GOVERNMENT OF KERALA
DEPARTMENT OF TECHNICAL EDUCATION

CURRICULUM DEVELOPMENT CENTRE
KALAMASSERY

CURRICULUM OF
DIPLOMA COURSE

IN

ELECTRONICS ENGINEERING

SEMESTER SYSTEM
(Revision 2006)

Prepared at

CURRICULUM DEVELOPMENT CENTRE, KALAMASSERY

RULES AND REGULATIONSOF THE DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY/COMMERCIAL PRACTICE UNDER THE STATE BOARD OF TECHNICAL EDUCATION, KERALA STATE. (SEMESTER SYSTEM)

01. Duration of the Diploma Course

The duration of the regular Diploma courses will be of three academic years, consisting of Six (6) consecutive semesters. The first 2 Semesters are combined and run on an year pattern, and called "Combined First and Second Semesters".

02. Medium of Instruction

The medium of instruction in all the theory and practical subjects shall be English.

03. Eligibility for Selection to the Diploma Course

Candidates for admission shall be required to have passed X^{th} class examination (S.S.L.C.) conducted by the Board of Public Examinations, Kerala State or any other equivalent examinations already recognized by the Board of Public Examinations, of Kerala State, with the eligibility for Higher Education.

04. Instructional duration in an academic year

a) The academic year shall consist of 2 Semesters, each consisting of a minimum of 16 weeks of instruction, including intervening holidays, but excluding the period of examinations and study holidays.

b) The course will follow Semester pattern, with an End semester examinations, conducted by the Board of Technical Examinations, Kerala State. The examinations for first year (Semester I & II Combined) will be conducted at the end of second semester.

c) There will be 7 Instructional periods of 55 Minutes duration per Day, and there shall be 5 working days in a week from Monday to Friday, and thereby 35 Periods per Week.

05. Minimum attendance required for obtaining eligibility to appear for the Examination.

a) A candidate must secure a minimum of 80% attendance in the combined First and Second Semester and in each subsequent Semester, in order to secure the eligibility to appear for each End Semester examinations.

b) In the case of those students with 65% or more attendance but could not attain 80% attendance due to Medical reasons, the Principal of the Polytechnic, at his/her discretion, may grant the eligibility to appear for the examination, subject to the remittance of "Condonation fee", fixed by the Government from time to time.

c) Students who have secured less than 65% attendance are not eligible to apply for "condonation", and will not be allowed to appear for the examination under any circumstances.

d) Students who have shortage of attendance, but not condoned, in any of the semesters including first year, are not eligible to appear for the end Semester Examinations, and therefore not eligible to be promoted to the higher semesters. They may seek readmission. Application for readmission may be entertained only for genuine cases on medical grounds and in doubtful cases the Principal may seek report from medical board for verification.

e) Condonation of attendance is permitted only once in the entire course of study both in the case of regular and part time courses.

06. Scheme of Evaluation.

a) The scheme of evaluation shall consist of (1) Internal assessment (Sessional) and (2) End Semester examinations in Theory and Practical Subjects. The maximum marks for End Semester Examinations, and Internal Assessment, both for the Theory and Practical papers will be 75 and 25 respectively except for the Combined I & II Semesters. However, for some exceptional subjects, this may vary. Details of break up of marks are given in the Curricula of each discipline.

b) The Total marks (Internal and End Semester Examinations) will be as follows:

Combined I &II Semesters: 1000 Marks

III to VI Semesters: 700 Marks/ Semester

c) All the end examination including the drawing examination will normally be of 180 Minutes duration. In certain specialized disciplines this requirement may not be adhered to strictly and the End Semester Examination of a longer duration may be permitted.

07. Award of internal assessment marks.

a) In respect of theory subjects the award of sessional mark will be on a Continuous Evaluation method, based on tests, assignments and attendance in the proportion of 40% for tests, 40% for assignments and 20% for attendance. There will be a minimum of three tests and Three Assignments, and all the 3 Test papers and 3 Assignments are taken into account for the calculation of Final Internal Assessment Marks.

b) Split up of Internal Assessment Marks :

A. Attendance:

Sl.No.	Percentage of Attendance*	Marks to be awarded (computed for 5 Marks)
1	Below 65	Zero
2	65 to 79	1
3	80 to 84	2
4	85 to 89	3
5	90 to 94	4
6	95 and above	5

B. Practical:

Sl.No.	Criteria component	Marks to be awarded
1	Observation Note/ Rough Record	20%
2	Fair Record (Timely submission, Accuracy and Neatness)	20%
3	Attendance*	20%
4	Test	40%

C. Drawing

Sl.No.	Criteria component	Marks to be awarded
1	Submission of Completed Drawing Sheets (Timely submission, Accuracy and Neatness)	40%
2	Attendance*	20%
3	Test	40%

*Percentage of attendance for that particular subject only is counted here.

D. Seminar

Sl. No.	Criteria component	Marks to be awarded
1	Relevance of Topic	10%
2	Collection of materials	20%
3	Presentation (Presentation slides, Delivery)	40%
4	Question-Answer,/Discussion	20%
5	Seminar Report	10%

E. Project Work

Sl. No.	Criteria component	Marks to be awarded
1	Relevance of Topic & Selection of	10%
2	Knowledge in the Tool	20%
3	Selection of Tool	20%
4	Fabrication & Final product	20%
4	Role of the individual in the Team	20%
5	Project Report	10%

c) The Faculty concerned will maintain a record of all details regarding Attendance and Internal Assessment marks awarded in the prescribed log book. The students can represent their grievances, if any, in respect of marks awarded, to the concerned Head of Section for clarification.

d) The students are required to keep a record of all their laboratory exercises performed by them in the form of a laboratory record. This record has to be authenticated by the teacher-in-charge of the laboratory and certified as the record of the bonafide work done by the student by the Head of Section before he is allowed to take the practical examinations. No student will be permitted to take any practical examinations without the bonafide Record.

08. End Examination

a) In each theory subject and in the drawing subject there will be an end examination in each Semester conducted by the Board of Technical Examination, Kerala State as per the pre-announced notification of examinations. The Timetable for the examination will also be informed to the students ahead of their conduct.

b) Regular/Supplementary examination for all semesters will be held at the end of each semester as the case may be.

c) The question paper for each Theory paper (excluding the Drawing papers) will consist of Two parts:

Part A – is for a maximum of 15 marks consisting of 10 short answer type questions of 1 ½ (One and a half) marks each (to be answered in one or two sentences) covering the whole subjects area. There will be no choice in Part A.

Part B – consists of 10 structured essay type questions of 12 marks each with two question from each of the five units in a subject. Students will have to attempt one question from each unit to score the prescribed maximum of 60 marks.

The part A and Part B will be given together in one question paper.

d) For drawing subjects, the design of question paper will be according to the needs of that particular drawing. There will not be any short answer type question in drawing.

e) For practical end examinations, the Board of Technical Examination, Kerala State will appoint examiners who will set a question paper consisting of practical exercises. This will be used for that practical subject.

09. Minimum marks for a pass

a) A candidate must secure a minimum of 40% marks in the End Semester examination in Theory and Practical for a Pass in each subject. There will be no separate minimum for a pass in the internal assessment but the total marks of End Semester examination and Internal assessment should not be less than 40% for a pass each subject.

10. Rules for promotion to the Higher Semesters.

a) A candidate will be allowed to go to the next higher Semester, if he/she attended the Combined I & II Semester/ Previous Semester, and has fulfilled the conditions of attendance requirement. However,

b) A candidate will be permitted to register for the Fifth Semester Examination if and only if he/she has passed all the subjects of the Combined I & II Semester, and

c) A candidate will be permitted to register for the Sixth Semester Examination only if he/she has passed all the subjects of Combined I & II, and III Semesters.

11. Classification of successful candidates

a) Candidates shall be declared to have passed the diploma course only if he/she has secured a Pass in all the theory and practical subjects in all the Six Semesters of study.

b) There will be 3 classifications of passed candidates namely.

First class with distinction

First class and

Second class

c) The total marks of the Semesters from 3 to 6 shall be considered to classify the successful candidates. That is all these marks will be added and the percentage of marks out of 2800 worked out.

First Class with Distinction

A candidate will be declared to have passed the Diploma Course in First Class with Distinction if he/she secures not less than 75% of the aggregate marks in all Semesters put together except First Year (Combined I & II Semesters) and passes all the above semesters including the Combined I & II Semesters in the first appearance itself, within the stipulated period of normal study, i.e., Three Years of Six Consecutive Semesters, without any break.

First Class

A candidate will be declared to have passed the Diploma Course in First Class if he/she secures not less than 60% of the aggregate marks in all Semesters put together except First Year (Combined I & II Semesters) and passes all the above semesters including the Combined I & II Semesters, within three consecutive chances including his regular chance offered by the Board of Technical Examination.

Second Class

All other successful candidates will be declared to have passed in the Second Class

12. Provision for Improvement/Betterment:

a). A candidate, if he desires, may improve his/her marks in any subject, in the immediate chance that follow his regular chance/attempt, in the 3rd, 4th and 5th Semesters. A "regular attempt/chance" is defined as the examination chance of the current semester of his/her study.

b) A candidate, if he/she desires, will be permitted to better his/her marks of the 6th Semester Subjects by reappearing for the entire subjects of that semester together, by taking the next available chance only. (Betterment can be done only for the 6th Semester)

c) Improvement/betterment will not be reckoned as another chance/attempt. Candidates appearing for betterment will not be considered for the purpose of ranking.

13. **Award of Rank**: Rank Holder in each Discipline will be selected from among the successful candidates who have passed the Diploma course in "FIRST CLASS WITH DISTINCTION" only. "Grace mark" awarded for the performance in arts/sports/similar extra or co- curricular

activities will not be considered for determining the rank holders subject to rules 11 and 12 above.

14. Maximum duration of the Diploma Course:

Normal duration of the diploma course is 6 consecutive Semesters, spanned in 3 Academic Years, as stated in para 01. However, in the case of those who have not acquired Diploma within the stipulated minimum duration of 3 Years, he/she may acquire the Diploma taking a maximum duration of another 3 Years. However, the maximum number of chances to appear for the End Semester examination is limited to 4, including his/her regular chance.

15. Cancellation of Candidature in the Diploma Examination:

If a candidate desires to cancel his candidature for end semester Examination he/she should forward the duly filled in Application Form, recommended by the Principal of the Polytechnics so as to reach the office of the Controller of Technical Examinations within 10 days after the completion of the last theory Examination of that particular Semester examination. For those who have applied for the examination and absent without canceling their candidature, it will be treated as an attempt/ chance. Cancellation of candidature in any Semester Examination is allowed only once. Candidates reported for malpractice will not be eligible for cancellation of examination.

16. Defaulters of fee:

Defaulters of fee will not be permitted to register for the End Semester examination

17. General Information:

Norms for transfer of students:

a) Application for transfer from one institution to another will be entertained only at the second year (3rd Semester) of the Diploma course. Candidates who desire to get transfer to another institution in the second year (3rd Semester) should submit the application in the prescribed "format for transfer" to the Principal of the Institution to which transfer is requested, through the Principal of the institution where the candidate is studying within 10 days from the date of re-opening of the institution after midsummer vacation.

b) All applications received with in the stipulated time will be processed and the list of candidates selected for transfer on the basis of the index marks secured by the candidates for admission to Polytechnics to the first year (Combined I and II semester)will be published by the concerned principals of the polytechnics to which transfer is requested for, and the selected candidates will be informed accordingly.

c) Principals of Polytechnics should intimate the names of candidates transferred with branch of study to other institution to the Joint Controller of Technical examinations with details such as name of institutions to which transferred, date of transfer, and Diploma Examinations Register Number within ten days from the last date of admission.

SUBJECTS OF STUDY AND SCHEME OF EVALUATION

Branch: Electronics, Electronics Production Technology, Electronics & Instrumentation, Electronics & Communication, Instrument Technology and Biomedical engineering

First Year (Semesters I & II Combined)

CODE	SUBJECT	Periods Per Week			Evaluation (Marks)			
		Theory	Practical	Total	Theory	Practical	Internal	Total
	THEORY:							
GE101	English	4	-----	4	100	----	25	125
GE102	Technical Mathematics	6	-----	6	100	----	25	125
GE103	Applied Science							
A	Physics	3	----	3	50	----	12.5	62.5
B	Chemistry	3	-----	3	50	----	12.5	62.5
GE104	Engineering Graphics	1	3	4	100	-----	50	150
GE105	Computer Fundamentals & Programming in C	2	1	3	100	----	25	125
EL101/ EC101/ EP101/ EI 101/ IT 101/ BM101	Basic Electrical & Electronics	4	-----	4	100	----	25	125
	PRACTICAL:							
GE106	Applied Science Lab							
A	Physics	----	2	2	----	50	25	75
B	Chemistry							
EL102/ EC102/ EP102/ EI 102/ IT 102/ BM102	Basic Electronics Lab	-----	2	2	----	50	25	75
EL103/ EC103/ EP103/ EI 103/ IT 103/ BM103	Workshop Practice	-----	4	4	----	50	25	75
TOTAL		**23**	**12**	**35**	**600**	**150**	**250**	**1000**

SUBJECT TITLE	**:**	**ENGLISH**
SUBJECT CODE	**:**	**GE 101**
PERIODS PER WEEK	**:**	**4**
PERIODS PER YEAR	**:**	**128**
TOTAL MARKS	**:**	**100 (YEARLY EXAMINATION FOR I AND II SEMESTERS)**

TIME SCHEDULE

UNIT	TOPICS		PERIODS
I	a)	Lessons – From Ignited minds	
		The dream and the message	10
		Give us a role model	10
II	a)	Lessons – From Ignited minds	
		Visionary teachers and scientists	15
III	a)	Phonetics and Grammar Introducing speech sounds Consonants, Vowels, Syllables, Stress etc. Tense, Nouns, Verbs, Articles, Active voice and Passive voice Prepositions, Adverbs, Auxiliaries, Direct and Indirect Speech Formation of Questions & Question tags	29
IV	a)	Lessons – from Ignited minds	
		Learning from Saints & Seers	15
		Patriotism Beyond Politics and Religion	15
		To My Country Men	5
		Epilogue	5
V	a)	Composition Essay writing Comprehension Precise writing Note making Application for Jobs Preparation of bio – data	24
		Total Periods	**128**

AIM :

The special needs of the technical students in English language require a curriculum that enables them to handle the language as an effective tool for communication. An integration of the four – fold language abilities namely listening, speaking, reading and writing aims at developing the ability to correctly and effectively use the language for specific technical requirements. Thus the teaching of English language to Technical students will definitely help them for their performance in their professional needs.

OBJECTIVES :

1. Comprehension

1.1 Discriminate words and derive ideas in a speech/writing

1.2 Express the main ideas in a summary

1.3 Organise logically the piece of information provided.

1.4 Comprehend written English available in the prescribed text.

2. Vocabulary

2.1 Identify the key words

2.2 Relate the correct meaning to the terms used

2.3 Extend the vocabulary

2.4 Use a thesaurus

2.5 Study the arrangement of words in sentences

2.6 Identify the structural functions of words in sentences.

3. Grammar

3.1 Use of tense forms

3.2 Nouns, Verbs, Articles

3.3 Identify sentence types

3.4 Analyse the different types of sentences

3.5 Study the ways of negation

3.6 Convert direct speech into Indirect speech

3.7 Realise active and Passive Voice constructions.

4. Composition

4.1 Practice writing essays, précis, note making

4.2 Preparation of Application for Jobs and Bio – data

5. Spoken Communication

5.1 Distinguish between formal and informal speech situations

5.2 Simulate model conversations

5.3 Converse within the peer group

5.4 Conduct seminars on topics learned in the text.

5.5 Conduct model Interviews

5.6 Arrange group discussions on General topics

6. Pronunciation

6.1 Introduce speech sounds

6.2 Consonants, Vowels, Syllables, Stress etc.

6.3 Find out pronunciation of words from dictionary

6.4 Transcribe words and short passages in broad phonemic script

STUDY MATERIALS

1. Ignited Minds by A.P.J. Abdul Kalam Published by Penguin Books
   Chapters : The Dream and the message, Give us a role model, Visionary teachers and scientists. Learning from Saints and seers, Patriotism beyond politics and religion, To my country men, Epilogue.
2. Essential English Grammar by Raymond Murphy Published by Cambridge University Press.
3. Intermediate English Grammar by Raymond Murphy published by Cambridge University Press.
4. Phonetics – A Text Book of English Phonetics for Indian Students by T. Balasubramaniam Published by Macmillan India (P) Ltd.
5. Composition – A Text Book of Two way Communication Techniques by Prof. P.P. John Published by Publication Division, University of Calicut.
6. English Pronouncing dictionary by Daniel Jones Published by Cambridge University Press.

SCHEME FOR SETTING QUESTION PAPERS

TOTAL MARKS : 100
DURATION 3 HOURS

I	Short answer questions	7 Numbers	Answer any 5	(5X2)	10 marks
II	Paragraph questions	7 Numbers	Answer any 4	(4X5)	20 marks
III	Essay questions	3 Numbers	Answer any 1	(1X10)	10 marks
IV	Grammar				30 marks
V	Phonetics				10 marks
VI	Composition				20 marks
				Total	100 marks

SUBJECT TITLE : TECHNICAL MATHEMATICS
SUBJECT CODE : GE 102
PERIODS/WEEK : 6
TOTAL PERIODS : 6 x 32 = 192

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	1.1 Matrices	8
	1.2 Determinants	6
	1.3 Binomial Series	6
	1.4 Trigonometric Functions	8
	Tutorials	4
	Test on Topics 1.1 to 1.4	3
II	2.1 Properties of Trigonometric functions	7
	2.2 Properties of triangles	6
	2.3 Solutions of a triangle	7
	2.4 Co-ordinate Geometry	8
	Tutorials	4
	Test on Topics 2.1 to 2.4	3
III	3.1 Functions and Limits	8
	3.2 Methods of Differentiation – I	10
	3.3 Methods of Differentiation – II	10
	Tutorials	4
	Test on Topics 3.1 to 3.3	3
IV	4.1 Application of differentiation	10
	4.2 Maxima and minima	8
	4.3 Indefinite Integral	10
	Tutorials	4
	Test on Topics 4.1 to 4.3	3
V	5.1 Integration by parts	6
	5.2 Definite Integral	6
	5.3 Application of integration	8
	5.4 Differential Equations	8
	Tutorials	4
	Test on Topics 5.1 to 5.4	3
	Revision	10
	Model test and feed back	7

		192

OBJECTIVES

On completion of the units, the student will be able to

UNIT – I

1.1 Matrices

1.1.0 Understand operations on matrices such as addition, subtraction, transpose, adjoint, inverse and multiplication

1.1.1 Define a matrix

1.1.2 Identify the type of a given matrix (Square, Unit, Singular etc)

1.1.3 Perform operations of addition and multiplication of a given matrix

1.1.4 Define – transpose, adjoint and inverse of a matrix

1.1.5 Find the inverse of 2 x 2 and 3 x 3 matrices

1.1.6 Solve linear equations by using the inverse of the coefficient matrix

1.2 Determinants

1.2.0 Solve simultaneous linear equations using determinants

1.2.1 Evaluate determinants of second and third order

1.2.3 Find the minors and cofactors of the elements in a determinant

1.2.4 Solve simultaneous linear equations in 3 unknowns using Cramer's rule.

1.2.5 Elimination of three linear equations in to unkowns.

1.3 Binomial series

1.3.0 Understand the binomial theorem for positive integers

1.3.1 State the meaning of nC_r

1.3.2 Derive formula for nCr and the proof of $nC_r = nC_{n-r}$

1.3.3 State the Binomial theorem for positive integers

1.3.4 Find a given term in a binomial expansion

1.4 Trigonometric functions

1.4.0 Understand the concept of trigonometric functions of any angle

1.4.1 Define trigonometric functions

1.4.2 Describe signs of trigonometric functions in each quadrant

1.4.3 Find other functions, given a trigonometric function and its quadrant

1.4.4 Find the trigonometric values of the angle between 0˚ and 360˚.

1.4.5 Find the value of trigonometric functions by using tables.

UNIT – II

2.1 Properties of Trigonometric Functions

2.1.0 Apply properties of trigonometric functions of compound angles, multiple and submultiple, sum and product formulae

2.1.1 State the identities for sin (A± B), cos (A± B), tan (A ±B).

2.1.2 Solve the problems of the types

(1) Prove that $\frac{\text{Cos A - Sin A}}{\text{Cos A + Sin A}} = \tan(45^\circ - A)$

2.1.3 Prove the formulas for Sin 2A, Cos 2A, tan 2A, Sin 3A and Cos 3A

2.1.4 State the identities for SinA, CosA, tanA in terms of A/2.

2.1.5 Solve the problems of the type: if Sin A = 0.6 and A is acute, find sin 2A and cos A/2

2.1.6 Express sum or difference of two sines or two cosines as a product and vice versa.

2.1.7 Apply sum and product formulae to do the problems of the type

(1) $\frac{\text{Sin A + Sin 3A+ Sin 5A}}{\text{Cos A+Cos 3A+ Cos 5A}} = \tan 3A$

(2) $\text{Sin } 10^\circ \text{ Sin } 50^\circ \text{ Sin } 70^\circ = 1/8$

2.2 Properties of Triangles

2.2.0 Understand the properties of triangles

2.2.1 State and prove the following identities

1) $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$

2) $a^2 = b^2+c^2-2bc \cos A$

3) $a = b \cos C + c \cos B$

2.2.2 State and prove

1) Napier's formula

$$\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c}\cot(A/2)$$

2) $(b-c)\cos(A/2) = a \sin\left(\frac{B-C}{2}\right)$

2.3 Solution of triangles

2.3.0 Solve a triangle given necessary data

2.3.1 Solve a triangle, given

1) Three sides

2) Two sides and the included angle by using Napier's formula.

2.4 Co-ordinate Geometry

2.4.0 Understand various forms of the equation of a straight line

2.4.1 Define slope of a straight line

2.4.2 Find the slope of a line joining two points (x_1,y_1) and (x_2,y_2)

2.4.3 Derive the equation of a straight line of the form

1) $y = mx + c$
2) $y-y_1 = m(x-x_1)$
3) $\frac{y-y_1}{y_1-y_2} = \frac{x-x_1}{x_1-x_2}$
4) $\frac{x}{a} + \frac{y}{b} = 1$

2.4.4 Find the equation of a line given suitable data using any of the above form.

2.4.5 Find the slope and intercepts on the axes, given a linear equation in 'x' and 'y'.

2.4.6 Find the point of intersection of two lines whose equations are given

2.4.7 Find the angle between two lines

2.4.8 Find the condition for two lines are

1) Parallel
2) Perpendicular

2.4.9 Find the equation of the line

1) Parallel and
2) Perpendicular to a given line and passing through a given point.

