quaternary – Myoglobin & Hemoglobin, Test for Proteins.

3. STRUCTURES & PROPERTIES OF LIPIDS, NUCLEIC ACIDS 20

Lipid – Classification (Fatty acids, Glycerolipids, Phospholipids, Glycolipids, Sphingolipids, Steroids) - Physiological importance, Significance of Cholesterol

Nucleic Acids – Structure of Purines – Pyrimidines – Nucleosides - Nucleotides - Ribonucleic acids - Deoxyribonucleic acids - Nucleoprotein complexes, Synthetic Nucleotide analogs, Functions of Nucleotides – Carrier of Chemical energy of cell- Enzyme Cofactor – Regulatory Molecules

4. NUTRITION & METABOLISM 20

Nutrition, Digestion and absorption of Carbohydrates - Lipids - Proteins - Vitamins - Minerals, Vitamins – Biomedical importance – Classifications – Deficiency diseases

Introduction to Biocatalysis by Enzymes and Pathways, Introduction to Biosynthesis and Breakdown of Carbohydrates- Lipids- Proteins and Nucleic Acids

5. INTERMEDIARY METABOLISM & BIOENERGETICS 18

TCA cycle - Glycolysis – Glyconeogenesis - Pentose phosphate shunt - Urea cycle – Interconnection of Pathways – Metabolic regulations.

High energy compounds – Electronegative Potential of compounds, Respiratory Chains- ATP cycle- Calculation of ATP production during Glycolysis and TCA cycle, Regulation of levels of High energy compounds and reducing equivalents inside the cell.

Total : 90

TEXT BOOKS

1. Lehninger's Principles of Biochemistry by David L. Nelson and Michael M. Cox, Macmillan Worth publisher.
2. Lubert Stryer, Biochemistry, 4th Edition, WH. Freeman and co., 2000.
3. Murray, R.K., Granner, B.K., Mayes, P.A., Rodwell, V.W., Harper's Biochemistry Prentice Hall International.
4. Voet and Voet, Biochemistry 2nd Edition, John Wiley and Sons Inc., 1995
5. B.S. Bahl., Arun Bahl., Advanced Organic Chemistry 1st Edition, S. Chand & Co. Ltd., 2000.

PE1X01 PETROLEUM THERMODYNAMICS 3 0 0 100

AIM:

The student, after completing this course, will have knowledge of the principles of thermodynamics and will be able to apply this knowledge to new situation.

OBJECTIVES:

The student, after completing this course, will be able to :

i) Calculate the parameters such as specific heats, vapour pressure and compressibility factor
ii) Calculate the heat of reaction, heat of formation, etc. and will be able to draw the P-T, P-U and - -T diagrams for single and multicomponent systems
iii) Calculate the equilibrium constant and the various parameters for a multicomponent system
iv) Evaluate the hydrocarbon fluid characteristics such as gas formation volume factor
v) Convert the given volumetric analysis into gravimetric analysis and vice versa; determine the specific heat of mixtures and functioning of a steam condenser.

UNIT 1 : 20

Behaviour of Gases and Liquids – Gas laws, Density, Mole percent, Weight percent, Volume percent, Specific gravity, Heat, Work Closed and Open Systems, First and Second Laws of thermodynamics, specific heats, Compressibility factor, PVT relationships, Vapour pressure, Claussius – Clayperson equation, heat of vaporization.

UNIT 2 : 20

Chemical Thermodynamics of Petroleum Hydrocarbons: Free energy change, Heat of reaction, Entropy change, Heat capacity, Heat of formation, Fugacity, Pressure – Temperature diagram, Pressure – Volume diagram, Density – Temperature diagram for one and two component system. Pressure – Composition diagram, Temperature – Composition diagram, Temperature – Composition diagram, for multi component system Gibbs phase rule

UNIT 3 : 15

Qualitative phase behaviour of Hydrocarbon systems: Calculation of liquid and vapour composition of Bubble point and Dew point pressure for multi component system. Equilibrium constant

UNIT 4 : 15

Hydrocarbon Fluid Characteristics – Gas formation volume factor, Gas solubility, Oil formation volume factor, Viscosity

UNIT 5 : **20**

Mixtures – Dalton and gibb's – Dalton Law Volumetric analysis of a gas mixture – apparent weight and gas constant – specific heats of a gas mixture – determination of calorific values of fuels – oil and fuel vapour mixtures – steam condensor

Total 90

References:

1. J.M. Smith, H.C. Van Ness, M.M. Abbott "Introduction to Chemical Engineering Thermodynamics", McGraw Hill Intl. Publications, NY, 1978.