UNIT – III

3.1 Functions and Limits

3.1.0 Understand the concepts of functions and limits

3.1.1 Give example for functions

3.1.2 Explain the meaning of limit of the following type

1) $f(x) = l$ as $x \to a$

2) $\lim_{x \to \alpha} 1/x = 0$

3.1.3 Find the limit of the following type

1) $\lim_{x \to 1} \frac{2x + 1}{3x - 2}$

2) $\lim_{x \to \alpha} \frac{2x^2 + 3x}{5x^2 + 4x + 1}$

3) limit $\frac{x^2 - 3x}{x^2 - 9}$ as $x \to 3$

3.1.4 verify the following results

1) limit $\frac{x^n - a^n}{x - a} = n a^{n-1}$, when n is rational as $x \to a$

2) limit $\frac{\sin ø}{ø} = 1$, ø is in radian as $ø \to 0$

3.1.5 Solve problems of the type

1) Limit $\frac{\sqrt{x} - \sqrt{a}}{x - a}$ as $x \to a$

2) limit $\frac{\sin mø}{ø}$ as $ø \to 0$

3.1.6 Describe the general definition of continuous functions

3.2 Methods of Differentiation – I

3.2.0 Apply the methods of differentiation

3.2.1 Define the derivative of a function $y = f(x)$ as limit $\frac{\Delta y}{\Delta x}$ as $\Delta x \to 0$

3.2.2 Show the geometrical concept of derivatives

3.2.3 Find the derivatives of x^n, Sinx, and Cosx from first principles

3.2.4 State the rules of differentiation

1) Sum or difference
2) Product
3) Quotient

3.2.5 Find derivatives of e^x and log n. State all the fundamental formulae

3.2.6 Apply the rules and differentiate simple functions of the type

1) $x^2 \sec x$
2) $\frac{\tan x}{x^2 + 1}$
3) $\frac{x \operatorname{Cosec} x}{3x - 2}$

3.3 Methods of Differentiation – II

3.3.0 Apply different methods of differentiation

3.3.1 Find the derivatives if the functions of the form $[f(x)]^n$, Sin f(x), Cos f(x), with respect to x.

3.3.2 Find the derivatives of

$e^{\sin x}$, $\log \sin x$, $(x^2+1)^{10}$ $\operatorname{Sec} 5x$, $\frac{\sin 2x}{1+\cos 2x}$, $\operatorname{Cot}^5 (x^3)$, $\log (\sec x + \tan x)$

3.3.3 Find the derivative of the implicit functions of the form $ax^2 + 2hxy + by^2 = 0$

3.3.4 Differentiate parametric functions of the type $x = f(x)$, $y = g(t)$

3.3.5 Find the second derivative of the functions $y = \frac{x}{x-2}$, $y = x^2 \sin x$

3.3.6 Solve the problem of the type

If $y = x^2 \cos x$, show that

$x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + (x^2+6) y = 0$

UNIT – IV

4.1 Applications of Differentiation

4.1.0 Apply the theories of differentiation in different problems

4.1.1 State geometrical meaning of derivatives

4.1.2 Find the slope of the curve
$y = x^2 - 3x + 2$ at (3,2)
$y = \tan x$ at $x = \pi/3$

4.1.3 Find the equation of the tangent and normal to the semi circle
$y = \sqrt{25-x^2}$ at (4,3) on it

4.1.4 Solve problems of the type: The radius of a circular plate is increasing in length at 0.1 cm per second. What is the rate at which the area is increasing when the radius is 12 cm.

4.1.5 Solve problems of the type: A spherical balloon is inflated with air such that its volume increases at the rate 5.c.c per second. Find the rate at which its curved surface is increasing when its radius is 7 cm.

4.1.6 Solve problems of the type: The displacement 'S' in time 't' is given by $S = 2/3t+$ Cost at $t = \pi/4$; find the velocity and acceleration

4.2 Maxima and Minima

4.2.0 Apply the concept of derivative to find maxima and minima

4.2.1 State the conditions for a function
$y = f(x)$ to be (1) increasing (2) decreasing

4.2.2 State the conditions for maximum and minimum values of a function

4.2.3 Solve the problem of the type:

1) Find the maximum and minimum values of $y = x^3 - 18x^2 + 96x$

2) Prove that a rectangular of fixed perimeter has its maximum area when it becomes a square.

4.3 Indefinite integral

4.3.0 Apply various methods of integration

4.3.1 Explain that $\int f(x)dx = f(x) + c$ means $\frac{d}{dx}[f(x)+c) = f(x)$, c being an arbitrary constant

4.3.2 State the standard formulas of integral x^n, sinx, cos x, e^x, etc

4.3.3 Find the integrals using the rules

1) $\int (u \pm v)\, dx = \int u\,du \pm vdx$

2) $\int kudx = k\int udx$

4.3.4 Evaluate the integrals of the form

1) $\int f(ax+b)\, dx$

2) $\int \sin^2 x\, dx$

4.3.5 Evaluate the integrals of the form

1) $\int x \sin(x^2)\, dx$

2) $\int \frac{2x^4}{1+x^{10}} dx$

3) $\int \cos^3 x \sin x\, dx$

4) $\int ex^2\, x\, dx$

UNIT – V

5.1 Integration by parts

5.1.0 Solve the problems of the type

1) $\int x \cos x \, dx$

2) $\int x^2 e^{-x} \, dx$

3) $\int x \log x \, dx$

4) $\int \log x \, dx$

5.2 Definite Integrals

5.2.0 Understand the concept of definite integral

5.2.1 Define the definite integral

$$\int_a^b f(x)\,dx = f(b) - f(a) \text{ where } F^1(x) = f(x)$$

5.2.2 Evaluate the definite integral

1) $\int_0^1 x(1-x)^2 \, dx$

2) $\int_0^{\pi} \sin^2 x \, dx$

3) $\int_0^1 x\sqrt{1+x^2} \, dx$

4) $\int_0^{\pi} \frac{1-\sin x}{x+\cos x} dx$

5) $\int_0^{\pi/2} x \cos x \, dx$

5.3 Application of Integration

5.3.0 Apply the concept of definite integral to solve problems of the following

5.3.1 Find the area bounded by a curve, two ordinates (abscissa) and x – axis (y axis)

5.3.2 Find Volume of a solid of revolution about x or y axis

5.4 Differential equations

5.4.0 Solve simple differential equations of first order

5.4.1 Solve the differential equation of the variable separable type

5.4.2 Solve the differential equation of the form $dy/dx + Py = Q$ where P and Q are simple functions of x

CONTENT DETAILS

UNIT – I

1.1 Matrices

Matrix notation, order of a matrix, and type of matrices: - Square matrix, unit matrix, Zero matrix, and Singular matrix. Transpose of a matrix, symmetric and skew-symmetric matrices, sum and product of matrices, Adjoint of a matrix, inverse of a matrix (definition only) and problems.

1.2 Determinants

Determinants of second and third order matrices, minors and cofactors, Cramer's rule, solution of simultaneous linear equations in three unknowns by Cramer's rule. Elimination of three linear equations in two unknowns.

1.3 **Binomial series**

Idea of nC_r, Value of nC_r (no derivation). Binomial theorem for positive integers (no proof), finding a given term in a Binomial Expansion.

1.4 Trigonometric functions

Definition of trigonometric functions of an angle in any quadrant, Signs of trigonometric functions of related angles, Given a trigonometric functions of an angle and its quadrant find others. Find the values of the trigonometric functions between 0° and 360°.

UNIT – II

2.1 Properties of trigonometric functions

Addition formulae, Multiple and Sub-multiple formulae, Sum and Product formulae, simple problems.

2.2 Properties of triangles

State and prove Sine rule, Cosine rule and projection formula. State and prove Napier's formula and simple problems relating to this.

2.3 Solution of triangle

Solve the triangle given

1. Three sides
2. Two sides and the included angle (use Napier's formula)

2.4 Co-ordinate geometry

Straight line-Slope, Equations of a straight line in the forms

1) $Y = mx + C$,
2) $y-y_1 = m(x-x_1)$,
3) $\frac{y-y_1}{y_1-y_2} = \frac{x-x_1}{x_1-x_2}$
4) $\frac{x}{a} + \frac{y}{b} = 1$

Points of Intersection of two lines, Angle between two lines, Conditions for two lines, Conditions for two lines to be parallel and predicator.

UNIT – III

3.1 Function and Limits

Definition, some problems for finding limits, Properties

Limit $\frac{x^n-a^n}{x-a} = na^{n-1}$ and limit $\frac{\sin\phi}{\phi} = 1$ (statements only),
$x \to a$ $\phi \to 0$

General definition of continuous functions.

3.2 Methods of Differentiation I

Definition of derivative of x^n, Sin x, Cos x etc by using first principle, find derivatives of e^x and log x, Fundamental formulas, product and Quotient rules (statement only). Derivatives of other trigonometric functions, Simple problems.

3.3 Methods of Differentiation II

Function of a function rule, Differentiation of implicit and parametric equations, problems on differentiation of functions involving these forms, second order derivatives, Simple problems.

UNIT – IV

4.1 Application of Differentiation

Geometrical meaning of derivatives, Slope, Tangent, Normal and Equation of a straight line, Rate of change.

Problems connecting Area and Volume, Velocity and Accelerations.

4.2 Maxima and Minima

Increasing and Decreasing functions, Turning points, Finding Maximum and Minimum values of a function by using derivatives, Conditions for Maximum and Minimum, Simple problems.

4.3 Indefinite Integral

Definition of integration, Fundamental formulas, Problems, Integration by substitution, function of the form $\int f(g(x)\, g^1(x)\, dx$, $\int f(ax+b)^n\, dx$

UNIT – V

5.1 Integrates by parts

Integral of the product of two functions, formula (without proof) and simple problems.

5.2 Definite Integral

Definitions, simple problems, $\int_0^{\pi/2} \text{Sin}^2x\, dx$, $\int_0^{\pi/2} \frac{\text{Sin}x}{\sqrt{1-\cos x}}\, dx$

5.3 Application of integration

Finding areas between the curve y = f(x) and the axes, Volume of the solid, Problems

5.4 Differential equations:

Solutions of equations of the form Variable separable, Linear equations.

REFERENCE BOOKS

1. Washington A.J. : Basic Technical Mathematics, Addison Wesley
2. Green John. R : Calculus with Analytic Geometry, McGraw Hill Book Co.,
3. Karuppannan. T.C. : Mathematics for Technical Students, Macmillan and Co.,
4. T.T.T.I. Madras : Mathematics for Technicians Vol. I and II, Sehgal Educational Consultants (P) Ltd, Faridabad
5. Shanti Narayanan : Algebra

SUBJECT TITLE : APPLIED SCIENCE – A - PHYSICS
SUBJECT CODE : GE 103 A
PERIOD/WEEK : 3
PERIODS/YEAR : 96

TIME SHEDULE

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	1.2 Dynamics	14
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II	2.1 Statics	10
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	2.3 Fluid Flow	5
	2.4 Viscosity	3
	2.5 Surface Tension	3
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III	3.1 Optics	7
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	3.5 Photoelectric Effect	3
	Test – 3	2
	Total	96

OBJECTIVES

On Completion of the unit, the student will be able to

UNIT – I

1.1 Units And Dimensions

1.1.0 Understand the concept of units and measurements with a basic knowledge about dimensions
1.1.1 Define Unit of a physical quantity.
1.1.2 Explain the principle of measurement.
1.1.3 Identify fundamental and derived units.
1.1.4 Define dimension of a physical quantity.
1.1.5 Derive dimensional formula for physical quantities.

1.2 Dynamics

1.2.0 Apply the dynamics of a particle in practical situations.
1.2.1 Identify vector and scalar quantities.
1.2.2 Derive the expression $Sn = u+a (n – ½)$
1.2.3 Solve Problems related to gravity with equations of motion.
1.2.4 Derive the expressions for time of flight, horizontal range and maximum height for a projectile.
1.2.5 Solve the problems based on the above expression
1.2.6 State the Newton's laws of motion
1.2.7 Define the terms:
1. Force 2. Inertia 3. Momentum
1.2.8 Derive the relation F = ma
1.2.9 State Law of conservation of momentum and prove it in the case of two bodies making a collision.
1.2.10 Explain the principle behind recoil of gun and derive an expression for recoil velocity.
1.2.11 Solve Problems related to Laws of motion.
1.2.12 Define angular displacement, angular velocity and angular acceleration.
1.2.13 Derive relation between linear velocity and angular velocity.
1.2.14 Derive expression for centripetal acceleration.
1.2.15 Apply the principle of centripetal force in the case of banking of roads and rails.
1.2.16 Solve problems related to centripetal force.

1.3 Work, Power and Energy

1.3.0 Understand the concepts of work, power and energy and their applications
1.3.1 Define 1. Work 2. Power 3. Energy
1.3.2 Distinguish between Potential Energy and Kinetic Energy and mention the expressions for them.
1.3.3 Solve problems using the above expressions.

1.4 Rotational Dynamics

1.4.0 Understand the dynamics of a rotating body.
1.4.1 Define Moment of Inertia of a rigid body
1.4.2 Define Radius of gyration
1.4.3 Scale theorems of parallel and perpendicular axes.
1.4.4 Define Torque
1.4.5 Mention relation between torque and angular momentum.
1.4.6 Mention the expression for kinetic energy of rotation.
1.4.7 Derive an expression for moment of inertia of a uniform circular disc about an axis passing through its center and perpendicular to its plane.
1.4.8 Derive expression for kinetic energy of a disc rotting on a horizontal plane.
1.4.9 Solve problems using the above expressions.

UNIT – II

2.1 Statics

2.1.0 Understand the principles of statics and its applications

2.1.1 Add Vectors using triangle method.
2.1.2 Define Resultant and Equilibrant of vectors.
2.1.3 State Parallelogram law of forces.
2.1.4 Derive expression for resultant using Parallelogram law.
2.1.5 State the law of triangle of forces.
2.1.6 State Lami's theorem.
2.1.7 Explain moment of a force.
2.1.8 State the conditions of equilibrium of a rigid body acted upon by a large number of coplanar parallel forces.
2.1.9 Derive expression for work done by a couple.

2.2 Elasticity

2.2.0	Comprehend the concept of elasticity
2.2.1	Define Stress, Strain and Elastic limit.
2.2.2	State Hooke's law.
2.2.3	Derive expression for Young's modulus, rigidity modulus and bulk modulus.
2.2.4	Solve Problems related to modulus of elasticity.

2.3 Fluid Flow

2.3.0	Understand the principle of fluid flow
2.3.1	Distinguish between Streamline and Turbulent flow.
2.3.2	Explain Pressure energy, Kinetic energy and Potential energy of a liquid.
2.3.3	Mention equation of continuity.
2.3.4	State Bernouille's theorem.
2.3.5	Explain the working of airfoil and atomizer.

2.4 Viscosity

2.4.0	Apply the principle of viscosity in solving problems.
2.4.1	Define coefficient of viscosity.
2.4.2	Give the Poiseusilles formula.
2.4.3	Explain terminal velocity.
2.4.4	Mention Stoke's formula.
2.4.5	Explain the effect of temperature on viscosity
2.4.6	Solve problems using Poiseuille's formula.

2.5 Surface Tension

2.5.0	Comprehend the phenomenon of surface tension and its applications.
2.5.1	Define surface tension.
2.5.2	Define surface energy.
2.5.3	Derive the relation between surface tension and surface energy.
2.5.4	Mention the expression for the excess of pressure issued a spherical drop and bubble.
2.5.5	Solve problems related to surface tension.

2.6 Simple Harmonic Motion

2.6.0	Comprehend the concept of wave motion
2.6.1	Define Simple Harmonic motion.
2.6.2	Derive equation for S.H. motion.
2.6.3	Explain period, frequency, amplitude and phase.
2.6.4	Distinguish between transverse and longitudinal waves.
2.6.5	Define wavelength.
2.6.6	Derive the relation $V= n\lambda$
2.6.7	Explain resonance.
2.6.8	Explain ultrasonic frequency.
2.6.9	Mention applications of ultrasonic.

UNIT – III

3.1 Optics

3.1	Understand the concept of optical phenomena
3.1.1	State Snell's law of refraction.
3.1.2	Explain critical angle and total internal reflection.
3.1.3	Explain the propagation of light through optic fiber.
3.1.4	Convex and concave mirror- focus, image formation.
3.1.5	Mention the formula $1/u + 1/v = 1/f$ (No derivation)
3.1.6	Convex and concave lens - focus, image formation.
3.1.7	Mention the formuls $1/f= (n-1)(1/R1 - 1/R2)$, No derivation
3.1.8	Simple microscope, Magnifying power $m=1+D/f$, No derivation.

3.2 Electricity

3.2	Understand the fundamentals of electricity and its magnetic effect
3.2.1	State Kirchoff's law.
3.2.2	Derive expression for balancing condition of wheat Stone's Bridge.
3.2.3	State Biots and Savarts law.
3.2.4	Mention the expression for magnetic field due to current through a circular cuf.
3.2.5	State Fleming's left hand rule.
3.2.6	Describe the principle and construction of a moving coil galvanometer.
3.2.7	Explain the conversion of galvanometer into ammeter and voltmeter
3.2.8	Solves problems based on the above laws.

3.3 Semiconductors

3.3	Comprehend the working of semiconductor devices
3.3.1	Explain P.N. Junction.
3.3.2	Describe a junction transistor PNP and NPN.
3.3.3	Explain transistor configuration.
3.3.4	Describe a common emitter amplifier.
3.3.5	Represent Logic gates symbolically.
3.3.6	Explain with the help of truth table.

3.4 Laser

3.4	Understand laser action and its application
3.4.1	Explain population inversion, spontaneous emission, stimulated emission and optical pumping.
3.4.2	Write down the characteristics of LASER.
3.4.3	Describe various applications of Laser.

3.5 Photoelectric Effect

3.5.0	Comprehend the theories of photoelectric effect
3.5.1	Describe Max planks quantum theory.
3.5.2	Explain Photoelectric effect and its application.
3.5.3	State Laws of Photoelectric emission.
3.5.4	Device Einstein's photoelectric equation.
3.5.5	Solve problems using the above equation.

CONTENT DETAILS

UNIT – I

1.1 Units and dimensions

Units – fundamental and derived units. Systems of units – S.I. Dimensions – Application – Derivation of expression of period of a simple pendulum using dimension.

1.2 Dynamics

Equation of motion (re-capitulation only) - Derivation of $S_n = U + a (n – ½)$ - Acceleration due to gravity – equation of motion under gravity. Numerical problems.

Projectile motion – Derivation of expressions for Time of flight, Horizontal range, Maximum height Problems.

Linear Momentum, Newton's laws of motion – Definition of force and inertia – Derivation of F = ma – Unit of force. Law of conservation of momentum – Derivation – Recoil of gun. Numerical Problems.

Circular motion – definitions for angular displacement angular velocity and angular acceleration – relation between linear velocity and angular velocity (deviation). Centripetal acceleration and centripetal force-derivation-examples Banking of roads and rails (qualitative) centrifugal force – Numerical problems.

1.3 Work, power and energy

Definitions for Work, Power, Energy – Units of work – Power and energy, Potential energy and Kinetic energy – Expression for P.E and K.E. (no derivation). Numerical problems.

1.4 Rotational Dynamics

Moment of inertia of a rigid body – Radius of gyration. Theorems of Parallel and Perpendicular axis (only statement) – Angular momentum Torque – Relation between Torque and angular momentum

(no derivation) expression for K.E. of rotation (no derivation). Moment of Inertia of a uniform circular disc about an axis passing through its center and Perpendicular to its Plane (derivation) – K.E. of disc rolling on a horizontal Plane. Numerical problems.

UNIT – II

2.1 Statics

Vectors and Scalars – Triangle Method of vector addition – Concurrent forces – Resultant and equilibrant – Parallelogram law – Derivation of the resultant in Magnitude and direction – Law of triangle of forces – Lami's theorem – Resolution of forces – Parallel forces – Like and unlike Parallel forces – moment of force- Conditions of equilibrium of body under the action of a number of coplanar parallel forces couples – Moment of a couple – work done by a couple – Numerical problems.

2.2 Elasticity

Elastic and plastic bodies – Stress – Strain – units - Hooke's law – Young's Modulus Rigidity modulus, Bulk modulus – Numerical problems.

2.3 Fluid flow

Stream line and turbulent flow – Pressure enemy, Potential energy and kinetic energy of a liquid – Equation of continuity – Bernoulli's theorem – Applications – Air foil and Atomizer.

2.4 Viscosity

Viscous force – Coefficient of viscosity – Unit dimension - Poiseuille's formula (no derivation). Stokes formula - Variation of viscosity with temperature - Numerical problems.

2.5 Surface tension

Surface tension - Surface energy – Relation between S.T and Surface energy (Proof) – Expression for excess of Pressure inside a spherical drop and bubble (no derivation) – Problems.

2.6 Simple Harmonic Motion

Definition of Simple Harmonic Motion – Examples – SHM as projection of uniform circular motion on any diameter of a circle – Equation of SHM – Period, frequency, amplitude, phase motion – Transverse and longitudinal waves. Definition of wavelength and frequency – Derivation of relation $V + f\lambda$ - free vibration – forced vibration – Resonance – Ultrasonic Applications.

UNIT – III

3.1 Optics

Smells law of refraction – Critical angle – Total internal reflection – Optical fiber Convex and concave mirror – Focus, image formed by mirror (Qualitaive idea only), Mention the formula $1/u + 1/v = 1/f$, (no derivation) – Convex and concave lens, focus image formed by lenses(qualitative idea only), mention the formula $1/f = 9n-1)[1/R1 - 1/R2]$, no derivation. Simple microscope – magnifying power $m=1+d/f$, No derivation.

3.2 Electricity

Kirchoff's Laws – WheatStone's bridge - Condition for balancing – Magnetic effect of Electricity – Biot and Savart Law – Right hand palm rule – Magnetic field due to current through circular coil at a point on the axial line and at the center (no derivation) – Fleming's Left hand rule – Force on a current carrying Conductor placed in a magnetic field – moving coil galvanometer – theory and construction – Conversion of a galvanometer into ammeter and voltmeter – Numerical problems.

3.3 Semiconductors

PN Junction – Junction transistor – Transistor configuration, α and β – Common emitter amplifier.

Logic gates (symbolic representation and truth task only) – AND, OR, NOT gates – universal gates NAND, NOR, XOR gates.

3.4 Laser

Population inversion, Spontaneous emission, stimulated emission, optical pumping – characteristics – applications.

3.5 Photoelectric Effect

Quantum theory – Photoelectric effect – Laws of photoelectric effect – Einstein's photoelectric equation – Numerical problems.

REFERENCE BOOKS

1. Physics - Halliday and Resnick
2. Mechanics - D.S. Mathur
3. Optics - Jenkins and White
4. Digital and Computer Principles - Malvino

SUBJECT TITLE : APPLIED SCIENCE – B. CHEMISTRY
SUBJECT CODE : GE 103 B
PERIODS/WEEK : 3
PERIODS/YEAR : 96

TIME SHEDULE

UNIT	TOPIC	PERIODS
I	**INORGANIC AND THEORECTICAL CHEMISTRY**	
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	1.2 Acid Base & Redox Reactions	9
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	Test – I	1
II	**PHYSICAL CHEMISTRY**	
	2.1 Electrochemistry	10
	2.2 Corrosion	7
	2.3 Energetics	10
	2.4 Colloids	5
	Test – II	1
III	**ORGANIC CHEMISTRY**	
	3.1 Introduction	4
	3.2 Polymers	9
	3.3 Paints, Varnishes & Adhesives	6
	3.4 Fuels	9
	3.5 Environmental Pollution	5
	3.6 Chemistry In Action	2
	Test – III	1
	Total	96

OBJECTIVES

UNIT - I INORGANIC AND THEORETICAL CHEMISTRY

Formulae and Equations

1.1.1 Review the fundamental ideas in chemistry
1.1.2 Explain the terms atom, molecule, valency, radical, molecular formula
1.1.3 Compute molecular weight from molecular formula
1.1.4 Do the calculations based on simple stoichiometric equations – weight(s)/volume(s) of product(s)/reactant(s)

Structure of Atom

1.1.5 Understand the basic ideas related to modern approach to the structure of atom
1.1.6 State the fundamental particles – proton, electron, neutron – their charge & mass
1.1.7 Differentiate atomic number & mass number
1.1.8 Explain the concept of isotopes
1.1.9 Describe the dual nature of matter
1.1.10 Outline de-Broglie equation
1.1.11 State Heisenberg's uncertainty principle
1.1.12 Explain the concept of uncertainty
1.1.13 Distinguish between orbit & Orbital
1.1.14 Illustrate the Hund's rule & Aufbau principle
1.1.15 Illustrate the electronic configuration of first 20 elements
1.1.16 State modern periodic law
1.1.17 Classify elements based on electronic configuration

Chemical Bonding

1.1.18 Understand the different types of chemical bonds – how & why they are formed
1.1.19 Explain the reason for inactivity of zero group elements
1.1.20 Illustrate ionic, covalent & co-ordinate bond
1.1.21 Define electro-negativity
1.1.22 Explain the polar character of covalent bond & significance of Hydrogen Bonding
1.1.23 Illustrate the application of hydrogen bonding – high boiling point of water, density of ice, silky nature of proteins (elementary idea only)

Acid-base & Redox reactions

1.4.0 Appreciate the reactions of acids & bases
1.4.1 Illustrate Arrhenius' & Lewis concept of acids and bases
1.4.2 Distinguish between strong and weak acids and bases
1.4.3 Explain neutralization
1.4.4 Illustrate the calculation of equivalent weights of acids and bases based on equations
1.4.5 Explain the electronic concept of oxidation & reduction
1.4.6 State oxidation number
1.4.7 Define the O.N concept of oxidisation & reduction
1.4.8 Illustrate redox reactions taking the reactions in Daniel Cell as example

P^H & Its Applications

1.5.0 Understand the ionic product of water
1.5.1 State pH – understand its expression
1.5.2 Describe what is pH scale
1.5.3 Solve simple problems
1.5.4 Define buffer solutions
1.5.5 Describe what is acid buffer & basic buffer – one example each

Volumetric Analysis

1.6.0 Understand the theory behind volumetric analysis
1.6.1 Describe what is meant by the terms titration, end point & indicator
1.6.2 Identify the indicators phenolphthalein/methyl orange to be used in a given acid-base titration, know the respective pH ranges
1.6.3 Solve problems based on the relation $V_1N_1=V_2N_2$ & $V_1M_1 = V_2M_2$

Water

1.7.0 Understand hard & soft water- definition, types of hardness, its causes & certain methods of removal

1.7.1 Distinguish between hard water & soft water

1.7.2 Mention the types of hardness

1.7.3 Explain methods of removal of hardness – one each (temp. – boiling, permanent – ion exchange)

1.7.4 Define degree of hardness

1.7.5 Explain the method of determination of degree of hardness using EDTA – principle, procedure & calculation

1.7.6 Explain disadvantages of using hard water – wastage of soap in laundry, formation of boiler scales

UNIT - II PHYSICAL CHEMISTRY

Electrochemistry

2.1.0 Review the outline of electrolysis, distinguish between electrolytic cells & galvanic cells, identify corrosion as an electrochemical process

2.1.1 Distinguish between a) conductors & insulators b) metallic & electrolytic conduction c) strong & weak electrolytes

2.1.2 Explain electrolysis taking molten NaCI as example anode reaction & cathode reaction as oxidisation & reduction.

2.1.3 Explain the applications of electrolysis, electroplating & anodizing

2.1.4 Distinguish between electrolytic cell & galvanic cell, the difference in the sign of the electrodes in the above cells

2.1.5 Outline the schematic representation of galvanic cell

2.1.6 Explain the classification of galvanic cells as primary & secondary

2.1.7 Illustrate primary cell with Daniel cell as examples

2.1.8 Illustrate secondary cell with lead storage cell as examples

2.1.9 Explain the electrode reactions while recharging

2.1.10 Explain the term electrode potential

2.1.11 Define electrochemical series

2.1.12 Illustrate the construction of a galvanic cell – minimum 3 examples

2.1.13 Explain the concept of fuel cells (elementary idea only)

2.1.14 Explain hydrogen-oxygen fuel cell & methanol-oxygen fuel cell

2.1.15 Describe the chemical reactions in the cell

2.1.16 Mention the advantages of fuel cells

Corrosion

2.2.0 Understand the concept of corrosion & identify it as an electrochemical process

2.2.1 Define corrosion

2.2.2 Explain the rusting of iron-mention the conditions for rusting

2.2.3 Explain the electrochemical theory of corrosion

2.2.4 Describe the methods of prevention of corrosion, barrier protection and sacrificial protection

2.2.5 Explain the theory behind each method learned

Chemical Energetics

2.3.0 Appreciate the basic concepts of 'Thermodynamics' & 'Chemical Thermodynamics'

2.3.1 Explain the scope and limitations of thermodynamics

2.3.2 Distinguish between a) reversible & irreversible reactions b) exothermic & endothermic reactions

2.3.4 Explain 'system & surroundings'

2.3.5 Distinguish between open, closed & isolated systems

2.3.6 Define macroscopic properties

2.3.7 Distinguish between extensive & intensive properties

2.3.8 Describe the different thermodynamic processes like isothermal, adiabatic, isobaric & isochoric process
2.3.9 State the first law of thermodynamics
2.3.10 Explain internal energy E & ^E
2.3.11 Explain the concept of work & heat
2.3.12 State the mathematical expression for the first law of thermodynamics
2.3.13 State Hess's Law – only statement & examples (solving problems not expected)
2.3.14 Describe the limitations of the 1st law
2.3.15 Explain the terms a) 'enthalpy' H & ^H b) entropy S & ^S
2.3.16 Describe spontaneous & non-spontaneous processes with suitable examples.
2.3.17 State 2nd law of thermodynamics
2.3.18 Explain Gibb's free energy G & ^G
2.3.19 Derive the mathematical expression (only) for Gibb's – Helmholtz equation
2.3.20 State 3rd law of thermodynamics

Colloids

2.4.0 Comprehend the methods of preparation, the properties & some industrial applications of colloid
2.4.1 Define 'colloids'
2.4.2 Illustrate the different types of colloids with examples.
2.4.3 Describe the method for the preparation of Fe(OH)3 sol
2.4.4 Describe Bredic's Arc method
2.4.5 Describe the purification of colloids by Dialysis
2.4.6 Describe the properties 1) Tyndall effect 2) Brownian movement 3) electrophoresis 4) coagulation
2.4.7 State Hardy-Schultze rule & explain with examples.
2.4.8 Define Gold-No
2.4.9 Describe the industrial applications – 1) smoke precipitation 2) sewage treatment 3) purification of drinking water

UNIT – III ORGANIC CHEMISTRY

Introduction to organic chemistry

3.1.0 Understand the fundamental ideas of organic chemistry
3.1.1 List the differences between organic & inorganic compounds
3.1.2 Describe the uniqueness of carbon atom
3.1.3 Define 'catenation'
3.1.4 Distinguish between saturated & unsaturated compounds
3.1.5 Illustrate general classification & that based on functional groups
3.1.6 Define isomerism – explain with simple examples only

Polymers

3.2.0 Understand the nature of some industrially important polymers
3.2.1 Define polymerization
3.2.2 Distinguish between addition & unsaturated compounds
3.2.3 Differentiate between thermoplastics & thermosetting plastics
3.2.4 Outline the merits & demerits of plastics
3.2.5 Distinguish natural rubber from synthetic rubber with suitable examples
3.2.6 Explain vulcanization & its merits
3.2.7 Define "fiber"
3.2.8 Describe different types of fibers with suitable examples

Paints, varnishes, adhesives & lubricants

3.3.0 Appreciate the requisites of good paints
3.3.1 Name the constituents of paints – vehicle, pigment & other additive
3.3.2 Identify the role of various additives – acrylics, polymethanes, fillers, plastizisers, driers, antiskinning agents (one examples each)
3.3.3 List the two types of varnishes & their constituents
3.3.4 State the common uses of varnishes

3.3.5 List the various constituents of varnish
3.3.6 Explain the principle of lubrication
3.3.7 List the types of lubricants – with one example each
3.3.8 Define 'adhesives'
3.3.9 List the two types of adhesives
3.3.10 State the applications of 1) paper adhesive 2) wood adhesive 3) metal bonding adhesive 4) break & clutch bonding adhesive 5) printed circuits

Fuels

3.4.0 Comprehend the classification and use of various types of fuel.
3.4.1 Define "fuel"
3.4.2 Explain their classification into solid, liquid & gaseous
3.4.3 Give brief explanation of solid fuels wood, charcoal, lignite, bituminous coal, anthracite coal – list their applications
3.4.4 Explain briefly the liquid fuels petrol, diesel, kerosene & list their applications
3.4.5 Explain gaseous fuels natural gas (CNG), producer gas, water gas, LPG & Gobar gas
3.4.6 Describe nuclear fuels with examples
3.4.7 Define 1) calorific value 2) octane number 3) Cetane no.
3.4.8 Explain 1) knocking 2) cracking

Environmental pollution

3.5.0 Investigate the impact of pollution on the environment
3.5.1 Describe the categorization and sources
3.5.2 List the different methods of controlling pollution
1) Effluent treatment 2) removal of toxic gases and particulate materials
3.5.3 Distinguish between BOD & COD

Chemistry in action

3.6.0 Understand some commonly used medicines & propellants
3.6.1 Explain what is 1) dyes 2) antipyretics & analgesics 3) antiseptics & disinfectants 4) tranquilizers 5) antibiotics - mention 2 examples each
3.6.2 Define propellants
3.6.3 Classify propellants with one example each.

CONTENT DETAILS

UNIT – I INORGANIC AND THEORECTICAL CHEMISTRY

1.1 Introduction

Atoms and Molecules, Valency, Molecular formula, Atomic weight, Molecular weight, Chemical equation, Problems based on Chemical equation.

Structure of atom, Modern approach De-broghi & Heisenberg's uncertainty Principle (Elementary idea only) – Concept of Orbit, orbital, Aufban, Hundi, Paul's Principle – Electric configuration – Modern Periods Law - classification of elements based on electronic configuration.

Chemical Bonding - theory of valency – Inertness of Zero group elements - Ionic bond, Co-ordinate bond, Co-valent bond, Polar character of covalent bond – Hydrogen bond – Applications High B.P of Water, density of ice, silky nature of protein (Idea only).

1.2 Acids-bases and Redox reactions

Acids-Bases – (Arrherius, & Lewis Concepts) – Concepts of strong and weak acids & bases – Neutralization - Equivalent weight of acid & bases (Calculate based on Equation) -Oxidation, Reduction (electronic concept and oxidation No concept) - Redox reaction (Eg: - Daniel Cell reaction).

Ironic product of water, PH & POH (Definition and expression) PH Scale – Calculation of PH & POH – Buffer solution (examples) – Application of PH a) Boiler feed water b) Potable water c) Effluent treatment.

Volumetric analysis: Quantitative & Qualitative analysis – Units of measurement of Concentration (Normality, Morality & PPM) – Titration, Endpoint Acid – Base Indicators (Phenolphthalein & Methyl orange) – Choice of Indicators.

1.3 Water

Hard & soft water, Types of Hardness – degree of hardness. One method to remove Temporary hardness (Boiling) – Renormal of permanent hardness (Ion-exchange method) – disadvantages of using hard water a) Wastage of Soap in laundry) Boil Scales – Determination of Degree of hardness using EDTA (Principle & Procedure only).
(Problems not expected from the chapter)

UNIT – II PHYSICAL CHEMISTRY

2.1 Electrochemistry & corrosion

Conductors & Insulators, Metallic & electrolyte conductors, strong & weak electrolytes – Mechanism of electrolysis – Molten Nail – Application of electrolysis – Electroplating & Anodizing.

Galvanic cell – Difference in the sign of electrodes – Primary cell (eg: - Daniel cell construction details, Anode reaction, cathode reaction & Net cell reaction)

Secondary cells – Lead storage balling, (Constructional details – charging & discharging) Electrochemical senis – Application in the construction of a cell.

Fuel cells – Introduction, Hydrogen – Oxygen fuel cell, Methanol – Oxygen fuel (elementary idea only) – Advantages.

2.2 Corrosion

Definition – Rusting of Fe condition for Rusting of Fe, Electrochemical theory of corrosion, Preventing of corrosion

i) Barrur protection
ii) Sacrificial protection
iii) Cathodic protection
iv) Antirust solution.

2.3 Chemical Energetics

Understand the term chemical energetic & thermodynamics _ Scope & Limitations of Thermodynamics. Basic concepts – Reversible & Irreversible reaction, Exothermic & endothermic reactions, systems & surroundings – Types of systems Open, closed, Isolated – process – Macroscopic properties – Extensive & Intensive properties.

Thermodynamic process - Isothermal, Adrabalie, Isobaric, Isochoric Process.

First Law of Thermodynamics – (statement)

Internal energy (E) and Internal energy change (E)

Concept of Work & heat

Mathematical expression for the 1^{st} Law of thermodynamics

Application of 1^{st} Law (Hess's Law)

(Statement and eg), Limitation of 1^{st} Law.

Enthalpy (H) and Enthalpy Change (H), Entropy (S) and Entropy Change (S)

Second Law of Thermo dynamics (statement & Mathematical Expression)

Gibbs Free energy (G) and Gibbs free energy change (AG)

Gibbs-Helzmotz equation (expression only)

Third Law of Thermodynamics (statement only)

2.4 Colloids

Definition, Types of colloids, preparation 1) Condensation-e.g. Ferric hydroxide sol 2) Dispersion- e.g. Bredic's arc method, purification – dialysis, Properties. 1. Tyndall effect 2. Brownian movement 3. Electrophoresis 4. Coagulation Hardy – Schulze rule, Gold number Industrial application 1) Smoke precipitation 2) Treatment of sewage 3) Purification of drinking water.

UNIT – III ORGANIC CHEMISTRY

3.1 Introduction

Differences between organic and inorganic compounds – uniqueness of carbon – catenation, saturated and unsaturated – general classification of organic compound – classification based on functional groups isomerism (definition wish an example).

3.2 Polymers

Polymerization – illustrate with examples – Addition and condensation polymerization with one example each.

3.3 Plastics - Thermoplastics, Thermosetting plastic, with one example each – advantages.

3.4 Rubber – Natural and synthetic rubber (example), vulcanization.

3.5 Fiber – Natural fibers, synthetic fibers, semi synthetic fibers, examples.

3.3 Paints and Varnishes and adhesives, lubricants

Requisites of a good paint – Constituents – acrylics, polyurethane, filler, plasticizers, pigments, driers and antiskinning agents.

VARNISHES - Type, Constituents

LUBRICANTS - Principle of lubrication – Types of lubricants

ADHESIVES - Types and Applications.

3.4 Fuels

Types of fuels - solid, liquid, gaseous and nuclear - Calorific value of fuels. Knocking, Cracking - Octane number and octave number.

3.5 Environmental pollution

Categorization, Sources and Controlling.

3.6 Chemistry ice action:

Dyes – antipyretics and analgesics – antiseptic – disinfectant – tranquilizers – antibiotics (Concept and two examples each). Propellants – definition classification (solid – liquid – hybrid) one example each.

REFERENCE BOOKS

1.	Soni P.L.	A Text Book of Inorganic Chemistry	S.Chand & Co., New Delhi
2.	Puri B.L. & Sharma L.R	A Text Book of Inorganic Chemistry	Shoban Lal Nagin Chand&Co
3.	B.S.Bahl	Text book of Organic Chemistry	S.Chand & Co., New Delhi
4.	I.L. Finar Arun Bahl	Organic Chemistry – Vol I	ELBS & Longman, Group Ltd.,
5.	Sono. P.L.	Textbook of physical Chemistry	Sultan Chand & Sons, New
6.	A.J. Mee	Physical Chemistry	William Heinemann Ltd.,
7.	Glasstone & Lewis	Element of Physical Chemistry	Macmillan Press

SUBJECT TITLE : ENGINEERING GRAPHICS
SUBJECT CODE : GE 104
PERIOD/WEEK : 4
PERIOD/YEAR : 128

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	1.1 Importance of Engineering Graphics	2
	1.2 Drawing Instruments	2
	1.3 Drawing standards	2
	1.4 Free hand Lettering and Numbering	3
	1.5 Dimensioning	3
	1.6 Geometric construction	16
	Test 1	3
		31
II	2.1 Projection of Points, Lines and planes	18
	Test 2	3
		21
III	3.1 Orthographic Projection of Objects	27
	Test 3	3
		30
IV	4.1 Sectional views of objects	11
	4.2 Auxiliary views	3
	Test 4	3
		17
V	5.1 Pictorial Drawing	8
	5.2 Visualization	4
	5.3 Perspective Drawing	3
	5.4 Development of surfaces	11
	Test 5	3
		29
	Total	128 Periods

Note : A minimum number of 10 sheets should be done.

OBJECTIVES

UNIT - I

On completion of this study the student should be able to –

1.1 Importance of Engineering Graphics

1.1.0 Understand the importance of engineering graphics
- 1.1.1 Explain the importance of engineering communication medium
- 1.1.2 Describe the development of engineering graphics and computer aided drafting CAD
- 1.1.3 Indicate the link between engineering graphics and other subjects of study in diploma courses

1.2 Drawing Instruments

1.2.0 Use engineering drawing instruments
- 1.2.1 Select the proper instrument to draw horizontal, vertical and inclined lines
- 1.2.2 Select the proper instrument to draw large and small circles and arcs to its specifications
- 1.2.3 Select the proper pencil to draw different types of line according to its specifications
- 1.2.4 Identify the steps to keep the drawing clean and tiny

1.3 Drawing standards

1.3.0 Appreciate the standards of engineering drawing
- 1.3.1 Select the drawing sheet
- 1.3.2 Draw different types of lines
- 1.3.3 Prepare of title block as per BIS
- 1.3.4 Fold of drawing sheets as per standards

1.4 Free hand Lettering & Numbering

1.4.0 Apply free hand lettering and numbering
- 1.4.1 Write drawing tile using sloping and vertical lettering including numerals as per BIS
- 1.4.2 Select suitable size of letters of different layout and applications
- 1.4.3 Write engineering drawings notes using lettering stencils

1.5 Dimensioning

1.5.0 Apply dimensioning as per standards
- 1.5.1 State the need of dimensioning as per BIS specification
- 1.5.2 Identify the notations used in a drawing as per BIS
- 1.5.3 Identify the system of placement of the dimensions as per BIS
- 1.5.4 Dimension of a given drawing according to BIS including features
- 1.5.5 Apply the rules for dimensioning of standard features, given a drawing comprising of standard features
- 1.5.6 Identify principles of dimensioning, given a dimensioned drawing
- 1.5.7 Identity the correctness or otherwise of an engineering drawing dimensioned as per SP 46 and dimension the same correctly

1.6 Geometric construction

1.6.0 Apply principles of geometrical construction
- 1.6.1 Construct polygon, given the length of the side
- 1.6.2 Insert a regular polygon in a circle.
- 1.6.3 Define Ellipse, involutes, helix, Parabola, Hyperbola and Cycloid,
- 1.6.4 Construct Ellipse by different methods (concentric, eccentricity, parallelogram
- 1.6.5 Construct an involute, helix, parabola from given data
- 1.6.6 Identify the application of these constructions in engineering practice.