2. T.D.Eastop, A.McConkey, Applied Thermodynamics for Engineering Technologists.

3. Robert W.Gallant "Physical properties of Hydrocarbons" – volume-I Gulf Publishing Company, NY 1990.

4. V.N.Erikh, N.G.Rasina, M.G.Rudin, "The Chemistry and Technology of Petroleum and Gas (MIR Publications) 1986.

5. John J.McKetta Jr. "Advances in Petroleum Chemistry and Refining" – Volume 9 (Inter-science Publications), NY, 1983.

FT1X01 FASHION ART AND DESIGN 3 1 0 100

Unit 1 **15**

Origin of clothing – an overview on clothing as a social message - Social status - Occupation - Ethnic, political, and religious affiliation - Marital status - Sexual interest - Origin and history of clothing – clothing of Europe – America – Asia – Africa - Future trends. Definition of fashion – origin of fashion - types of fashion – origin of fashion languages – Fashion and variation - Fashion and the process of change - Fashion and status - terms related to fashion.

Unit 2 **15**

Definition of Costumes - Ancient Costume - Medieval Costume - Renaissance Costume – 18^{th} to 20^{th} century costumes - Costumes of ancient civilization – Egypt, Greece, Roman, English, French empires during Renaissance 1500 –1600 AD – Overview of costumes of India – Pakistan - Srilanka - Burma - China – Japan. Factors influencing costume changes.

Unit 3 **15**

Lines – Geometric structures - Theory of Colour – Pigment theory – light theory – Metamerism - Chromophore - Colour wheel - Tints and shades - Colour Harmony - Prang Colour system - Sketching and Drawing - Concepts of Design - Principle of Designing - Proportions – Rhythm – Balance, Emphasis, Harmony - Computer Aided Designing - Study of leading Fashion Designers – French, Italian, American, Indian & English.

Unit 4 **15**

Definition of Fashion designing – Fashion Cycle - A passion for fashion designing - Background to the world of Fashion Design –Fashion Promotion - Fashion merchandising – Fashion photography – Fashion Magazines – Fashion Show – Fashion Trend – Fashion Modeling – Men's Fashion – Women's Fashion – kid Fashion – Fashion Jewelry - Fashion Accessories – Latest fashions based on Age, Sex, Nationality, Occupation, and Socio Economic Status.

Unit 5 **15**

Study on Traditional Textiles – Overview of Dacca Muslin, Jamdhani, Himrus & Amrus, Carpets, Kashmir shawls, Kancheepuram & Baluchari saris, Paithani Saris, Bandhani, Patola, Ikkat, Kalamkari , Chikankari, Kashidakari , Kantha Kasuti & other styles of printing and dyeing textiles.

Unit 6 **15**

Study on Human Anatomy based on proportion, structure, shape, size, eight head theories, Figure irregularities, Difference between normal figure and fashion figure, converting a normal figure into fashion figure using pictures from magazines. Marking different types of lines on the flesh croqui like – center front line, princess line, waist line, side seam, armhole, neck line, panty line, bust line.

Tutorial **30**

To make students to practice drawing of Lines, Proportions, Rhythm, Harmony, Croquis, Human anatomy, Paintings, and various postures of human body illustrating fashion.

Total no. of periods = 120

TEXTBOOKS:

1. Russel Gillow, Nicholas Barnard, “Traditional Indian Textiles”, Thames and Hudson Ltd.,London, 1991.
2. Elizabeth Rouse, “Understanding Fashion”, Blackwell Scientific Publication, Oxford, 1989. ISBN:0632018917
3. Katherine Morris Lustre “Historic Costume” Chas A. Bennett Co., Publishers, Peoria, Illinois.

REFERENCES:

1. Mckelvey, K. and Munslow, J. “Illustrating Fashion”, Blackwell Science, 1997, ISBN: 063204024633
2. Entwistle, J. “The Fashioned Body”, Polity 2000, ISBN: 0745620078.
3. S.N Dar, “Costumes of India & Pakistan”, D.B Tataporevala sons & co. Ltd., 1982.
4. Churye G.S, “Indian Costume”, Ramdas Bhatkal for Popular Prakashan Pvt. Ltd., Bombay, 1995.
5. Corter Ernestine, “The Changing World of Fashion”, Om Book Service, 1900 to present.
6. Singer, “Sewing Active Wear”, The Hamlyn Publishing group Ltd., London 1963.
7. Hatanaka kokyo Collection –“Textile arts of India”, chronide Books, 1996
8. Madhubani, K.prakash, “An Invaluable book on the original Art Tradition”, Design Point, 1994. 34

FT1X02 YARN MANUFACTURE 3 1 0 100

Aim:

To impart basic knowledge of various fibres, processes and machinery used in yarn manufacture, yarn properties and end uses.