UNIT – II

2.1 Projection of Points, Lines and Planes

2.1.0 Understand the projection of points, lines and planes
- 2.1.1 Project points in different quadrants
- 2.1.2 Project lines parallel to both planes
- 2.1.3 Project lines perpendicular to HP and || to VP

2.1.4 Project lines perpendicular to VP and || to HP
2.1.5 Project lines inclined to HP and || to VP
2.1.6 Project lines inclined to VP and || to HP
2.1.7 Project lines inclined to both planes-simple direct questions and answers
2.1.8 Find true length of lines
2.1.9 Project of planes parallel to VP and perpendicular to HP
2.1.10 Project planes parallel to HP and perpendicular to VP

UNIT - III

3.1 Orthographic Projection of Objects

3.1.0 Apply principles of orthographic projection
3.1.1 Explain the principle of orthographic projection with simple sketches
3.1.2 Prepare an engineering drawing of a given simple engineering path in first angle and third angle projection
3.1.3 Draw the orthographic views of an object, given its pictorial drawing
3.1.4 Sketch (free hand) the orthographic views of 3.2 and 3.3
3.1.5 Select the minimum number of views needed to represent a given object fully
3.1.6 Identify the engineering path correctly from a number of orthographic drawings

UNIT - IV

4.1 Sectional views of objects

4.1.0 Recognize the need of sectional views
4.1.1 Explain the need to draw sectional views
4.1.2 Select the section place for a given component to reveal maximum information
4.1.3 Draw the sectional views for 4.2
4.1.4 Sketch simple sections (Full and half) for a range of simple engineering objects
4.1.5 Select the component from a given sectional view

4.2 Auxiliary views

4.2.0 Recognize the need of auxiliary views
4.2.1 State whether the auxiliary view is needed, given an engineering drawing
4.2.2 Draw the auxiliary views of a given engineering drawing

UNIT - V

5.1 Pictorial Drawing

5.1.0 Prepare pictorial drawing
5.1.1 Explain the need for and types of commonly used pictorial drawings
5.1.2 Prepare isometric drawing of simple objects using appropriate construction procedures given their appropriate drawings
5.1.3 Sketch the isometric views of simple engineering objects given either orthographic drawing or actual components
5.1.4 Prepare oblique drawing – cavalier and cabinet-of simple engineering objects given either orthographic drawings or actual components
5.1.5 Sketch 5.4 by free hand
5.1.6 Identify the correct pictorial view from orthographic drawings

5.2 Visualization

5.2.0 Visualize and object in 3D, given its orthographic drawings
5.2.1 Compare an engineering part with its drawings
5.2.2 Identify surfaces with reference to orthographic drawing
5.2.3 Prepare a model of the part, given its orthographic drawing

5.3 Perspective Drawing

5.3.0 Prepare perspectives
5.3.1 State the principle of perspective projection
5.3.2 Prepare two-point perspective of a rectangular block
5.3.3 Sketch perspective of combination of rectangular block

5.4 Development of surfaces

5.4.0 Prepare development of surfaces

- 5.4.1 State the need for preparing the development drawings
- 5.4.2 Prepare development of surfaces of simple engineering component like tray, funnel, ducts (rectangular and square hopper)
- 5.4.3 Prepare development of surfaces of 90-degree elbow pipe

CONTENT DETAILS

UNIT - I

1.1 The Importance of Engineering Graphics

Explanation of the scope and objective of this subject – its importance as a graphic communication, Computer Aided Drafting (CAD) need for preparing drawing as per standards – BIS, SP 46.

1.2 Drawing Instruments.

Basic drawing instruments – T square – Set square – compass dividers – drawing boards – Pencils – Drawing papers – Mini drafter – French curves – Stencils – Selection and mode of using them.

1.3 Drawing Standards

Size of drawing sheets – Layouts of drawing sheet – Title Blocks – Types of lines – Folding of drawing sheets.

1.4 Free hand Lettering and Numbering

Need for legible lettering and numbering on drawings – selection of suitable size of lettering for different drawing writing of Engineering drawing titles and notes using both vertical and sloping styles.

1.5 Dimensioning

Function of dimensioning need for dimensioning engineering drawing according to BIS – rotation used in dimensions – dimension line – extension line – arrow heads and leader – system of dimensions - method I and method II

1.6 Geometric construction

Construction of regular polygon given the length of its side - methods of inserting a regular Polygon in a given circle – construction of ellipse by different methods (eccentrically, concentric circle, parallelogram). Definition of involute, helix, parabola & hyperbola – Construction of cycloid helix, involute and parabola.

UNIT – II

2.1 Projection of points, lines and planes

Projection of points in different quadrants, projection of straight lines parallel to one or both planes, parallel to one plane –perpendicular to other – inclined to one plane and parallel to other line inclined to both planes (In first quadrant only)

Methods of finding true length and its inclination with the reference planes. Projection of planes – parallel to one plane and perpendicular to other plane (in first quadrant only)

UNIT - III

3.1 Orthographic projection of objects

Explanation of the meaning of orthographic projection using a viewing box and a model- number views obtained need of only three views for displaying the object. Concept front view, top view and side view-sketching these views for a number of engineering objects- explanation of the meaning of first angle and third angle projection – symbol of projection

UNIT - IV

4.1 **Sectional views of objects**

Need for sectional drawing of an engineering object- selection of the section plane to reveal the maximum information – sectional views (full and half section) of simple engineering objects.

4.2 **Auxiliary views**

Need of auxiliary views – auxiliary views given engineering drawings

UNIT - V

5.1 **Pictorial drawings**

Isometric projection, construction of isometric scales- isometric projection of simple Engineering objects

Oblique projection cavalier and cabinet of simple Engineering objects

5.2 **Visualization**

Preparation of pictorial views from a group of orthographic drawings

5.3 Perspective drawing

Principle of perspective projection – type of perspective projection – two-point perspective of a rectangular block and combination of two rectangular blocks of different sizes

5.4 **Development of surfaces**

Development of surfaces of simple engineering components trace-funnel, ducts-rectangular and square –hopper-90 degree Elbow

REFERENCE BOOKS

1. Engineering Drawing - N. D Bhutt
2. Engineering Graphics - K. C. John
3. Engineering Graphics - P. I. Varghese

SUBJECT TITLE : COMPUTER FUNDAMENTALS & PROGRAMMING IN C
SUBJECT CODE : GE 105
PERIODS/WEEK : 3
PERIODS/YEAR : 96

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	1.1 Introduction to Computers	12
	1.2 Windows & Word Processing	6
	Test 1	2
II	2.1 Data Processing	5
	2.2 Problem solving methodology	11
	Test 2	2
III	3.1 Introduction to C Programming	12
	3.2 Programming practice	6
	Test 3	2
IV	4.1 Arrays, strings & functions	12
	4.2 Programming practice	6
	Test 4	2
V	5.1 Graphics in C	7
	5.2 Computer Networks	3
	5.3 Programming practice	6
	Test 5	2
	TOTAL	**96**

OBJECTIVES

UNIT – I

1.1.0 Know the application, classification and working of computers

1.1.1 Define a Computer
1.1.2 Discuss the various applications of computers
1.1.3 List the different classifications of computers based on processing methods
1.1.4 Describe the working of analog, digital and hybrid computers

1.2.0 **Appreciate the functions of hardware and software components**

1.2.1 Define hardware and software
1.2.2 Discuss about Instruction and program
1.2.3 Describe the hardware functional components of a digital computer with the help of a block diagram
1.2.4 List the functions of ALU, Memory, Input, Output Units and Control Unit
1.2.5 Define CPU and Microprocessor
1.2.6 List the classifications of computers based on capability
1.2.7 Describe micro, mini, mainframe and supercomputers in brief
1.2.8 Discuss machine language, Assembly language and high level language

1.2.9 List the different software components
1.2.10 Define system software and application software
1.2.11 Give examples for system software and application software
1.2.12 State the need for translators – assembler, compiler
1.2.13 Define operating system
1.2.14 List the functions of operating system
1.2.15 List the names of various operating system

1.3.0 **Appreciate the working of memory and input – output devices**
1.3.1 Define memory
1.3.2 Discuss the units' bit, byte, kilobyte, megabyte, gigabyte etc.
1.3.3 Discuss the characteristics of primary memory and secondary memory
1.3.4 Distinguish between sequential access memory and Random Access Memory
1.3.5 Differentiate between Read Only Memory and Read/Write memory
1.3.6 Discuss RAM & ROM
1.3.7 List the different types of ROM
1.3.8 List the different secondary memory devices
1.3.9 Discuss the working of floppy disk, magnetic tape, Hard disk, Compact disk (block diagrams and detailed description not necessary)
1.3.10 Discuss working of CDROM, CD-R, CD-RW & DVD (block diagrams and detailed description not necessary)
1.3.11 List the names of various I/O devices
1.3.12 Discuss input devices – Keyboard, mouse, scanner, Optical Character reader, Optical Mark reader, bar code reader, digitizer, light pen, joystick in brief (block diagrams and detailed description not necessary)
1.3.13 Discuss output devices – monitor, Printer, plotter (block diagrams and detailed description not necessary)
1.3.14 Describe the printers – Dot matrix printer, Inkjet printer, Laser printer in brief (block diagrams and detailed description not necessary)

1.4.0 Use the provisions of windows o s and word processing
1.4.0 Define Booting
1.4.1 Define Booting
1.4.2 Demonstrate the features of Windows Operating System
1.4.3 Operate various facilities in windows- 95 or higher version such as Desktop, icon, menu, folder, programs, screen saver, media player, shut down procedure
1.4.4 Discuss word processing
1.4.5 Prepare documents using WORD - create, format, save, print and open documents
1.4.6 Prepare presentations using power point – creation and use of slide show presentations

UNIT – II

2.1.0 Use data processing techniques and DBMS (not for theory exam)
2.1.1 Define Data, Database, and Database management system
2.1.2 Define Data, Database, and Database management system
2.1.3 State the need of spreadsheet
2.1.4 List the name of electronics spreadsheet and DBMS software packages
2.1.5 Use Excel for the creation, formatting, formula, save, print, open close and exit worksheets
2.1.6 Use Access for the creation, editing and querying of tables

2.2.0 Understand problem solving methodology
2.2.1 List the various steps involved in problem solving
2.2.2 Define what is an Algorithm
2.2.3 Write Algorithm for solving general and computer related problems
2.2.4 Define what is a Flow chart
2.2.5 Discuss the different flow-charting symbols

2.2.6 Draw flow chart for solving general and computer related problems
2.2.7 Define syntax and semantic of programming languages
2.2.8 List the name of two programming methods
2.2.9 Discuss the characteristics of procedural and object oriented programming languages
2.2.10 Give examples for procedural and object oriented language

UNIT – III

3.1.0 Use 'C' language in programming

3.1.1 Discuss the characteristic of C language
3.1.2 Describe the structure of a C program
3.1.3 State the need for header files, main ()
3.1.4 Discuss the basic data types in C –int., float, and double char
3.1.5 Discuss about identifiers, keywords and declaration of identifiers
3.1.6 Discuss about statements and compound statements
3.1.7 Describe briefly assignment, arithmetic operators, increment-decrement operators and arithmetic expressions
3.1.8 Discuss operator precedence and rules for evaluation of an expression
3.1.9 State the need of stdio.h
3.1.10 Discuss various input and output statements-printf(), scanf(), getchar(), Putchar (), getchar ()
3.1.11 Discuss the need of various control sequences and escape sequences
3.1.12 Write simple programs using input/output assignment and arithmetic statements
3.1.13 Describe the relational operators and relational expressions with their precedence in brief
3.1.14 Describe logical operators with their precedence in brief
3.1.15 Write programs with relational operators and logical operators

3.2.0 Prepare programs involving branching and looping statements

3.2.1 State the need for branching statements
3.2.2 Describe IF, IF ELSE statement, nested IF and IF Ladder
3.2.3 Describe the Switch Statement
3.2.4 Write Programs using IF Else and Switch statement
3.2.5 State the need for looping statements
3.2.6 Discuss the method of looping using While, Do and for loops
3.2.7 Write programs using While, Do and For loops

UNIT – IV

4.1.0 Create arrays and strings

4.1.1 State the need of arrays
4.1.2 Discuss the method declaring arrays and subscripting in arrays
4.1.3 Discuss the method of inputting, processing, and outputting values of array element
4.1.4 Write program for array processing
4.1.5 Write program for linear search and bubble sort
4.1.6 Discuss about multidimensional arrays
4.1.7 Write programs on multidimensional arrays, matrices manipulation
4.1.8 Discuss the declaration of character string
4.1.9 Discuss various string input and output functions – gets() and puts()

4.2.0 Understand functions in 'C' language

4.2.1 State the need for function
4.2.2 Compare user defined and library functions
4.2.3 Discuss the structure of a user defined function and its calling with or without parameters
4.2.4 Define void function
4.2.5 Describe various library functions – sin (), cos.(),tan(),exp(), abs(), log(),log10(), POW(), sqrt(), - strlen (), strcpy (), strcmp (), strcat ().
4.2.6 Write simple programs on functions and strings

UNIT – V

5.1.0 Use computer graphics in 'C' language to prepare programs

- 5.1.1 State the use of graphics.h
- 5.1.2 Define resolution
- 5.1.3 Discuss the functions initgraph(), setcolor(), setbkcolor(), putpixel(), line(), circle(), rectangle(), outtexty()
- 5.1.4 Write programs based on graphics

5.2.0 Understand new trends in information technology

- 5.2.1 Define the work 'multimedia'
- 5.2.2 Define the word 'multimedia'
- 5.2.3 Discuss the components required for a multimedia personal computer
- 5.2.4 Define computer network
- 5.2.5 Define LAN, WAN
- 5.2.6 Discuss the concept if Server and nodes
- 5.2.7 Discuss Internet, World Wide Web, and e-mail
- 5.2.8 Discuss Computer virus and anti-virus programs
- 5.2.9 Define artificial Intelligence and discuss its application fields

CONTENT DETAILS

UNIT – I Introduction to Computers & Word Processing

Introduction, application of computers, generations of computers, classification of computers – analog, digital, hybrid Computers, Structure of a computer - Hardware and Software components – Input unit, Output unit, ALU, Memory unit, Control unit, CPU, Microprocessor, micro, mini, supercomputers – machine languages, assembly languages, high level languages – system soft ware, application software – assembler, compiler, operating system – Types of memory – primary memory, secondary memory, sequential access , random access memory, RAM, ROM – magnetic tape, floppy, hard disc, compact disc – input devices, out put devices.

Practical sessions on Windows O/S, Word, Power point

UNIT – II Data Processing and Programming Methodology

Practical session on Electronic spread sheet and DBMS – EXCEL, ACCESS

Steps in problem solving – Algorithm, Flowchart- Flow chart symbols- examples syntax, semantics- types of high level languages – characteristics of high level languages - Types of high level languages – Examples – Procedural and object oriented programming languages

UNIT – III Introduction to C Programming

Characteristics of C-language – structure of a program header files, main (), Statements, compound statements, Data types – Keyword and variables, assignment operators, arithmetic operators, expressions, precedence of operators, order of evaluation – relational and logical operators - Input /out put statements -– control sequences – escape sequences – branching statements, if, if-else, switch – looping statements while, do, for statements.

Writing Sample programs – Practical session on programming

UNIT – IV Arrays and Functions

Arrays – declaration, processing, searching, sorting – linear search, bubble sort – multi dimensional arrays- matrix manipulations, character strings, string declaration, input/out put functions gets (), puts ()

User defined functions – library functions – structure of functions, calling functions, argument passing, void functions – mathematical and string library functions – math.h, stdio.h, string.h

Writing programs – Practical session on programming

UNIT – V Graphics and Networking

C-Graphics – resolution – graphics functions – initgraph (), setcolor (), setbkcolor (), putpixel (), Line (), circle (), rectangle (), out text (), outtextxy ()
Multimedia – Computer networking
LAN, WAN- Internet, modem, www-E-mail, computer virus, artificial intelligence.

REFERENCE BOOKS

1. Brian w. Kernigham and Dennys M. Ripchie The 'C' programming Language PHI
2. Hughes J. K. and Michton J. I. A structured approach to Programming PHI
3. Gottfried.B Theory and problems Programming with C TMH
4. E. Balaguruswamy Programming ANSI C TMH
5. Robert A. Radcliffe Encyclopedia C BPB

SUBJECT TITLE : BASIC ELECTRICAL AND ELECTRONICS
SUBJECT CODE : EL 101/EC 101/EP 101/EI 101/IT 101/BM 101
PERIODS/WEEK : 4
PERIODS/YEAR : 128

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	Passive Components, A.C. Fundamentals, Poly-phase circuits & Network Theorems	28
	Test 1	1
II	Semi conductors, PN junction Diodes Different types of diodes	20
	Test 2	1
III	Diode circuits, Introduction to Transistors	25
	Test 3	1
IV	Transistor configuration & Biasing Techniques	25
	Test 4	1
V	Special type of Transistors, Power devices & Opto-Electronic devices	25
	Test 5	1
	Total	128

OBJECTIVES

UNIT – I

1.1.0 Understand the different types of resistors and their uses

1.1.1 Define the property of resistance
1.1.2 List the specifications of resistors and state their importance
1.1.3 Classify types of resistors
1.1.4 List the applications of fixed resistors, variable resistors in electronic circuits.
1.1.5 Explain the working of PTC and NTC resistors and their application.

1.2.0 Familiarize with capacitors used in electronic circuits and their applications

1.2.1 State the charging and discharging of capacitors
1.2.2 List the specification of a capacitor and state their importance
1.2.3 Classify capacitors
1.2.4 Explain the working of capacitors
1.2.5 State the application of each type of capacitors
1.2.6 List the use of gang condensers, trimmers, padders.

1.3.0 Familiarize with different types of inductors, transformers and their applications

1.3.1 List the different types of inductors and their applications
1.3.2 Explain the working principle of a transformers
1.3.3 List the types and applications of transformers

1.4.0 Understand the basic network theorems

1.4.1 Explain superposition theorem, Thevenin's theorem, Norton's theorem, reciprocity theorem and maximum power transfer theorem

1.5.0 Understand the fundamentals of alternating current

1.5.1 Define waveform, time period, frequency and amplitude, phase difference, r.m.s. value, average value
1.5.2 Derive the equation of sinusoidal voltage and current
1.5.3 Explain A.C. through resistors, inductors and capacitors
1.5.4 Define Q-factor of a coil
1.5.5 Define resonance in R-L-C -Series & parallel circuits
1.5.6 State the inductive reactance, capacitive reactance and impedance
1.5.7 Explain the generation of 3phase voltage equations, phase difference and vector representation
1.5.8 Define line voltage and current, phase voltage and current in 3 Ø system
1.5.9 Explain circuits the use of star & delta connections.

UNIT – II

2.1.0 Recognize the semiconductor materials & devices

2.1.1 Sketch Energy Band diagrams of conductors, insulators & semiconductors
2.1.2 Distinguish between intrinsic & extrinsic semiconductors
2.1.3 State the majority & minority carriers in P, N type materials
2.1.4 Explain the term doping
2.1.5 Explain the formation of PN junction diode, depletion region
2.1.6 Distinguish between drift & diffusion currents
2.1.7 Describe potential barrier
2.1.8 Sketch V-I characteristics of diode
2.1.9 Describe Zener & Avalanche Breakdown of diodes
2.1.10 Explain the determination of static & dynamic resistance of diode
2.1.11 Explain the specifications of diodes

2.2.0 Recognize different types of diodes

2.2.1 Explain the working & V-I characteristics of Power, Zener, Varactor & Tunnel diodes
2.2.2 Describe important specifications of diodes
2.2.3 Describe applications of Power diodes, Zener diodes, Varactor diodes & Tunnel diodes

UNIT – III

3.1.0 Appreciate the principle of rectification and filtering

3.1.1 State the working of a diode and a rectifier
3.1.2 Draw half wave and full wave rectifier circuits including bridge rectifier and explain their working
3.1.3 Draw the relationship between DC output and AC input voltage
3.1.4 Define the terms rectification efficiency, ripple factor
3.1.5 Calculation of average and r.m.s values of voltages and currents for various rectifiers
3.1.6 Draw the filter circuits, different types, shunt capacitor, series inductor and π section filters and explain their working
3.1.7 Draw the different wave shapes
3.1.8 Draw the voltage Doublers and Tripler circuit and state principle of working

3.2.0 Understand the concept of transistor

3.2.1 Explain the working of PNP & NPN transistor
3.2.2 Draw the mechanism of current flow and current relation $I_E = I_B + I_C$
3.2.3 State the meaning of leakage current and effect of temperature

UNIT – IV

4.1.0 Understand different configurations of transistors

- 4.1.1 Draw the different configuration of transistor
- 4.1.2 Sketch the input and output characteristics of CB & CE Configuration
- 4.1.3 Determination of i/p & o/p resistance from characteristic curves
- 4.1.4 Compare the different configurations of transistor
- 4.1.5 Define and relate the term Gama and Beta factors

4.2.0 Understand different biasing techniques of transistors

- 4.2.1 Sketch DC Load line
- 4.2.2 Define operating point
- 4.2.3 Explain the need for stabilization of operating point
- 4.2.4 Study the different biasing circuits
- 4.2.5 Study the behavior of CE amplifier with potential divider biasing.

UNIT – V

5.1.0 Understand the operation of UJT

- 5.1.1 Study the operation of UJT, VI characteristics & symbol
- 5.1.2 Equivalent circuit of UJT & its Application

5.2.0 Translate the principle of operation of FET

- 5.2.1 Draw the Basic construction of JFET, P-channel and N-channel
- 5.2.2 State the principle of operation and the characteristics of JFET
- 5.2.3 Compare FET with Bipolar Transistor
- 5.2.4 List the advantages and disadvantages
- 5.2.5 List the parameters of JFET
- 5.2.6 Applications of JFET
- 5.2.7 Classify MOSFET such as depletion and enhancement modes
- 5.2.8 Compare JFET and MOSFET
- 5.2.9 Application of MOSFET

5.3.0 Appreciate the concept of integrated circuit

- 5.3.1 Study the basics of integrated circuits
- 5.3.2 List the advantages
- 5.3.3 State the needs for SMD & list the advantages

5.4.0 Recognize the different types of opto electronic devices

- 5.4.1 State the working principles of photo resistors, photodiodes, phototransistors, photovoltaic cells, LEDs, LCDs, and Opto couplers
- 5.4.2 Explain simple application of Opto electronic devices.

CONTENT OUTLINE

UNIT – I:

PASSIVE COMPONENTS, A.C FUNDAMENTALS, POLY-PHASE CIRCUITS & NETWORK THEOREMS

Fixed resistors, variable resistors and their specifications – PTC and NTC resistors, High precision resistors, applications. Capacitors – charging & discharging specification, different types of capacitors, variable capacitors, application of capacitors. Inductors – AFC & RFC, Transformers, pulse transformer, applications.

Equations of sinusoidal voltage & current, waveforms, time period, frequency, amplitude, phase difference, r.m.s value, average value, A.C. through Resistors, Inductors and Capacitor, inductive reactance, capacitive reactance and impedance. Q-factor, resonance in R.L.C. (Series & parallel).

Network theorem's – Superposition theorem, Thevenin's theorem, Reciprocating theorem, Norton,s theorem, Maximum power transfer theorem.

Poly-phase circuits – generation of poly phase voltage, equations, phase difference, e m f vector representation, comparison between single & 3 phase systems, star & delta connections, relations of voltage & current in star/delta connections, expression for power in 3 phase systems – simple problems.

UNIT – II:

SEMI CONDUCTORS, PN JUNCTION DIODES, DIFFERENT TYPES OF DIODES.

Energy band diagram of conductors, insulators, semiconductors, intrinsic & extrinsic semiconductors, doping, P&N type, majority & minority carriers. PN junction, drift & diffusion current, depletion layer, potential barrier, behaviour of PN junction under forward & reverse bias, break down on diodes, Zener & avalanche breakdown. VI characteristic of PN junction diode, determination of static and dynamic resistance, specification of diode

Different types of diodes – brief description, working & VI characteristics of power, zener, varactor and tunnel diodes. Important specification & applications

UNIT – III:

DIODE CIRCUITS, INTRODUCTION TO TRANSISTORS

Working of the diode as a rectifier, half wave & full wave rectifiers, bridge rectifiers. Relation between D.C output and A.C output voltage, rectification efficiency & ripple factor, average & r.m.s values of voltage & current for various rectifiers. Filter circuits, shunt capacitor, series inductance and π section filter circuits, applications. Voltage Doubler & Tripler circuits operations.