Unit 1 **10**

Introduction to fibres – definition, staple fibres and filament fibres. Classification – Natural fibres, Man-made fibres. Properties – essential properties, desirable properties. Cross-sectional and longitudinal views of different fibres, end uses.
Speciality fibres – characteristics and end uses of high tenacity and high modulus fibres, high temperature and flame retardant fibres, high stretch fibres (Lycra), ultra-fine fibres, nano fibres, superabsorbent fibres – medical and hygiene applications.
Yarn number – definition, systems of expression, simple calculations.

Unit 2 **10**

Ginning – objectives of ginning, Types of gins – Knife roller gin, Saw gin, Ginning out-turn. Effect of ginning performance on yarn quality.
Blowroom – objectives of blowroom, mixing – need of mixing, blending – objectives and types, Opening and cleaning – principle and brief description of opening, cleaning and blending machines – Mixing bale opener, Monocylinder, Axi-flow cleaner, Step cleaner, Krishner beater. Cleaning efficiency in blowroom. Settings and speeds of various Openers/cleaners. Sequence of machines in modern blowroom line. Blowroom line for cotton, man-made fibres and their blends.

Unit 3 **10**

Carding – objectives of carding, basics of opening, cleaning and fibre individualization, nep removal. Study of working of modern high production card, speeds and setting of functional elements, card clothing and production calculation. Basic concept of auto-levelling in carding. Brief mention on latest developments in carding to increase production and sliver quality, features of chute feed system.

Unit 4 **10**

Drawframe – basic principles of doubling and drafting. Description of working of a modern drawframe. Concept of roller flutes, roller setting, and roller pressure. Draft and production calculation. Effect of roller defects and break draft on sliver quality. Process parameters for processing cotton, man-made fibres and blends. Concept of working of autoleveller on drawframe. Influence of drawframe sliver quality on yarn characteristics.

Unit 5 **10**

Comber – requirement and objectives of comber preparatory process. Methods of lap preparation – lap doubling process, sliver doubling process.

Objectives and principles of combing. Working of comber – sequence and timing of operations in combing. Types of feeding – concurrent feed and counter feed, degree of combing. Combing efficiency. Concept of piecing waves, asymmetric web condensation. Draft and production calculation. Comber waste percentage, difference between carded yarn and combed yarn.

Unit 6 **10**

Speedframe – objectives of speedframe, principle of working of modern speedframe. Differences between bobbin lead / flyer lead roving processes. Function of aprons and spacer, settings and speeds. Draft, twist and production calculations. Importance of roving quality on ring frame performance and yarn quality.

Unit 7 **15**

Ring spinning – principle of working. Brief on drafting system – angle of roller stand, fluted rollers, types of flutes – cots, aprons and their specifications. Functions of yarn guide, balloon control ring, separators, rings and travellers, features of antiwedge ring and elliptical traveller, orbit ring/traveller, zenith ring/traveller. Spindles – spindle size, spindle drives. Process parameters – speeds, settings, draft and production rates for cotton, synthetics and blends.

Condensed yarn spinning – principle of working, different methods of condensed yarn manufacture, condensed yarn properties and end uses vis-à-vis conventional ring-spun yarn properties.

Unit 8 **15**

Modern spinning systems – basic principle of working of Rotor spinning, Air-jet spinning, Friction spinning, Twistless spinning, Wrap spinning, Core yarn spinning. Count range, properties and end uses of yarns.

Sewing thread production – requirements of sewing threads, fibres used, methods of production, types, properties and end uses.

Mélange yarns and Fancy yarns – types, properties and applications.

Double yarns and Cable yarns – requirements, properties and end uses.

Tutorial **30**

To solve simple problems related to calculation of cleaning efficiency, draft, twist, production, count, etc.

Total no. of periods = 120

TEXTBOOKS:

1. Lord P.R., “Yarn Production: Science, Technology and Economics”, The Textile Institute, Manchester, 2002. ISBN: 1870372174.
2. Chattopadhyay R.(Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.

REFERENCES:

1. Klein W., “Short Staple Spinning Series: The Technology of Short-staple Spinning”, Vol. 1, The Textile Institute, Manchester, 1998. ISBN: 1870812980.
2. Klein W., “Short Staple Spinning Series: A Practical Guide to Opening and Carding”, Vol. 2, The Textile Institute, Manchester, 2000. ISBN: 1870812999.
3. Klein W., “Short Staple Spinning Series: A Practical Guide to Combing, Drawing and the Roving Frame”, Vol.3, The Textile Institute, Manchester, 2002. ISBN: 187037228X.
4. Klein W., “Short Staple Spinning Series: A Practical Guide to Ring Spinning”, Vol. 4, The Textile Institute, Manchester, 2002. ISBN: 1870372298
5. Klein W., “Short Staple Spinning Series: New Spinning Systems”, Vol. 5, The Textile Institute, Manchester, 1993. ISBN: 1870812557.
6. Gowda R.V.M., “New Spinning Systems”, 2nd edition, 2006, NCUTE publication.