Concept of bipolar transistor PNP & NPN transistor – Mechanism of current flow, current relation ($I_E = I_B + I_C$). Concept of leakage current (I_{CBD}) and effect of temperature on leakage current.

UNIT – IV:

TRANSISTOR CONFIGURATION AND BIASING TECHNIQUES

CB Configuration leakage current, input & characteristics, determination of dynamic input & output resistance, CE configuration, current relation (Collector current in terms of base current & leakage current I_{CED}), Input & output characteristics, determination of input & output resistance.

CC configuration – expression of emitter current in terms of base current and leakage current

Comparison of CB, CE & CC with regards to input & output impedances, current gain, voltage gain & leakage current.

Transistor biasing techniques – DC load line – Fixing the operating point, Need for stabilization.

Different biasing methods – Working of a single stage CE transistor amplifier.

UNIT – V:

SPECIAL TYPE OF TRANSISTORS, POWER DEVICES & OPTO ELECTRONICS DEVICES.

UJT, Operation, VI characteristics, Equivalent circuit, Applications. FET, advantages and disadvantages, Basic construction of JFET, Principle and operation of JFET, Parameters of JFET, Applications.

MOSFET, Depletion MOSFET, Enhancement MOSFET, Application.

Difference between JFET & MOSFET

Power devices – SCR, diac & triac

Introduction to Integrated ckt technology, Advantages, SMD's and its advantages

Opto electronic devices – working principles of photo resistors, photodiodes, phototransistors, photovoltaic cell, LED, LCD & Opto couplers – simple application of opto electronic devices.

REFERENCE BOOKS

1. Basic Electrical Engineering. : V.N. Mittle
2. Basic Electronics and Linear circuits : Kulshreshtha, Bhargava N.M. & S.C.Gupta TTTI Chandigarh
3. Electronic Devices and circuits : Milman and Halkias
4. Electronic Principles : Malvino
5. Electronic Devices and Circuit Theory : Robert Boylestad and Nashelsky
6. Electronic Devices and Circuits : Allen Mottershead
7. Electronic circuits : Floyd

SUBJECT TITLE : APPLIED SCIENCE LAB - PHYSICS
SUBJECT CODE : GE 106 A
PERIODS/WEEK : 2
PERIODS/YEAR : 64

LIST OF PRACTICAL EXPERIMENTS – PHYSICS

1. Vernier Calipers
2. Screw Gauge
3. Common balance
4. Simple Pendulum
5. Hooke's law
6. Moment bar
7. Inclined Plane
8. Concurrent forces (Mass of the body)
9. Hare's apparatus
10. U-tube
11. Quill tube
12. Resonance column
13. Diode Characteristics
14. Convex lens
15. Ohm's law

SUBJECT TITLE : APPLIED SCIENCE LAB – CHEMISTRY
SUBJECT CODE : GE 106 B
PERIODS/WEEK : 2
PERIODS/YEAR : 64

OBJECTIVES

I. VOLUMETRIC ANALYSIS

1.1 Acidimetry Alkalimetry

1.1.a Determine the strength of the given hydrochloric and solution using a standard solution of sodium hydroxide and calculate the amount of HCI in a given volume

1.1.b Determine the strength of given sulphuric acid solution using a standard solution of sodium carbonate. Calculate the amount of sulphuric acid and in a given volume

1.1.c Determine the strength of given sodium hydroxide solution given a standard solution of sodium carbonate using a link solution sulphuric acid/hydrochloric acid. Calculate the amount of sodium hydroxide in a given volume

1.1.d Determine the strength of given nitric acid solution given a standard solution of oxalic acid using link solution sodium hydroxide/potassium hydroxide. Calculate the amount of nitric acid in a given volume.

1.2 Permanganometry

1.2.a Determine the strength of given potassium permanganate solution using a standard solution of ferrous ammonium sulphate

1.2.b Determine the strength and calculate the amount of crystalline ferrous solution

1.3 Hardness estimation

1.3.a Determine the degree of hardness of a given sample of hard water using a standard solution of EDTA.

II. pH DETERMINATION

2.1.1 Determine the pH of three different solutions using pH meter
2.1.2 Determine the pH value of three different solutions using universal indicator
2.1.3 Determine the pH value of three different solutions using pH test paper

III. PREPARATION OF STANDARD SOLUTIONS

3.1.1 Weigh accurately a crystalline substance using a chemical balance
3.1.2 Prepare a standard solution of sodium carbonate by weighting out accurately solid sodium carbonate and making it into a definite volume
3.1.3 Prepare a standard solution of oxalic acid when oxalic acid crystals are given.

CONTENT DETAILS

I. VOLUMETRIC ANALYSIS

1.1 Acidimetry Alkalimetry
a) Estimation of Hydrochloric acid
b) Estimation of Sulphuric acid
c) Estimation of Sodium hydroxide given standard sodium carbonate solution

d) Estimation of Nitric acid given standard sulphuric acid solution

1.2 Permanganometry
1.3 Estimation of potassium permanganate
1.4 Estimation of crystalline ferrous sulphate
1.5 Estimation of sodium hydroxide, given standard ferrous salt solution

1.3 Hardness estimation
Estimation of total hardness of water – using standard EDTA solution

II. pH DETERMINATION

2.1 Determination of pH using pH meter
2.2 Determination of pH using universal indicator, pH test paper.
2.3 Determination of pH using pH test paper.

III. PREPARATION OF STANDARD SOLUTION

3.1 Preparation of a standard solution of sodium carbonates
3.2 Preparation of a standard solution of oxalic acid

REFERENCE BOOKS

A.O. Thomas & Mani Practical Chemistry for B.Sc. main

SUBJECT TITLE : BASIC ELECTRONICS LAB
SUBJECT CODE : EL 102/EC 102/EP 102/EI 102/IT 102/BM102
PERIODS/WEEK : 2
PERIODS/YEAR : 64

EXERCISES

1. Identification of Passive Components: Resistors, Capacitors, Inductors, Transformers, Thermistors, and LDR & familiarization with Breadboards.
2. Identification of various types of Electronic Instruments: Ammeters, Voltmeters, Multimeters (Analog and Digital), Function Generators, Power Supply and CRO.
3. To observe a Sine wave on a CRO and draw it indicating all its values: Amplitude, Time Period and Frequency.
4. Measurement of voltage at various setting (Low and high voltage) of regulated Power supply by using Analog & Digital Multimeters
5. Measurement of voltage and current by loading the regulated Power Supply.
6. Measurement of Resistors by Multimeters and Compare with Colour code value
7. Check an Electrolytic Capacitor using a Multimeter
8. Identification of Package type and Terminal familiarisation with characteristics & Rating using data book for various types of Diodes.
9. Checking of Diode using a Multimeter
10. Draw the V-I characteristics (Forward and Reverse) of a silicon Diode. Determine the static and dynamic resistance
11. Draw the V-I characteristics (Forward) of a Germanium Diode. Determine static and dynamic resistance.
12. Plot the V-I characteristics of Zener diode. Determine the Breakdown voltage
13. Measure and Plot the Input/Output voltages of a half wave rectifier with and without filters. Calculate Ripple Factor
14. Measure and plot the Input/Output voltages of a full wave rectifier with and without filters. Calculate Ripple Factor.
15. Measure and Plot the Input/Output voltages of Bridge Rectifier with and without filters. Calculate Ripple Factor
16. Plot the wave shapes of a full wave rectifier with shunt capacitor, series inductor and π section filter. Measure voltages
17. Setup a voltage regulator using Zener Diode.
18. Construct a voltage doublers and observe the output
19. Construct a voltage Trippler and observe the output
20. Identification of Package Type & Terminals familiarization with characteristic & Rating using data books for transistors
21. Plot the Input and Output characteristics for a transistor in common base configuration and determine current gain, Input and Output resistance

22. Plot the input and output characteristics for a transistor in common emitter configuration and determine current gain, input and output resistance.
23. Plot the V-I characteristics of UJT
24. Plot the V-I characteristics of a JFET
25. Familiarization of ICs and SMD

SUBJECT TITLE : WORKSHOP PRACTICE
SUBJECT CODE : EL 103/EP 103/EC 103/EI 103/IT 103/BM103
PERIODS/WEEK : 4
PERIODS/YEAR : 128

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	Sheet metal and Aluminium fabrication	40
	Test – I	4
II	Fitting	20
	Test – II	3
III	Welding	16
	Test – III	3
IV	Carpentry	16
	Test – IV	3
V	Machine shop practice	20
	Test – V	3
	Total	128

OBJECTIVES

Upon completion of the course of study, the student should be able to:

1.0 Perform various exercises as per the given drawing and specifications
- 1.1 Identify the required tools from a given number of tools
- 1.2 Select particular tool for a specified operation
- 1.3 Locate the functional part of equipments and tools
- 1.4 Explain the use of tools and equipment
- 1.5 Prepare the edges/work piece as per drawing standard
- 1.6 Set up the job as per the procedures of operation
- 1.7 Perform various steps as per the procedure
- 1.8 Inspect the job for achievement of accuracy and finish
- 1.9 Clean the tools, instruments and work place
- 1.10 Return the tools, instrument as per regulations
- 1.11 Exhibit safety precautions

CONTENT DETAILS

UNIT – I:
SHEET METAL AND ALUMINIUM FABRICATION

Sheet Metal

Study of tools - Different types of punches, shears, snips, cutters, hand drills, taps, dies and tools used for cutting bending and making holes for mounting electronic Hardware and components.

Exercise

Marking, measuring, cutting of sheets

Formation of joints like grooved joint, locked grooved joints, corner joints, bending, punching, drilling of sheets to make cabinets and chassis and panels

Aluminium Fabrications

Introduction – Aluminium fabrication and its scope, Study of tools - Different types of files, hacksaw, screwdriver, hammer, drill bits etc, Measuring tools – Steel tapes, try square, bevel square, combination set etc

Exercise

Cutting, filing, drilling with portable drill, making keyholes, making of different types of joints such as straight joints, corner joints, cut joint with different aluminum sections.

UNIT – II:

FITTING

Study of tools - Marking tools – scriber, compass, divider, outside and inside calipers, center punch, tri square, bevel square, straight edge, surface plate, v – block, Cutting tools – Flat chisels, flat, cross cut, half round, diamond, point side.

Files – single cut & double cut, rough, second cut, smooth and dead smooth files, safe edge file, flat, square, pillar, round, triangular, half round knife and needle files, Scraper – Flat, Triangular and half round, Hacksaw – Solid and adjustable frames, Power hacksaw, Striking tools – Ball peen, straight pen, cross peen, sledge hammer, Holding devices – Bench vice, leg vice, hand vice, pin vice and toolmakers vice, Drills & Taps – Hand drill, power drill, various types of taps B.S.W. & Metric

Miscellaneous tools – Screwdriver, spanners (double end spanner, ring spanner, box spanner)

Exercise

Cutting chipping, filling, scribing, drilling, reaming, tapping and dieing exercises

Preparation of joints, making of utility articles

UNIT – III:

WELDING

Identification of various tools, equipment and accessories used in welding. Study of ac-arc welding, DC-generators, rectifier welding set, spot welding equipments.

Exercise

Horizontal and vertical welding

Welded joints after edge preparation – 'V' and double 'V'

UNIT – IV:

CARPENTRY

Study of tools - Marking and measuring tools such as straight edge, miter square, tri square, bevel square, marking knife, marking gauge, mortise gauge, cutting gauge, wing compass, trammel, dividers, outside and inside calipers, spirit level and plumb bob.

Cutting tools such as rip saw, tenon saw, bow saw, compass saw, key hole saw, firmer chisel, bevel edge firmer chisel, paring chisel, mortise chisel, jack plane, wooden and metal trying plane, smoothing plane, rebate plane, plough plane, spok shave, Boring tools such as bradawl ratchet brace, wheel brace etc, Holding devices – bench vice, sash clamp, g-clamp and miscellaneous tool like Rasp file, scraper, pincers

Exercise

Preparation of carpentry joints like cross halving joints, single side dove tail joint, double side dove tail joint, mortise and tenon joint. Practice on cabinet making (Electronic units such as Radios, TV, Amplifiers etc)

UNIT – V:

MACHINE SHOP PRACTICE

Exercise on lathe, shaper, planer, surface grinder, Lathe work – Plane, taper, step turning

Shaper – Shaping flat surface and grooving practice, Surface grinder – Grinding flat and inclined surfaces, Planning machine – Planning on flat and inclined surface

Computer aided manufacture with the help of CNC Machine (study only)

Identify various parts of a CNC Machine. Descriptive study of various codes used NC/CNC machine. Demonstration showing the working of CNC Machine with manual programming, with CAD as wells as CAD/CAM designer software

SUBJECTS OF STUDY AND SCHEME OF EVALUATION

SEMESTER III

Branch :Electronics

Code	Subject	Periods Per Week			Evaluation (Marks)			
		Theory	Practical/ Tutorial	Total	Theory	Practical	Internal	Total
EL301/EC301/ EP301/EI301/ IT301/BM301	Electrical Technology	5		5	75		25	100
EL302/EC302/ EP321/EI302/ IT302/BM302	Electronic Circuits	5	1	6	75		25	100
EL303/EC303/ EP303/EI303/ IT303/BM303	Digital Electronics	5	1	6	75		25	100
EL304/EC304/ EI304	Programming in C++	5	1	6	75		25	100
EL305/EC305/ EP305/EI305/ IT305/BM305	Electronics Circuits Lab		3	3		75	25	100
EL306/EC306/ EP306/EI306/ IT306/BM306	Digital Electronics Lab		3	3		75	25	100
EL307/EC307/ EI307	Computer Lab(C++)		3	3		75	25	100
	ISAP* Skills development		3	3				
	TOTAL	20	15	35	300	225	175	700

*ISAP: - Information Search Analysis and Presentation

SUBJECT TITLE : ELECTRICAL TECHNOLOGY
SUBJECT CODE : EL 301 / EC 301 / EP 301 /EI 301 / IT 301 / BM 301
PERIODS/WEEK : 5
PERIODS/SEMESTER : 80

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Transformers		14
		Test - I	1
II	DC Generators		16
		Test - II	1
III	DC Motors		14
		Test - III	1
IV	Alternators		14
		Test - IV	1
V	AC Motors		17
		Test - V	1
		Total	80

OBJECTIVES

UNIT – I

1.1.0 Review the working principle of transformers

1.1.1 Write the e.m.f equation of a transformer
1.1.2 Understand the losses in a transformer
1.1.3 Calculate the efficiency and regulation from O.C & S.C test
1.1.4 Understand the working principle of Auto transformer
1.1.5 Know the ratings and types of power transformers used in electronic circuits
1.1.6 Compare different type of transformers.

UNIT – II

2.1.0 Understand the Working Principle of DC Generator

2.1.1 Understand the generation of torque due to alignment of magnetic filed
2.1.2 Understand the principle of DC generator
2.1.3 Know the emf equation of DC generator
2.1.4 Know the construction of DC generator
2.1.5 Know the building up of voltage in DC shunt generator
2.1.6 Understand the load characteristic of DC shunt generator
2.1.7 Know the function of commutator in DC machines

UNIT – III

3.1.0 Understand the Working Principle of DC Motors

3.1.1 Understand the principle of operation of DC motors
3.1.2 Understand Fleming's left hand rule
3.1.3 Understand the shunt, series, compound motors
3.1.4 List the factors affecting the speed of DC motors
3.1.5 Understand the speed control using field control and armature voltage control
3.1.6 Illustrate the method of starting DC motor
3.1.7 List the application of DC motors

UNIT – IV

4.1.0 Understand the Working Principle of Alternators

- 4.1.1 Understand the principle of operation of alternator
- 4.1.2 Understand the construction of alternator
- 4.1.3 Know how the frequency of generated AC is determined
- 4.1.4 Know the relationship between frequency and number of poles
- 4.1.5 Know about the cooling of turbo alternators
- 4.1.6 Understand the load characteristic of alternator
- 4.1.7 Understand the parallel operations of alternators

UNIT – V

5.1.0 Understand the Working Principle of a Motors

- 5.1.1 Describe the working principle of 3 phase induction motor
- 5.1.2 Compare case and slip ring induction motors
- 5.1.3 Know about the starting of AC Motors
- 5.1.4 List the applications of 3 phase induction motors

5.2.0 Understand the Working Principle of Single Phase Motors

- 5.2.1 Identify the different types of motors used in electronic equipment's
- 5.2.2 Explain the principle of operations of single phase induction motor, universal motor, stepper motor
- 5.2.3 List the applications of universal motor, stepper motor
- 5.2.4 Understand the working principle of AC and DC servo motors
- 5.2.5 List the applications of servo motors

CONTENT DETAILS

UNIT - I: TRANSFORMERS

Working principle and elementary theory of ideal transformer – emf equations – turns ratio, losses, and efficiency of a transformer.

Autotransformer – working principle. Rating and types of transformers used in electronic circuits

Rating and types of transformers used in electronic circuits. Rating and types of transformers used in electronic circuits

UNIT - II: DC GENERATOR

Electromagnetic dynamic induction – generation of DC using split rings – principle of DC generator – constructions of DC generator – field systems – armature windings – emf equations – building up of voltage in DC shunt generator – load characteristics of DC shunt generator – armature reactions – process of commutations

UNIT - III: DC MOTOR

Principle of operations of DC motor – Fleming's left hand rule – back emf - torque equation - load characteristics of shunt and series motors – speed control of DC motor using filed control and armature voltage control. 3 point and 4 point starters – applications of DC Motors

UNIT - IV: ALTERNATORS

Basic principle of alternators - stationery armature and rotating field – constructions – emf equations- frequency and number of poles- excitation – cooling of turbo alternators – load characteristics of alternator - necessity and condition for parallel operations of alternators

UNIT - V: AC MOTORS

Rotating magnetic field – principle of operations of 3 phase induction motors – slip and slip frequency comparison between case and slip ring induction motors – direct online starter – star delta starter - applications of 3 phase induction motor – single phase induction motor.

Universal motor- application of single phase Induction motor – stepper motors – principle – applications – servo motors

REFERENCE BOOKS

1. Hugh's Electrical Technology : Edward Hughs
2. A Text Book of Electrical Engg : B.L. Theraja
3. Electrical Machines : Battacharya

SUBJECT TITLE : ELECTRONIC CIRCUITS
SUBJECT CODE : EL 302 / EC 302 / EP 302/ EI 302 / IT 302/BM302
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16(Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Single stage & Multi-stage Amplifiers	15	
		Test - I	1
II	Tuned Voltage amplifiers & Audio power amplifiers		15
		Test - II	1
III	Feedback Amplifiers & Oscillators		15
		Test - III	1
IV	Multi-vibrators and Time base circuits		15
		Test - IV	1
V	Wave shaping circuits & Passive filters		15
		Test – V	1
		Total	80 +16

OBJECTIVES

UNIT – I

1.1.0 Understand the concept of a transistor amplifier

1.1.1 State the principle of transistor amplifier in CE configuration
1.1.2 Study the behavior of the CE amplifier with potential divider type of biasing
1.1.3 Determine the AC load line of CE amplifier
1.1.4 Calculate the voltage gain, current gain, power gain and I/O impedance
1.1.5 Understand the terms " frequency response" and "bandwidth" of amplifiers
1.1.6 Understand the characteristics and applications of Emitter Follower
1.1.7 Study the circuit of a single stage amplifier using MOSFETs
1.1.8 Identify the need of multistage amplifier
1.1.9 Understand the working of multistage amplifiers
1.1.10 Discuss the different methods of inter stage coupling
1.1.11 Study the working Principles and features of RC coupled, Transformer coupled and direct coupled multistage transistor amplifier
1.1.12 Understand the frequency response and identify the band width of RC coupled, transformer coupled and direct coupled amplifiers
1.1.13 Describe the approximate calculation of voltage gain of a two stage RC coupled amplifier
1.1.14 Mention the applications of RC coupled, transformer coupled and direct coupled amplifiers
1.1.15 Compare the performance of RC coupled, transformer coupled and direct coupled amplifier
1.1.16 Understand the operations and characteristics of a Darlington pair transistor

UNIT – II

2.1.0 Understand the operation of tuned voltage amplifier

2.1.1 Explain the series and parallel resonance circuit, expression for resonance frequency
2.1.2 Recognize the relation between resonance frequency "Q" and band width
2.1.3 Explain with circuit the operation and frequency response of single tuned, double tuned and stagger tuned amplifiers
2.1.4 List the applications of tuned amplifiers
2.1.5 State the need for neutralization in tuned amplifiers

2.2.0 Understand the working of Audio power amplifiers

2.2.1 Distinguish between the voltage amplifier and power amplifier
2.2.2 Illustrate the importance of impedance matching in power amplifier
2.2.3 Classify the different types of power amplifier class A, Class B, Class AB and class C
2.2.4 Explain the operation of a single ended power amplifier circuits
2.2.5 Derive the expression for collector efficiency by graphical method
2.2.6 State the importance of heat sinks and heat dissipation in power amplifiers
2.2.7 Explain the principle of push pull amplifiers circuit
2.2.8 Explain the operation of class B push pull power amplifier using output transformer
2.2.9 Explain the operation of complementary symmetry push pull amplifier circuit
2.2.10 List the advantages, disadvantages and applications of the above push pull amplifier circuit

UNIT – III

3.1.0 Understand the concept of feed back amplifier

3.1.1 Describe the positive and negative feed back in amplifier
3.1.2 Derive the expression for the gain of feed back amplifier
3.1.3 State the types of negative feed back in amplifiers
3.1.4 Explain the operation of a typical feed back amplifier circuit
3.1.5 Explain the effect of negative feed back on gain stability, distortion, band width, input and output impedance

3.2.0 Understand the principle of oscillator circuits

3.2.1 State the Barkhausan criterion for oscillation
3.2.2 Describe the working of RC oscillators – RC phase shift oscillator and wein bridge oscillator
3.2.3 List the applications of RC oscillators
3.2.4 Explain the basic principle of LC oscillators
3.2.5 Explain the working of Hartley and colpitt's oscillators
3.2.6 List the applications of LC oscillators
3.2.7 Explain the operation of crystal oscillator
3.2.8 List the advantages and applications of crystal oscillator

UNIT –IV

4.1.0 Understand the operation of Multivibrators

4.1.1 Name the types of multivibrators
4.1.2 Describe the operation of Bistable multivibrator using transistors
4.1.3 Describe the synchronous and Asynchronous methods of triggering Bistable multivibrator
4.1.4 Explain the operation of monostable multivibrator using transistors
4.1.5 Study the expression for pulse width, factors affecting pulse width
4.1.6 Explain triggering methods of monostable multivibrators
4.1.3 Explain the operations of astable multivibrators using transistors
4.1.7 Derive the expression for the frequency of oscillation
4.1.8 Solve simple problems in multivibrators
4.1.9 List the applications of multivibrators

4.2.0 Understand the operation of Schmitt trigger

4.2.1 Explain the operation of Schmitt trigger circuit
4.2.2 Explain UTP and LTP
4.2.3 List the applications of Schmitt trigger

4.3.0 Understand the time base circuits

4.3.1 Identify the need for time base wave form.
4.3.2 Explain the basic saw tooth generation circuit using charging and discharging of a capacitor
4.3.3 List the applications of time base circuits

UNIT V

5.1.0 Understand the linear wave shaping circuits

5.1.1 Identify the different wave shapes
5.1.2 Define the characteristics of pulse wave form - rise time, fall times and tilt
5.1.3 Study RC differentiating and Integrating circuits.
5.1.4 State the conditions for proper integration and differentiation
5.1.5 List the applications of integrator and differentiator circuits

5.2.0 Understand the non-linear wave shaping circuits

5.2.1 Classify the diode clipping circuits
5.2.2 Explain the operation of series shunt and biased type clipping circuits with wave forms
5.2.3 Explain the operation of Zener diode clipper circuits
5.2.4 Define the term clamping
5.2.5 Explain the operation of various types of diode clamping circuits
5.2.6 List the applications of clamping circuits

CONTENT DETAILS

UNIT - I: **15**

Single stage transistor amplifier and multistage transistor amplifiers

Action of transistor as an amplifier – single stage C.E amplifier circuit with voltage divider biasing – graphical analysis of the small signal CE amplifier – AC load line – Gain, frequency response and bandwidth of BJT amplifier - calculation of voltage gain, input impedance, and output impudence – Emitter follower

Multistage Amplifiers

Need for multistage amplifier–frequency response of cascaded stages – inter-stage coupling methods-classification of multistage amplifiers – two stage RC coupled amplifier using BJT - frequency response - band width - advantages and disadvantages - applications – calculation of voltage gain, input impedance, and output impedance - Two stage transformer coupled and direct coupled multistage amplifier –frequency response – advantages and disadvantages – applications –Darlington pair transistor – expression for current gain

UNIT - II: **15**

Tuned Voltage Amplifiers and Power Amplifiers

Series and parallel resonant circuits, expression for resonant frequency – relation between resonant frequency, Q factor and bandwidth – single tuned, double tuned, and stagger tuned voltage amplifiers - working principles - frequency responses - applications–concept of neutralization

Need for power amplifier – difference between voltage and power amplifiers – importance of impedance matching in power amplifiers, transformer impedance matching - classification of power amplifiers – Class A, Class B, Class AB and Class C – expression for efficiency of class B push pull power amplifier – push pull power amplifier with output transformer – complementary symmetry push pull power amplifier – advantages and disadvantages - cross over distortion in Class B power amplifier – importance of heat sinks and heat dissipation curves in power amplifiers

UNIT - III:

Feed Back Amplifier and Oscillators

Types of feed back – derivation for the expression of gain of a feed back amplifier – types of negative feed back amplifiers – explanation with block diagram – typical circuit diagrams of voltage shunt & current series negative feed back amplifier – effect of negative feed back on voltage gain, stability, distortion, bandwidth and input & output impedance

Oscillators

Classification– Barkhausan criteria–RC Oscillators: RC phase shift oscillator, Wein bridge oscillator - expression for frequency of oscillation (no derivation) – LC oscillators. Hartley oscillator, Colpitts oscillator, applications of RC and LC oscillators – crystal oscillator - applications

UNIT – IV:

Multivibrators

Types of multivibrators – Bistable Multivibrator using transistor- triggering methods- monostable multivibrator using transistor - working and wave form – expression for pulse width (no derivations), factors affecting pulse width - triggering methods - astable multivibrator using transistor - working and wave form – expression for frequency – simple numeric problems on astable and monostable multivibrators .

Schmitt trigger circuit using transistor- explanation with waveform – U.T.P, L.T.P, and hystersis – applications of multivibrators and Schmitt trigger

Time base circuits- need for time base circuits –simple method of generation of saw tooth waveform – Boot strap circuit

UJT Relaxation oscillator-principle- period of oscillation -applications

UNIT – V :

Wave Shaping circuits

Types of wave forms – ideal pulse wave form – rise time, fall time, and tilt - linear and non linear wave shaping circuits- transient phenomena in RC and RL circuits – RC differentiating and integrating circuits

Clipping circuits – diode clippers – series, shunt, biased and combinational clipper circuits - Zener diode clipper circuits – clamping circuits - diode clampers – positive, negative, and biased type – explain with sine and square wave input

REFERENCE BOOKS

1. Electronics devices and circuit theory - Robert Boyelsted, Louis Nashelsky
2. Electronics Devices and Circuits - Bogart
3. Introduction to Electronic Circuit Design- Spencer and Ghausi
4. Electronics devices and circuit theory - Floyd
5. Electronics and circuits - David A Bell
6. Solid state pulse circuits - David A Bell
7. Amplifiers with discrete components - R.S Moni.
8. Basic Electronics and Linear circuits - Kulshreshtha, D.C. Bhargava, S.C . Guptha
9. Electronic Principles - Malvino.

SUBJECT TITLE : DIGITAL ELECTRONICS
SUBJECT CODE : EL 303 / EC 303 / EP 303 /EI 303 / IT 303/ BM 303
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16 (Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Number system, Boolean algebra		15
		Test - I	1
II	Logic families and Combinational logic circuits		15
		Test - II	1
III	Sequential logic circuits		15
		Test - III	1
IV	Memories		15
		Test - IV	1
V	Programmable Logic Devices		15
		Test - V	1
		Total	80 +16

OBJECTIVES

UNIT – I

1.1.0 Understand number systems

1.1.1 State and explain the need for a best suited number system based on which the modern digital technology is built up.
1.1.2 Give the features of a decimal number system with examples and compare binary number system.
1.1.3 Explain the conversion from decimal to binary by actual division and tabulation with suitable example.
1.1.4 Discuss decimal and binary fractions and conversion of decimal fraction into binary with suitable examples.
1.1.5 Give the features of octal number system with suitable examples for conversion of decimal into octal and octal into binary.
1.1.6 Discuss octal fractions and conversion of decimal fraction into octal.
1.1.7 Give the features of Hexadecimal number system with suitable examples for conversion of decimal into Hexadecimal and Hexadecimal into binary.
1.1.8 Discuss Hexadecimal fraction and conversion of Hexadecimal into direct binary and back.
1.1.9 State the need for binary codes and list different types of binary codes.
1.1.10 Discuss the BCD codes, excess-3 code, Gray code and binary weighted codes with suitable examples.
1.1.11 Discuss ASCII code and its application with suitable examples.
1.1.12 Give the idea of EBCDIC and error detecting and correcting codes.
1.1.13 With suitable examples give the idea of binary arithmetic such as addition, subtraction, multiplication and division.

1.2.0 Understand Boolean algebra and logic simplifications

1.2.1 State the importance of logic theory and its applications.
1.2.2 Give the circuit diagram and explain the switching functions of AND, OR, XOR, and give their logic symbols
1.2.3 Draw symbols for NAND, NOR, NOT operation and discuss the advantages of using universal logic gates.
1.2.4 Know about the sum of product (SOP) expression, product of sum expression (POS.) minters and max terms.
1.2.5 Give an idea of switching circuits and tables
1.2.6 State the need for simplifying Boolean expression
1.2.7 Discuss the straight simplification with the help of logic rules and truth tables.
1.2.8 Give the basic principle of Karnaugh map..
1.2.9 Discuss two variables, three variables and four variables K-maps with the help of suitable examples and its reductions.
1.2.10 Give an idea of Don't care terms.
1.2.11 Discuss reduction of Boolean expressions using K-map.
1.2.12 Give the idea of simplification in both SOP and POS form with the help of example
1.2.13 List the advantages and disadvantages of Karnaugh map.

UNIT – II

2.1.0 Understand logic families

2.1.1 Classify digital logic gates on the basis of number of components incorporated with examples.
2.1.2 Give an idea of existing logic families.
2.1.3 Distinguish between positive and negative logic.
2.1.4 Describe how to represent logic gates by switches.
2.1.5 Give the detailed circuit description of transistor transfer logic and TTL inverter.
2.1.6 Identify the terms V_{IL}, V_{IH}, V_{OL}, V_{OH}, Noise margin, noise immunity propagation delay.
2.1.7 Give an idea of open collector gate and state logic, high threshold logic.
2.1.8 Explain the working principle of emitter coupled logic.
2.1.9 Describe in detail, the CMOS logic family.
2.1.10 Give the features of CMOS logic gates.
2.1.11 Identify the term current sourcing and current sinking, fan-in, fan-out, power dissipation, speed power product.

2.2.0 Understand combinational logic circuits

2.2.1 Give the idea of combinational logic circuits.
2.2.2 Design half adder, full adder, half subtractor, and full subtractor.
2.2.3 Design BCD adders.
2.2.4 Study the applications of adder IC 7483 for implementing binary adders and subtractors and BCD adders.
2.2.5 Study the importance of Look-ahead carry adder with examples.
2.2.6 Explain the various methods of binary multiplication and realize the logic diagram of a 2-bit multiplier.
2.2.7 Give the basic idea of a multiplier.
2.2.8 Discuss the operation of Multiplexers and demultiplexers.
2.2.9 List and explain the various applications of multiplexers and demultiplexers.
2.2.10 Understand operation of encoders and decoders.
2.2.11 Explain various decoders such as BCD to decimal, binary to excess 3 code, binary to gray code and BCD to 7 segment with suitable examples.
2.2.12 Give an idea of digital comparators.

UNIT – III

3.1.0 Understand sequential logic circuits

- 3.1.1 Give the idea of sequential logic circuits
- 3.1.2 Distinguish between synchronous and asynchronous sequential logic circuits
- 3.1.3 Construct SR flip flop using NAND gates
- 3.1.4 Explain JK flip flop with the help of truth table and timing diagram.
- 3.1.5 Study the need for preset and clear inputs
- 3.1.6 Analyze the race around condition
- 3.1.7 Give the idea with diagram and truth table of master slave JK flip flop
- 3.1.8 Explain D flip flop, T flip flop with the help of diagram and truth table
- 3.1.9 Discuss the working of shift registers serial in serial out parallel in parallel out parallel in serial out and serial in parallel out
- 3.1.10 Differentiate between right shift and left shift registers
- 3.1.11 Give the application of shift registers
- 3.1.12 Give the working of ring counter and its applications
- 3.1.13 Explain Johnson counter and its applications
- 3.1.14 Give an introduction to Binary counters
- 3.1.15 Differentiate between synchronous and asynchronous counters
- 3.1.16 Give the idea of asynchronous ripple counter with the help of flip flop states of the outputs and wave forms
- 3.1.17 Design and implement modulo- N asynchronous counter
- 3.1.18 Study the design procedure of modulo N synchronous counter and its realization.

UNIT – IV

4.1.0 Understand different types memories

- 4.1.1 Explain semi conductor memory
- 4.1.2 List various types of memory
- 4.1.3 Distinguish between ROM and RAM
- 4.1.4 Explain basic principle of working of ROM
- 4.1.5 State different types of ROM
- 4.1.6 List different ROM and RAM ICs
- 4.1.7 Explain the working of dynamic memory
- 4.1.8 Compare Static RAM, Dynamic RAM
- 4.1.9 State the difference between Flash ROM and NVRAM
- 4.1.10 Differentiate SD RAM and EDO RAM
- 4.1.11 Specify the speed of DIMM used in computer system
- 4.1.12 Define a secondary memory
- 4.1.13 Optical memory
- 4.1.14 Magnetic bubble memory

UNIT – V

5.1.0 Understand programmable logic devices

- 5.1.1 Give the principles of PLA with the help of a diagram
- 5.1.2 With the help of the appropriate diagram explain PLA arrays and a PLA structure with five input variables and four R functions
- 5.1.3 Give the advantages and disadvantages of PLA
- 5.1.4 Explain with the help of suitable diagram, the working of Programmable Array Logic (PAL)
- 5.1.5 Give the structure of FPLA circuit and describe its working
- 5.1.6 Understand the Basic Principle of FPLD, CPLD & FPGA
- 5.1.7 Understand the architecture of FPGA

CONTENT DETAILS

UNIT – I

Number System and Boolean algebra

Number systems - decimal, binary, octal, Hex number system – conversion from one system to another system – Fractions in all the number systems and its conversions - use of binary codes, different types of binary codes, binary coded decimal, self complementing codes, ASCII Code, EBCDIC error detecting and correcting codes, binary addition, subtraction, multiplication and division. 1'st complement and 2's complement method of subtraction

Introduction to logic theory, switching functions AND, OR, NOT, NOR, NAND, EX-OR operations. The sum of products (SOP) expression, product of sum (POS) expression, switching circuits, truth tables, Boolean theorems and postulates - simplifications of Boolean expressions - simplifications using postulates and Karnaugh map.

UNIT – II

Logic families

SSI, MSI, LSI, VLSI and ULSI, existing logic families, positive and negative logic - Transistor Transistor Logic- standard TTL and Schottky TTL, TTL inverter, Emitter Coupled Logic, CMOS logic family, features of CMOS logic gates, V_{IL}, V_H, V_{OL}, V_{OH}, noise margin, noise immunity, propagation delay, current sourcing and current sinking, fan in, fan out, power dissipation, speed power product, Comparison of advantages and disadvantages of various logic families

Combinational Logic Circuits

Introduction – Design half adder, full adder, half subtractor, full subtractor, BCD adder- implementation using gates and Adder IC 7483.

Look ahead Carry adder, multiplexer/data selector - basic 2 to 1MUX, 4 to 1 MUX, applications of the MUX, demultiplexer, 1 to 2 demultiplexer, 1 to 4 demultiplexer, – multiplexer and demultiplexer Ics-

Encoders and decoders, encoder and decoder Ics.

BCD to decimal, BCD to 7 segment decoder – encoder – digital comparators

UNIT – III

Sequential Logic Circuits

Introduction - SR flip flop, SR latch - SR flip-flop using NAND gates, JK flip- flop with preset and clear inputs, D flip-flop, T flip-flop, Master Slave flip-flop – Flip flop ICs

Binary counters-design and implementation of asynchronous modulus N counter, up down counters-examples

Design and implementation of mod N synchronous counters, and random sequence generators-examples.

Study of counter ICs, implementation of mod N counters.

Shift registers, serial in serial out, parallel in parallel out, serial in parallel out, parallel in serial out shift registers, left shift and right shift registers applications of shift registers, ring counter, Johnson counter and applications.

UNIT – IV

Memories

Semi conductor memory- Non-volatile memories – ROM – PROM – EPROM – EEROM – Flash ROM Volatile memories– RAM – static RAM - dynamic RAM – EDO RAM - SD RAM – DD RAM – SIM module – DIM module – related ICs -– specifications of memory like speed, access time, capacity, type – timing diagram for RAM. Optical memory – Magnetic bubble memory.

UNIT – V

Programmable Logic Devices

Introduction – PLD architecture – PLA (FPLA) operation – PLA design and programming – Different PLAs and their specifications

Combinational circuit using PAL – PLD programming cycle - designing 74138 using PAL – working with PALASM assembler software – Creating JEDEC file – Programming PAL using PAL Programmer / Universal Programmer – Testing the programmed PAL for its design – traffic light controller using PAL – Basics of FPGA, FPLD, CPLD – Architecture of FPGA

REFERENCE BOOKS

1. Digital system principles and applications - Ronald J. Tocci
2. Digital Integrated Circuits - Bogart
3. Digital Logic Applications and Design - John M Yarbrough
4. Digital fundamentals - Floyd & Jain
5. Fundamentals of digital circuits - A. Anand Kumar
6. Digital computer fundamentals - Thomas. C. Bartee
7. Digital electronics- An introduction to theory and practice - Gothman
8. Digital design - Mano
8. Digital Electronics - Green

SUBJECT TITLE : PROGRAMMING IN C++
SUBJECT CODE : EL 304/EC 304/EI 304
PERIODS/WEEK : 6
PERIODS/SEMESTER: 80+16 (Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Object Oriented Concepts		15
		Test I	1
II	Control structures		15
		Test II	1
III	Overloading And Inheritance		15
		Test III	1
IV	Pointers and virtual functions		15
		Test -IV	1
V	Files		15
		Test V	1
		Total	80 +16

OBJECTIVES

UNIT – I

1.1.0. **Understand the object oriented programming**

- 1.1.1 Know the typical structure of a procedural language
- 1.1.2 List the limitation of procedural language
- 1.1.3 Know object oriented approach
- 1.1.4 Know the organization of data and functions on OOP
- 1.1.5 now objects, classes, inheritance, Polymorphism, dynamic binding, overloading, data abstraction and encapsulation
- 1.1.6 Know the benefits of OOP
- 1.1.7 List the applications of OOP

1.2.0 Understand the C + + programming basics

- 1.2.1 Know the structure of C + + program
- 1.2.2 State the use of cin and cout
- 1.2.3 List keywords of C + + other than C
- 1.2.4 Define a class
- 1.2.5 Know access specifiers private and public
- 1.2.6 Know the dynamic initialization of variables
- 1.2.7 Understand the reference variables
- 1.2.8 List the operators in C++
- 1.2.9 Know the use of scope resolution operation

UNIT – II

2.1.0 Control structures

- 2.1.1 Know control structures
- 2.1.2 Compare classes and structures
- 2.1.3 Know constructors and destructors
- 2.1.4 Understand parameterized and dynamic constructors
- 2.1.5 Understand overloaded constructors
- 2.1.6 Member functions defined outside the class
- 2.1.7 Memory allocation for objects and classes

2.2.0 Functions and arrays

2.2.1 Know the declarations and advantages of inline functions

2..2.2 Know the method of assigning objects

- Passing objects to functions
- Returning objects from functions

2.2.3 Know the declarations and accessing of array of objects

2.2.4 Know string as class member

2.2.5 Explain friend functions and its necessity

UNIT – III

Overloading and Inheritance

3.1.0 Understand overloading

3.1.1 Understand the concept of overloading

3.1.2 Know functions overloading

3.1.3 Know operator keyword

3.1.4 Understand how to overload unary operators

3.1.5 Write simple programs

3.1.6 Understand how to overload binary operators

3.1.7 Know how to overload comparison operators

3.1.8 How to overload assignment operators

3.1.9 Understand conversion between objects and basic types

3.1.10 Understand conversion between basic types and objects

3.2.0 Understand inheritance

Stress the necessity for inheritance

3.2.1 Know the relation between base class and derived class

3.2.2 Give the syntax for defining a derived class

3.2.3 Know protected access specifier

3.2.4 Understand class hierarchies

3.2.5 Know public protected and private inheritance

3.2.6 Explain multilevel inheritance

3.2.7 Explain multiple inheritance

3.2.8 Know the construction in multiple inheritance

3.2.9 Know classes within class

UNIT – IV

Pointers and Virtual functions

4.1.0 Understand pointer manipulation

4.1.1 Know the deceleration, accessing of pointers to objects

4.1.2 Illustrate the above with small programs

4.1.3 Know about memory management

4.1.4 Use of New and delete

4.1.5 Know about this pointer

4.1.6 Know the usage of pointer to derived classes

4..1.7 Define a virtual function and stress the necessity of virtual functions

UNIT – V

5.1.0 File manipulation

5.1.1 Know stream

5.1.2 Stream hierarchies

5.1.3 Know about file stream

5.1.4 Know the modes for opening file

5.1.5 Know some file functions like write(), read( ), get( ), put( ), tell( ), seekp( ), tellg( ), seek( ).

5.1.6 Know the modes for opening file

5.1.7 Write simple programs

5.1.8 Know how to create template
5.1.9 Understand class template and functions template
5.1.10 Know how to handle exceptions
- Building an exception
- Catching every exceptions

CONTENT DETAILS

UNIT – I

Limitations of procedure oriented programming – characteristics of object – class – inheritance – polymorphism – overloading encapsulation – dynamic binding – access specifiers structure of C+ + program – cin – cout. – dynamic initialization of variables – operators – reference variables

UNIT – II

Control structures – classes and structures – constructors and destructors – memory allocation of objects and classes – inline functions – objects as arguments – returning objects – Array of objects string as class member – friend functions

UNIT – III

Function overloading – overload unary and binary operators – overload comparison and assignment operators – conversion between objects and basic types and basic types to objects. Inheritance – base class – derived class – protected access specifiers – class hierarchies – public, private and protected inheritance – multilevel inheritance – multiple inheritances – constructors in multiple inheritances – classes within class

UNIT – IV

Pointers to objects – dynamic memory management new and delete operators- this pointer – pointers to derived classes – virtual functions

UNIT - V

Stream – steam hierarchies – file streams – modes of opening file – file functions – class template – functions template – exception handling

REFERENCE BOOKS

1. Object oriented programming in C + + - Balaguruswami
2. Object oriented programming in MSC++ - Robert Lafore
3. "C++ -The Complete reference" - Herbert Schildt (Tata McGraw Hill)

SUBJECT TITLE : ELECTRONICS CIRCUITS LAB
SUBJECT CODE : EL305/EC305 /EP305/EI305/IT305 /BM305
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

LIST OF EXPERIMENTS

At least 10 experiments of the following type to be completed

1. Design and construct
   (i) RC differentiator circuit
   (ii) RC integrator circuit
   and study its pulse response
2. Design, construct and test shunt diode clipper circuits
   (i) Positive clipper
   (ii) Negative clipper
   (iii) Biased clipper
3. Zener diode clipper circuit
4. Design, construct and test various diode clamping circuits
   (i) Positive clamper
   (ii) Negative clamper
   (iii) Biased clamper
5. Design single stage RC coupled CE amplifier for a given gain
   (i) Observe the phase difference between input and output wave forms
   (ii) Measure mid band gain
   (iii) Plot its frequency response and determine the band width
6. Design an emitter follower circuit and measure the gain.
7. Design a RC phase shift oscillator for a given frequency of oscillation.
8. Design, construct and test a transistor astable multivibrator for
   (i) a specified frequency
   (ii) a specified duty cycle
9. Design a simple sweep circuit and observe its output wave form for a square wave input.
10. Assemble a boot strap sweep generator circuit & plot its output wave form for square wave input.
11. Design a BJT monostable multivibrator and plot the wave forms at base and collector of the transistors.
12. Design a Schmitt trigger circuit using BJT for specified UTP and LTP and observe the output with a sine wave input. Plot its transfer characteristics.
13. Design a UJT relaxation oscillator for a specified frequency of oscillation.

SUBJECT TITLE : DIGITAL ELECTRONICS LAB
SUBJECT CODE : EL 306/EC 306/EP 306/EI 306/IT 306/BM 306
PERIODS/WEEK : 3
PEIODS/SEMESRER : 48

LIST OF EXPERIMENTS

At least 15 experiments of the following type to be completed.

1. Familiarization of
   (i) TTL and CMOS Logic IC's by Verification of Truth Tables
   (ii) Universal gates for implementing other logic functions
2. Design a binary to gray and gray to binary converter.
3. Design, setup and verify the
   (i) Half and full adder circuits
   (ii) Half and full subtractor circuits
4. Design of combinational logic circuits from word statements.
5. Four bit adder and subtractor using ICs 7483
6. Design BCD adder using IC 7483.
7. Design BCD to Seven Segment Decoder using 7447 and Display
8. Design 4 to 1 MUX using NAND Gates
9. Study the multiplexer IC 74151
10. Implement combinational logic using multiplexer ICs
11. Verify the truth table RS, D, JK, T Flip flops using NAND gate
12. Design and construct asynchronous mod- N counter using flip-flops.
13. Design and construct synchronous mod - N counters flip-flops.
14. Design and construct random sequence generators.
15. Study of counter ICs.
16. Design and construct astable and monostable multivibrators using CMOS NOR gates
17. Design and construct 4 bit shift register using flip flops.
18. Study the operation of shift register ICs.
19. Construct Johnson counter and Ring counter.

SUBJECT TITLE : COMPUTER LAB (C++)
SUBJECT CODE : EL 307/EC 307/EI 307
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

Programming in C++

At least 15 experiments similar to the following to be completed

1. Write a Program to find the simple and compound interest.
2. Write a Program to convert Temperature in Celsius to Fahrenheit
3. Write a Program to find the sum of first n odd numbers using iterations
4. Write a Program to find the factorial of n
5. Write a Program to find the value of Sin and Cos functions using Maclaurin's series. Implement a custom function for computing the factorial value of n.
6. Write a Program to sort the given n numbers by Descending order and display the largest among them.
7. Write a program to sort the given n numbers by ascending order and display the smallest among them.
8. Create a class named Cstring with a private member mString and member functions such as reverse, substring, getstring, setstring and implement a constructor with and without parameter to initialize mString
9. Create a class named Cstack with required member and member functions, providing facility for push and pop operations.
10. Inherit the class C stack and implement a member function for returning the number of elements in the stack.
11. Create a class name C Matrix with appropriate members and member functions to compute determinant value, transpose and inverse. Transpose and inverse method should return C Matrix object. Implement Exception handler to handle Division by Zero.
12. Create a class named C Complex with appropriate members and member functions to perform Complex number operations (Rect and Polar). Perform operator overloading using arithmetic operators. Use multiple constructors for Rectangle and Polar form.
13. Write a Program to Create file containing 20 floating-point data recorded by observations of 5 Analog channels, read the file and calculate the Mean value and Standard deviation value of each channel. Include error-handling methods.
14. Write a Program to get diode parameters and store in a file. Provide facility for displaying the diode parameters when a device name is given. (I_F, I_R,V_D, V_R)
15. Write a Program to get marks of 5 of n Students store it in a file. Read data from file and find the total marks and display results as highest total first. Create a class named "Student" with required members and member functions. Use an object array as required. Include error-handling methods.

Information Search Analysis and Presentation Skills Development

Periods/Week : 3
Periods/Semester : 48

Introduction

The average Engineer walking out of education institution is surprised by the amount of non-technical work he or she faces in the real world (by the amount of personal contact, the number of phone calls, meetings, reports and presentation etc). Further many cannot find appropriate jobs, because of the lack of these skills. The problem aggravates in the case of diploma pass outs who are supposed to have interactions with different cadres in an industrial environment.

The time allotted for ISAP skills development are to be utilized to provide a slice of practical training in a form that may be used in a class room setting. This is not to be taught in a conventional manner. Here the emphasis will shift from teacher oriented methods to students oriented methods. While the information – skills acquired by all students will be same, the actual methods & techniques used by each student will vary according to his or her initiative, enthusiasm, effort taken etc.

These hours are to be taken as a supplement to the theory classes. Students will acquire ISAP skills based on the fundamental knowledge he/she has acquired from the theory sessions.

Objectives

Educational researchers have found that 17 year olds, in a single academic year, learn about 200 to 300 new words, in a university environment. However, during the same period they acquire around 4000 words in their informal home and play environment. That is learning is higher in an informal environment than in an academic one designed specifically for that purpose. The primary objective here is to simulate the informal learning environment.

Student is provided an ideal opportunity to acquire skills in learning to learn which is essential for the professional growth. This will inculcate information skills in the students. These skills will be a life long asset to him or her in fact they grow with age.

Oral and written communication skills are of at most importance to any engineer for a positive professional growth. Emphasis is given for this aspect also.

Activities

A. PART ONE.

Write articles on various technical areas and basic research papers. Students can identify simple projects individually or groups of not more than 4 any technical area. Emphasis here is on the acquisition of ISAP skills.

Source of Information

a. People
b. Print media – Magazines, News papers, Journals, Vendors catalogues etc.
c. Electronic information – CD ROM, Usage of internet – User news groups, WWW.

B. PART TWO

Transparency based Presentation

1. Preparation
   1.1 Audience Analysis.
   1.2 Information Gathering.
   1.3 Transparency design using Power Point/Presentation software.
   1.4 Production of transparency for OHP.
2. Delivery

Sample Projects

1. Prepare and deliver transparency based presentations on the topics,
    a. Technicians are not properly appreciated in the society.
    b. Engineers do not know about non technical topics.
    c. Lay people do not know enough about technical topics.
    d. India's products are not competitive in international markets as its quality is not good.
    e. India's software professionals are paid too much.
2. Prepare transparency based presentation for the opposite side of the issue you choose in project 1.
3. Prepare and deliver a brief autobiographical presentation.
4. Prepare and deliver a sales promotional presentation (Example – Washing machine, Computer , Air conditioner, Microwave oven or other items related to your branch of study)
5. Prepare and deliver a brief sales promotional presentation on a service (Example- Insurance Policy, Credit cards etc)
6. Prepare and deliver a technical presentation before lay audience (Example – Use of computers to common man, energy saving measures in a domestic environment or other topics related to specific branches of study)

C. PART THREE – COMMUNICATION SKILLS

Written Communication

Preparation of

a. Reports
    - Formal reports
    - Progress reports
    - Feasibility Reports
    - Laboratory reports.
b. Technical Proposals.
c. Email.
d. User manuals
e. Job Hunting material
    - Resumes
    - Letters for job hunting
f. Business letters
g. Memo, Notices, Agenda and minutes

Oral Communication

Oral communication activities like,

a. Dyadic communication (Interaction between two persons, example Telephone conversation)
b. Meetings.
c. Job interview.
d. Group Discussions.
e. Debates.
f. Case studies.

EVALUATION

There is no separate evaluation for ISAP skills. But the teachers will consider this for the award of internal assessment marks related to the theory subjects in that semester. The performance of the student will be taken equivalent to an Assignment and an Examination while awarding the internal assessment marks.

SUBJECTS OF STUDY AND SCHEME OF EVALUATION

SEMESTER IV

Branch :Electronics

Code	Subject	Periods Per Week			Evaluation (Marks)			
		Theory	Practical /Tutorial	Total	Theory	Practical	Internal	Total
EL401/EC401/ EP401/EI401/BM401	Linear Integrated Circuits	5		5	75		25	100
EL402/EC 402	Communication Systems	5	1	6	75		25	100
EL403/EC403/EP403/ BM403	Electronics Instruments & Measurements	5	1	6	75		25	100
EL404/EC404/ EP404/EI404/BM404	Microcontroller and applications	5	1	6	75		25	100
EL405	Communication Lab		3	3		75	25	100
EL406/EC406/EP406/ EI406/BM406	LIC Lab		3	3		75	25	100
EL407/EC407/EP407/ EI407/BM407	Micro controller Lab		3	3		75	25	100
	ISAP skills Development		3	3				
	TOTAL	20	15	35	300	225	175	700

SUBJECT TITLE : LINEAR INTEGRATED CIRCUITS
SUBJECT CODE : EL 401/EC401/ EP401 /EI401/ BM401
PERIODS/WEEK : 5
PERIODS/SEMESTER: 80

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Introduction to operational amplifiers		12
		Test - I	1
II	Applications of Op-amp		15
		Test - II	1
III	Active filters and wave form generators		15
		Test - III	1
IV	PLL and Timers		19
		Test - IV	1
V	Voltage Regulators and Power Supplies	14	
		Test - V	1
		Total	80

OBJECTIVES

UNIT – I

1.1.0 **Understand working of op-amp**

- 1.1.1 Draw and explain the block diagram of general purpose opamp
- 1.1.2 Define electrical characteristics of op-amp
- 1.1.3 State the characteristics of ideal op-amp
- 1.1.4 Explain the op-amp circuits –inverting –non inverting, difference, summing amplifiers, integrator, differentiator

UNIT – II

2.1.0 Understand the applications of op-amp

- 2.1.1 Use of op-amp for zero crossing detector, level detector, window detector and Schmitt trigger
- 2.1.2 Understand the working principle of instrumentation amplifier and log amplifier
- 2.1.3 Comprehend op-amp based A/D and D/A converter.
- 2.1.4 State the working principle of half wave and full wave precision rectifiers

UNIT – III

3.1.0 Active filters and waveform generators

- 3.1.1 Explain Butterworth filter (I and II order)
- 3.1.2 Explain Chebyshev filter (I and II order)
- 3.1.3 Explain circuits for sine, square and triangular waveform generators

UNIT – IV

4.1.0 Understand the operation of PLL and timer IC

- 4.1.1 Draw the block diagram of PLL
- 4.1.2 Define Lock range and capture range
- 4.1.3 Explain frequency multiplier using PLL
- 4.1.4 Explain FM demodulator using PLL
- 4.1.5 Explain the operation of VCO LM 566
- 4.1.6 Discuss the block diagram of Timer IC 555.

4.1.7 Explain different configuration of IC 555 operation, Astable, monostable (Symmetrical and asymmetrical),

UNIT – V

5.1.0 **Understand the operation of voltage regulator IC s-*-**

5.1.1 Draw and explain the internal schematic of IC 723
5.1.2 Explain the working of overload and fold back protection in IC 723
5.1.3 Study the operation of 3 terminal voltage regulators using ICs (78XX and 79XX series)
5.1.4 Understand Adjustable voltage regulators using LM 317, LM 340
5.1.6 Understand Simple Dual Power Supply using LM 340, LM 320
5.1.7 Discuss Tracking Dual Regulator using LM 317, LM 337
5.1.8 Understand the basic idea of Single Chip Power Supply

CONTENT DETAILS

UNIT – I

Introduction to Operational amplifies

Block diagram of general purpose op-amp–detailed explanation of each block–Differential amplifier– Op-amp symbol- package type- pin identifications –parameters of op-amp – concept of virtual ground –Input offset voltage, input offset current, input bias current, output offset voltage, CMRR, slew rate etc –Characteristics of ideal and actual op-amp –Op-amp circuits- inverting amplifier, non-inverting amplifier, voltage follower, comparator, difference amplifier, summing amplifier, integrators, differentiators.

UNIT – II

Application of op-amps

Zero crossing detector, positive and negative voltage level detector – Schmitt trigger, window detector, logarithmic amplifier, antilog amplifier, Instrumentation amplifier .

DAC and ADC: R-2R ladder type D to A converter, Counter type, dual slope integration and successive approximation type ADCs, Flash ADC- Half wave and full wave precision Rectifiers – Advantages.

UNIT – III

Active filters and waveform generators

Active filters –LPF, HPF, BPF and Universal filter–Butterworth and Chebyshev filter for I st and II nd order –Transfer function and its interpretation(no derivation), RC phase shift and Wien bridge oscillators, Astable and Monostable Multivibrators, Triangular wave generator .

UNIT – IV

PLL and Timers

PLL building blocks –Block diagram - principle of operation, lock range, capture range- Applications of PLL , VCO -LM 566

Timer- Functional block diagram of IC 555- its working principle – Monostable and Astable multivibrators using IC 555 – circuit - diagram and wave forms

UNIT – V

Voltage Regulators and Power Supplies

Voltage regulator IC 723 – Overload and fold back protection - 3 terminal voltage regulators-positve regulators (78XX series) and negative regulators (79XX series)-Adjustable voltage regulators LM317,LM 340.

Simple Dual Power Supply using LM 340, LM 320 – Tracking Dual Regulator using LM 317, LM 337 – Basic idea of Single Chip Power Supply.

REFERENCE BOOKS

1. Applications and Design with Analog Integrated Circuits – J Michael Jacob
2. Operational Amplifiers and Linear Integrated Circuits – Driscoll and Coughlin
3. Op- Amp and Linear Integrated ICs – Gaykwad
4. Introduction to IC technology and Linear Integrated Circuits – K.R.Botkar
5. Design with Operational amplifiers and analog integrated circuits – Sergio Franco

SUBJECT TITLE : COMMUNICATION SYSTEMS
SUBJECT CODE : EL 402/EC402
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80 +16(Tutorial)

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	Electromagnetic radiation and wave propagation	15
	Test	1
II	Modulation	15
	Test	1
III	Radio Transmitters	15
	Test	1
IV	Demodulation and Radio Receivers	15
	Test	1
V	Antenna	15
	Test	1
	Total	80+16

OBJECTIVES

UNIT – I

1.1.0 Understand Electro Magnetic Radiation and Wave Propagation

1.1.1 Define electric and magnetic fields.
1.1.2 Define EM wave, explain physical orientation with the help of a diagram.
1.1.3 Define a homogeneous medium.
1.1.4 Illustrate Electro magnetic waves in homogeneous medium
1.1.5 State the concept o f horizontal and vertical polarization

1.2.0 Understand the concept of Wave Propagation

1.2.1 List the types of wave propagation
1.2.2 Explain ground wave propagation
1.2.3 State the factors affecting the field strength
1.2.4 Describe the phenomenon the deflection of wave by the surface of earth
1.2.5 Explain the space wave propagation
1.2.6 Describe the factors affecting the propagation – effect of curvature of earth
1.2.7 Explain layers of Ionosphere, its significance in communication
1.2.8 Atmospheric effect – refraction, diffraction and reflection
1.2.9 Explain the terms ionospheric propagation
1.2.10 Define skip distance – max usable frequency (MUF) critical frequency virtual height, fading and diversity

UNIT – II

2.1.0 Understand the use of Modulation in Communications

2.1.1 State the need for modulation
2.1.2 Define Amplitude modulation, frequency modulation and phase modulation

2.2.0 Understand AM modulation

2.2.1 Derive an expression for amplitude modulated wave.
2.2.2 Define modulation index of AM
2.2.3 Draw and describe frequency spectrum of AM
2.2.4 Collector, emitter and base AM modulator circuits.
2.2.5 Low level modulator, block diagram, typical applications.
2.2.6 High level modulators, block diagram, typical applications.

2.2.7 Suppressed carrier systems, advantages and disadvantages over full carrier system
2.2.8 Vestigial side band system, band spectrum.
2.2.9 Single side band system, advantages and limitations.
2.2.10 Balanced modulator, circuit diagram, and explain its circuit.
2.2.11 Derive the expression for FM wave, Draw the wave forms.
2.2.12 Frequency spectrum, band width, modulation index.
2.2.13 Define PM, compare with FM, expression of PM

UNIT – III

3.1.0 Understand the working of Radio Transmitters and its uses

3.1.1 Draw the block diagram of AM transmitter and explain the functions of each block giving emphasis to buffer amplifier, harmonic generator, exciter, modulated power amplifier
3.1.2 Draw the block diagram of FM transmitter (direct FM and indirect FM)) and explain the functions of each block , pre-emphasis and de-emphasis
3.1.3 AFC
3.1.4 Digital Transmission –PAM, PWM, PPM and PCM – Applications and advantages
3.1.5 Digital carrier modulation schemes – BPSK, QPSK, Offset PSK, BFSK, MSK-comparison.
3.1.6 Understand Noise in Communication system and explain different types of noises.
3.1.7 Define signal to noise ratio.
3.1.8 Define noise figure.
3.1.9 State the different measures to improve signal to noise ration.

UNIT – IV

4.1.0 Define demodulation
4.2.0 Super heterodyne receiver concept, block diagram, mixer.
4.3.0 AM demodulation circuits- Diode detector.
4.4.0 AGC, Need for AGC, types of AGC, Simple AGC circuit for AM receiver.

4.4.1 State the factors affecting the selection of IF
4.4.2 Define sensitivity, selectivity of Radio receivers
4.4.3 Explain Tracking
4.4.4 Explain the RF and IF alignment procedure of a radio receiver, image frequency
4.4.5 AGC - simple, delayed and forward.
4.4.6 Explain with block diagram the operation of FM radio receiver
4.4.7 Understand the need of limiter in FM receiver
4.4.8 Compare an AM & FM receiver

UNIT – V

5.1.0 Antennas

5.1.1 Explain the physical concept of radiation of electromagnetic energy
5.1.2 Understand radiation patterns
5.1.3 Define point source, gain, power gain, directivity aperture, effective area, radiation pattern,
5.1.4 Beam width, radiation angle, radiation resistance
5.1.5 Explain with figure the different types of antenna – Half wave dipole, folded dipole –
5.1.6 Marconi antenna, Rhombic antenna, turnstile antenna.
5.1.7 Antenna arrays - End fire array and Broad side array, Yagi Uda antenna
5.1.8 State the application of each type

CONTENT DETAILS

UNIT – I

Electromagnetic Radiation and Wave Propagation

Electric and magnetic fields – electromagnetic wave - electromagnetic waves in Homogeneous medium– horizontal and vertical polarization

Types of wave propagation – ground wave propagation – factors affecting the filed strength, deflection of waves by the surface of earth - Space wave propagation– factors affecting the propagation, effect of the curvature of the earth - atmospheric effect – refraction diffraction and reflection- fading - diversity - Ionosphere and its layers – layer characteristics – refraction and reflection of sky wave by ionosphere, skip distance, M.U.F – critical frequency – virtual height.

UNIT - II:

Modulation

Need for modulation: - basic principle of different types of modulation AM, FM, & PM. Definition of AM – expression for AM voltage wave form- modulation index - significance of side bands-frequency spectrum - Principle of various types of modulators – collector, emitter and base modulation - low level and high-level modulations.

Suppressed carrier system – Vestigial side band system – single side band system-balanced modulator Definition of F.M - expression of F.M waveform- modulation index of FM signal-frequency spectrum, Narrow band FM and wide band FM, Definition of phase modulation – expression Waveforms of AM FM and PM, comparison

UNIT - III:

Radio Transmitters

Block diagram of AM transmitter- function of each, block – oscillation – frequency stability of buffer amplifier – harmonic generators-Exciters- modulated power amplifier. Types of FM modulations, Block diagram of a FM transmitter- Direct FM generation-Cosby and PLL, Indirect FM generation Armstrong method -block diagram, AFC. Digital Transmission — PAM, PCM, BPSK, QPSK, Offset PSK, BFSK, MSK

Noise in communication systems, different types of noise, signal to noise ratio, methods to improve signal to nose ratio

UNIT –IV

Demodulation and Radio Receivers

Need for demodulation. Principles of superhetrodyne receiver- Block diagram of AM receiver AM demodulator circuits –simple A.G.C, Delayed AGC and forward AGC-choice of IF in super heterodyne receiver –tracking - Image frequency, Characteristics of radio receiver- sensitivity, selectivity, signal to noise ratio. Block diagram of FM receiver – limiter - discriminator – De-emphasis– Comparison of FM and AM receiver

UNIT - V:

Antennas

Physical concepts of radiation of electromagnetic energy and radiation pattern

Definition of various terms used with antenna like point source, gain, power gain, directivity, aperture, effective area, radiation pattern ,beam width, radiation angle, radiation resistance.

Brief description of characteristics and applications of the following antennas: Half wave dipole, folded dipole, Marconi antenna, rhombic antenna, parabolic antenna,

Antenna arrays – End fire array and broadside antenna (No analysis). Yagi-Uda antenna

REFERENCE BOOKS

1. Electronic Communications : Robert J. Schoenbeck
2. Electronic Communication Systems : Blake-Thomson Delmar
3. Electronic Communication Systems : Kennedy-TMH
4. Electronic Communication Systems : Wayne Tomasi.
5. Electronic Communications : Roddy and Coolen.

SUBJECT TITLE : ELECTRONIC INSTRUMENTS & MEASUREMENTS
SUBJECT CODE : EL 403 / EC 403 / EP 403 / BM 403
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16 (Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Multi meter & CRO		15
		Test – I	1
II	Transducers and display devices		15
		Test – II	1
III	Instruments and Bridges		15
		Test – III	1
IV	Power supplies		15
		Test – IV	1
V	Digital Instruments and recorders		15
		Test – V	1
		TOTAL	**80+16**

OBJECTIVES

UNIT – I

1.1.0 Understand the terminologies in measurements
- 1.1.1 Define instrument accuracy, precision, sensitivity, resolution and error
- 1.1.2 Explain the working of galvanometer
- 1.1.3 Explain the conversion of galvanometer into voltmeter and ammeter
- 1.1.4 Describe the term sensitivity in voltmeter
- 1.1.5 State the difference between moving coil and moving iron instruments

1.2.0 Understand the working of multi meter and its uses
- 1.2.1 Draw the block diagram of analog multimeter
- 1.2.2 Explain how galvanometer is used to show different parameters in multimeter
- 1.2.3 Draw the circuit in the analog multimeter to measure different values of resistances
- 1.2.4 Draw and explain the DC voltage and DC current measuring circuit
- 1.2.5 Explain the measuring of AC quantity in analog multimeter
- 1.2.6 List the specification of a multi meter (analog type)

1.3.0 Understand the working of CRO and its uses
- 1.3.1 Draw the functional block diagram of a CRO and describe the function of each blocks
- 1.3.2 Sketch CRT and describe the features of different parts
- 1.3.3 Explain electrostatic focusing and acceleration
- 1.3.4 Define deflection sensitivity (definition and expression only)
- 1.3.5 List the specification of screen phosphor
- 1.3.6 Give a brief description of CRO probes (Different types)
- 1.3.7 Give the procedure of measurement of voltage (DC & AC), frequency, phase angle and time period with CRO
- 1.3.8 Give the special features of dual beam and dual true CROs

UNIT – II

2.1.0 Understand the concept of transducers & displays

2.1.1 Define transducers
2.1.2 Explain different types of transducers – variable resistance type, variable capacitance type, variable inductance type and self generating type
2.1.3 Explain the features of photo voltaic cell with application and examples
2.1.4 Give a brief description of ultrasonic transducers with their application
2.1.5 Give a brief description of LED, LCD, VFD, ELD & plasma displays.
2.1.6 Explain electromagnetic spectrum of Laser , formation of Laser beam and its classification.
2.1.7 Explain the structure and operation of Semiconductor Laser Diode and Solid State Laser (Ruby)

UNIT – III

3.1.0 Understand the concept of signal conditioners

3.1.1 Explain with circuit the principle of AF generator
3.1.2 Explain the working of s Function generator , Pulse generator
3.1.3 Explain the functioning of an RF generator , Applications
3.1.4 Explain the principle and block diagram of a spectrum analyzer, applications
3.1.5 Explain with the help of a block diagram logic analyzer, applications
3.1.6 Block diagram of a Basic instrumentation system- open loop and closed loop
3.1.7 Block diagram and principles of DAS, different types
3.1.8 Explain the role of instrumentation in telemetry

3.2.0 Understand the working of impedance bridges and their uses

3.2.1 Explain with circuit the principle of resistance measurement using DC wheat stone bridge
3.2.2 Explain with circuit the principle of impedance measurement using Maxwell's & Hay's bridges
3.2.3 Capacitance measurement using Wein bridge and Schering bridge
3.2.4 Explain the principle of Q meter

UNIT – IV

4.1.0 Understand the principle of power supplies

4.1.1 General block diagram of a power supply
4.1.2 Specifications of a power supply
4.1.3 Explain the term regulation
4.1.4 Define Line regulation and Load regulation
4.1.5 Using transistor, design shunt and series voltage regulator, explain their working
4.1.6 Differentiate fixed and variable power supplies
4.1.7 Explain the need of a protection circuit in a power supply
4.1.8 Explain different types of protection circuits, current limiting, and Fold back type.
4.1.9 SMPS – Basic circuit, Explain with the help of waveforms.
4.1.10 Explain the basic working principle of a UPS, types of UPS, On-line UPS and Off-Line UPS

UNIT – V

5.1.0 **Understand the working of digital instruments data recorders**

5.1.1 Explain block diagram of Digital voltmeter, Basic principles.
5.1.2 Explain the working of Digital Frequency meter, Block level explanation
5.1.3 Explain with block diagram digital multi meter
5.1.4 Differentiate 3 1/2 and 4 1/2 digit digital multi meter in terms of accuracy
5.1.5 Explain the working of digital storage oscilloscope

5.2.0 **Explain the principle of Data recorders**

5.2.1 Explain the working of Galvanometric Recorders.

5.2.1 Explain the working of Potentiometer type Recorders

5.2.3 Explain the working of X-Y Recorders, Circular Chart Recorders and Strip Chart Recorders

5.2.4 Compare different types of data recorders.

5.2.5 Know about IEEE 488 standard

CONTENT DETAILS

UNIT – I:

Multimeter & CRO

Definition of instrument accuracy, precision, sensitivity, resolution and error – galvanometer working principle with a diagram - conversion of galvanometer into voltmeter and ammeter – Voltmeter sensitivity – Resistance measurement circuit in the multimeter – DC voltage and current measuring circuit – AC voltage and current measuring circuit in the multimeter - specifications of a multimeter (analog type)

Functional block diagram of a CRO - construction of CRT – electron gun, electrostatic focusing and acceleration, deflection sensitivity – definition and expression only. Specifications of screen phosphor, CRO probes - measurement of voltage, time period, frequency, and phase angle using CRO - dual trace CRO

UNIT – II:

Transducers and display devices

Concept of transducers – definition - resistance type – potentiometer – strain gauge – inductance type – LVDT - capacitance type – self generating type – thermo couple – different types of thermo couples - piezo electric transducer – Hall effect transducer - photo voltaic cell - applications with examples- Ultrasonic transducers and applications - LDR

LED characteristics – seven segment LED displays – alphanumeric displays – LCD display –LCD text displays and graphic displays – Laser – spectrum classification – Semiconductor laser diode – Ruby Laser - Plasma display – Vacuum Fluorescent display – Electro Luminance display

Opto couplers – applications

UNIT – III:

Instruments and bridges

Function Generators – AF and Pulse generators – Block diagram and working principle of RF generators – Spectrum Analyzers and Logic analyzers - Open loop and Closed loop systems – block level explanation, Data acquisition systems, Telemetry .

Types of bridges – Resistance measurement using Wheaton's Bridge –Maxwell's and Hayes Bridge – Wein-Bridge and Schering Bridge – Q meter – Working principle and appliocations.

UNIT – IV:

Power supplies

Power supply – Block diagram – Functions of each block – Specifications – Voltage regulations – Line Regulation – Load regulation – Shunt voltage regulator – Series voltage regulator – Using Transistor - Design – Fixed and Variable power supplies – Protection circuits – Current Limiting – Fold Back limiting. SMPS- Working, Circuit, Waveforms. UPS different type – Online and off line - block diagram

UNIT – V:

Digital instruments & recorders

Block diagram of Digital Voltmeter – Digital Frequency meter – Block diagram and working principle of Digital Multi meter – 3 ½ and 4½ digit multimeter – comparison in terms accuracy, resolution, Digital storage Oscilloscope

Data Recorders – Galvanometric Recorders – Potentiometer type Recorders – X-Y Recorders – Circular Chart Recorders – Strip Chart Recorders – Introduction to IEEE 488 standard.

REFERENCE BOOKS

1. Introduction to Instrumentation and Control -Ghosh and Arun K
2. Industrial Electronics and Control - Biswanath Paul (PHI).
3. A Course in Electrical & Electronic Measurements and Instrumentation - A.K Sawhney
4. Modern Electronic Instrumentation and Measurement Technique - Albert D Helfrick
5. Electronic Instrumentation - Khalsi
6. Principles of Measurement and Instrumentation - Alan. S. Morris
7. Electronics Instruments and Instrumentation Technology - Anand M M S (PHI)
8. Transducers and Instrumentation - Murty D V S

SUBJECT TITLE : MICROCONTROLLERS & APPLICATIONS
SUBJECT CODE : EL 404/EC 404/ EP 404 /EI 404/ BM 404
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16 (Tutorial)

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	Micro Controller Overview	12
	Test – I	1
II	Micro Controller Architecture	15
	Test – II	1
III	Timer/Counter, Addressing mode, Instruction set	15
	Test – III	1
IV	Development of Microcontroller based system	18
	Test – IV	1
V	Applications of Microcontrollers	15
	Test – V	2
	Total	80+16

OBJECTIVES

UNIT – I

1.1.0 Understand the term micro controller

- 1.1.1 Study the architecture of 8085 Microprocessor(Basic idea only)
- 1.1.2 Compare microcontroller with microprocessor
- 1.1.3 Discuss the features and advantages
- 1.1.4 Discuss the general architecture of a microcontroller
- 1.1.5 Give examples for microcontrollers from different manufactures
- 1.1.6 Classify microcontroller based on word length
- 1.1.7 List typical applications
- 1.1.8 Discuss selection-criteria for specific applications.
- 1.1.9 Discuss Von-Neumann and Princeton architecture.

UNIT – II

2.1.0 Understand 8051 microcontroller architecture

- 2.1.1 Discuss pin details and features of 8051
- 2.1.2 Compare different versions from 8031 to 8751
- 2.1.3 Explain the architecture of 8051
- 2.1.4 Memory organization in 8051
- 2.1.5 Discuss constructional details of Ports

UNIT – III

3.1.0 Understand microcontroller applications and interfacing

- 3.1.1 Explain timers in 8051
- 3.1.2 Explain TMOD / TCON
- 3.1.3 Discuss different modes

3.2.0 Discuss Serial communication using 8051

- 3.2.1 Explain serial communication ports in 8051
- 3.2.2 Discuss SCON, PCON
- 3.2.3 Discuss different modes

3.3.0 Discuss different interrupts

3.3.1 Discuss how to use EI, IP and TCON in connection with interrupt.

3.3.2 Discuss about TI/RI

3.3.0 Discuss external RAM and ROM interfacing with 8051, explain the circuit

3.5.0 Discuss different addressing modes

3.6.0 Discuss different types instructions in 8051

3.7.0 Discuss simple programs with 8051, like programs for addition, multiplication, data transfer, subtraction, Port reading/writing, Timer control applications.

UNIT – IV

4.1.0 Understand microcontroller based system design

4.1.1 Explain how to develop a proto type based on microcontroller

4.1.2 Top down and bottom up approaches while designing a system

4.1.3 Discuss Simulators, Emulators, compare them.

4.1.4 Discuss an assembler, Types of assembler – Self and Cross.

4.1.5 Explain the application of Loader, linker, debugger, editor in a development system

4.2.0 Study different interfacing chips

4.2.1 Peripheral Interface chip 8255, Block diagram

4.2.2 Block diagram of timer 8253, functions.

4.2.3 Block diagram of keyboard/display interface 8279, functions.

4.2.4 Block diagram of USART 8251, functions

UNIT – V

5.1.0 Discuss various applications of a microcontroller (Schematics and Flowcharts)

5.1.1 Stepper motor interfacing with 8051.

5.1.2 A/D and D/A converter interfacing

5.1.3 Interface a 4 x 4 Matrix keyboard

5.1.4 Interface LED Display in dynamic display mode.

5.1.5 Interface an LCD Display.

CONTENT DETAILS

UNIT – I

Architecture of 8085 Microprocessor - Introduction to Microcontrollers – Compare Microcontrollers and Microprocessors – Features of a Microcontroller – Advantages of Microcontrollers – Overview of Microcontroller structure – Microcontroller families – Examples of Microcontrollers from different manufactures –Classification of Microcontrollers based on word length – Typical applications – Criteria in selecting a Microcontroller.

Different types of architecture used in Microcontrollers – Von Neumann Architecture – Harward Architecture.

UNIT – II

Introduction to 8051 Microcontroller – Features – Pin details –Compare different versions, 8031 – 8751. Architecture of 8051 – Memory organization – Program memory – Data memory - Internal RAM structure – B register, Accumulator, Register Banks – Bit addressable area – Special Function registers – Program Status Word – Flags – Architecture of Ports – EA-external Access – PSEN Program store enable – ALE – Reset.

UNIT – III

Timer / Counter – Different modes – TCON – TMOD -– Serial communication port – different modes – SCON – PCON – SBUF –Interrupts – IE – IP – TCON – TI/RI – External RAM interfacing – External ROM Interfacing – Addressing Modes – Instruction Set – Types – Simple Programs

UNIT –IV

Development of a Microcontroller based system – Top Down approach – Bottom up approach – concept of Simulators , Emulators , Assembler - Self assembler, Cross Assembler, Loader , Linker, Editor, Debugger.

Study of peripheral chips – PPI 8255 – Timer/Counter 8253 – Keyboard/display interface 8279 – USART 8251 .

UNIT – V

Applications of Microcontrollers – Stepper motor Control – Matrix Keyboard – Seven Segment Display (Dynamic Display) – A/D Converter – LCD display–DC motor speed control

Serial data transfer

(Schematic study only)

REFERENCE BOOKS

1. Microprocessor Architecture Programming and Applications with the 8085 - Ramesh S Gaonkar.(PRI)
2. 8051 Microcontroller - Mazidi and Mazidi.
3. 8051 Microcontroller - Kenneth J Ayala(Thomson)
4. Microprocessor and microcontroller - R. Theagarajan, SCITECH, Chennai
5. Microprocessors and interfacing - Douglas V.Hall – TMH
6. Microcontroller based System design - P.S.Manoharan – SCITECH
7. Microcontroller Interfacing - John B.Peatman - TMH

SUBJECT TITLE : COMMUNICATION LAB
SUBJECT CODE : EL 405
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

CONTENT DETAILS

(At least 8 experiments to be completed)

1. Active Filters LPF,HPF & BPF
2. AM Modulation circuit using Transistor
3. AM Demodulation circuit
4. FM Modulator using 555
5. FM Demodulator using 565
6. Setup a passive pre-emphasis circuit and plot its response
7. Setup a passive de-emphasis circuit and plot its response
8. Setup a mixer stage using discrete components and study its working
9. Setup an IF stage using IFT and verify its frequency response
10. Setup a Pulse Position Modulator using 555
11. Setup PPM Demodulator
12. Setup a Pulse Amplitude Modulator
13. Setup a PAM Demodulator
14. Setup a Pulse Width Modulator using 555
15. Setup PSK Modulator
16. Set up PSK demodulator

SUBJECT TITLE : LINEAR IC LAB
SUBJECT CODE : EL 406 /EC 406 / EP 406 / EI 406/BM406
PERIODS/WEEK : 3
PERIODS/SEM : 48

LIST OF EXPERIMENTS

(At least 10 experiments to be completed)

1. Design, construct and test the following using Op-amp 741
   (1) Inverting amplifier (2) Non-inverting amplifier
   (3) Difference amplifier (4) Summing amplifier
   (5) Schmitt trigger (6) Level detector
   (6) Differentiator circuit (7) integrator circuit
2. Symmetric and asymmetrical Astable Multivibrator
3. Monostable Multivibrator using Op-amp 741
4. Wien bridge oscillator
5. RC Phase shift oscillator
6. Setup a voltage regulator using IC723 and plot the regulation characteristics
7. Symmetric and asymmetrical Astable Multivibrator using IC 555
8. Design, construct and test monostable Multivibrator using 555 IC
9. Design +5V, 1A power supply using IC 7805.
10. Design and test variable power supply using LM 317
11. R-2R ladder type DAC
12. Counter type ADC
13. ADC and DAC ICs

SUBJECT TITLE : MICROCONTROLLER LAB
SUBJECT CODE : EL407/EC 407/ EP407/EI 407/ BM407
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

CONTENT DETAILS

Microcontroller programming and interfacing

At least 15 experiments similar to the following to be completed

1. Familiarization of Microcontroller Kit
2. Multiplication of two 8 bit numbers
3. Division of two numbers
4. Finding the maximum data in an array
5. Find number of occurrence of an same data in an array
6. Sorting : ascending and descending
7. BCD to Hex conversion
8. Hex to BCD conversion
9. Binary to ASCII
10. ASCII to Binary
11. Square wave generation
12. Counter using timer
13. Program using interrupt
14. Least Common Multiple
15. Greatest Common Divisor
16. Sum of first N natural numbers
17. Sum of Arithmetic Progression
18. Sum of an given array
19. Average of an array
20. String comparison

Interfacing with application boards

21. Digital I/O
22. Matrix keyboard
23. Seven segment displays
24. LCD Displays
25. Traffic light
26. 8 bit ADC
27. 8 bit DAC
28. Stepper motor control
29. DC motor control
30. Sending data through serial port of controller

SUBJECTS OF STUDY AND SCHEME OF EVALUATION

SEMESTER V

Branch : Electronics

Code	Subject	Periods Per Week			Evaluation (Marks)			
		Theory	Practical/Tutorial	Total	Theory	Practical	Internal	Total
EL501/EC501/ EI501	Advanced Microprocessors	5		5	75		25	100
EL502/EP502/ EI 502	Industrial Electronics	5	1	6	75		25	100
EL503	Audio Video Systems	5	1	6	75		25	100
EL504/EC504/ EP504/BM504	Computer Hardware & Networking	5	1	6	75		25	100
EL505/EP505/ EI 505	Industrial Electronics & PLC Lab		3	3		75	25	100
EL506/EC506/ EI506	PCB Design &SPICE Lab		3	3		75	25	100
EL507/EC507/ EP507/BM507	Computer Hardware and Networking Lab		3	3		75	25	100
	Project & Seminar		3	3				
	TOTAL	20	15	35	300	225	175	700

SUBJECT TITLE : ADVANCED MICROPROCESSORS
SUBJECT CODE : EL 501 /EC 501 / EI 501
PERIODS/WEEK : 5
PERIODS/SEMESTER : 80

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Intel 8086 Microprocessor Architecture	15	
		Test – I	1
II	Assembler and Programming		15
		Test – II	1
III	Interrupts and Interfacing		15
		Test – III	1
IV	80286, 80386 and 40486 Processors		15
		Test – IV	1
V	Pentium Microprocessors		15
		Test – V	1
		Total	80

OBJECTIVES

UNIT – I

1.1.0 Understand Intel 8086 microprocessors

- 1.1.1 Explain architecture of 8086
- 1.1.2 Explain addressing modes of 8086
- 1.1.3 Understand the instructions
- 1.1.4 Explain how 20 bit physical address is generated
- 1.1.5 Give the idea of pipelining
- 1.1.6 Describe memory bank
- 1.1.7 Describe minimum mode configuration of 8086
- 1.1.8 Describe maximum mode configuration of 8086
- 1.1.9 Compare 8086 & 8088

UNIT – II

2.1.0 Programming the 8086

- 2.1.1 Discuss Different addressing modes of 8086
- 2.1.2 Explain different instructions in 8086
- 2.1.3 Explain different instruction types

2.2.0 Discuss Assembler

- 2.2.1 Define an Assembler
- 2.2.2 Define Assembler Directive
- 2.2.3 DOS interrupt routine linker
- 2.2.4 Locator and debugger

  Simple Programs

UNIT – III

3.1.0. Basic Interrupt processing

- 3.1.1 Types of interrupts
- 3.1.2 Hardware Interrupts

3.2.0 Interfacing the 8259A Interrupt controller

3.3.0. Interfacing the 8237 DMA controller
3.4.0 Interfacing the 8279 Keyboard/ Display interface

UNIT – IV
4.1.0. Understand the architecture of 80286
4.2.0. Understand the 80386 processor
- 2.1 Architecture, special registers
- 2.2 Memory management
- 2.3 Memory paging

4.3.0 Compare 80486SX and 80486DX
4.4.0 Understand the basic architecture and memory system of 80486 processor

UNIT – V
5.1.0 Understand Special registers and Memory management of Pentium processor
5.2.0 Understand internal structure and memory management of Pentium pro processor
5.3.0 Special Pentium pro features.
5.4.0 Features of Pentium II and Pentium IV Processors
5.5.0 Comparison of RISC & CISC Microprocessors.

CONTENT DETAILS

UNIT – I
Introduction to Microprocessors - architecture of 8086 – pin details – segmentation of memory addressing modes – 20 bit physical address generation – memory bank - Queue register - concept of pipelining - minimum mode and maximum mode operation –
Comparison with 8088

UNIT – II
Addressing modes – Instruction set – Data Transfer instructions – Arithmetic instructions string manipulation instructions – branch instructions – processor control instructions.
Assembler Directives – DOS interrupt routine linker – Locator and debugger.
Simple programs

UNIT – III
Basic interrupt processing- interrupt vector table – hardware interrupts.
Interfacing the 8086 with the following chips: 8259A Interrupt controller, 8237 DMA controller, 8279 Keyboard/ Display interface.

UNIT –IV
Architecture of 80286, protected mode memory addressing, Architecture and special registers in 80386, memory management and memory paging in 80386 - Comparison of 80486 SX and 80486 DX - Basic architecture and memory system of 80486.

UNIT – V
Special registers and memory management in Pentium processor
Internal structure and memory management of Pentium pro processor, special Pentium pro features. Features of Pentium II and Pentium IV Processors – Comparison RISC and CISC Microprocessors.

REFERENCE BOOKS

1. The Intel Microprocessors - Barry B. Brey, 6th edn.
2. The 8086 Microprocessor - Kenneth J. Ayala
3. Microprocessors and Interfacing - Douglas V.Hall – TMH
4. The 8088 and 8086 Microprocessors - Triebel and Singh
5. Microcomputer Systems: 8086/8088 Family - Cheng and Gibson

SUBJECT TITLE : INDUSTRIAL ELECTRONICS
SUBJECT CODE : EL 502 / EI 502 /EP 502
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16(Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Power devices		15
		Test - I	1
II	Triggering & Commutation of SCR		15
		Test - II	1
III	AC and DC drives		14
		Test - III	1
IV	Industrial heating and other industrial applications		14
		Test - IV	1
V	Programmable Logic Controller		17
		Test - V	1
		Total	80+16

OBJECTIVES

UNIT – I

1.1.0 Understand the working and application of power devices
- 1.1.1 Define Power diode and explain the structure of it
- 1.1.2 Explain the circuit diagram and V-I characteristics of the power diode
- 1.1.3 State the power transistors and explain the structure, static characteristics and rating
- 1.1.4 Describe power MOSFETS
- 1.1.5 Explain with proper diagrams the structure, characteristics, transient behavior and rating
- 1.1.6 Describe IGBTs. Mention the structural aspects of IGBTs
- 1.1.7 Explain the working principle of IGBTs
- 1.1.8 Explain with proper circuit diagrams I-V characteristics, switching characteristics
- 1.1.9 Mention series and parallel operations
- 1.1.10 Understand the working of thyristors in switching circuits
- 1.1.11 Describe the structure and working principle of a Triac and the state characteristics
- 1.1.12 Describe the structure and working principle of a Diac and the static characteristics
- 1.1.13 Explain the protection methods of switching devices
- 1.1.14 Explain the role of snubber circuits

UNIT – II

Understand the working and application of SCR in switching circuits
- 2.1.1 State the method of turn On (using 'R' triggering and R-C & UJT triggering)
- 2.1.2 Explain various commutation techniques of SCR – brief description only
- 2.1.3 Understand the operation of single-phase half wave converter, full wave midpoint and bridge converters. Expression for output voltage
- 2.1.4 Understand the operation of three phase converter
- 2.1.5 Understand the working of thyristor AC switches (SCR & Triac)
- 2.1.6 Explain briefly the working of series switching control of ac loads, phase control with resistance load, the Triac light dimming circuit and phase continue with R-L loads.
- 2.1.7 Understand the principle of PWM

2.1.8 Explain single phase series, bridge inverter with relevant waveforms and mathematical expressions
2.1.9 To study switching sequence in bridge inverter, liming waveforms
2.1.10 To study the working principle of three phase bridge inverter.

UNIT – III

3.1.0 Study single phase and three phase dual converters using waveforms
3.1.1 Mention few application – 1- ø & 3 – ø dual converters
3.1.2 Understand the principles and applications of cyclo converters
3.1.3 State the Principle of choppers
3.1.4 Describe step up and step down choppers
3.1.5 Understand the working of Jone's chopper with waveforms
3.1.6 Study AC choppers
3.1.7 Mention the applications of chopper
3.1.8 Compare AC and DC drives
3.1.9 State the requirements of variable speed drive
3.1.10 Explain the speed control of DC drive
3.1.11 Understand the methods of speed control of induction motors
3.1.12 Describe variable voltage and variable frequency speed control
3.1.13 Explain soft start of AC and DC motors

UNIT-IV

4.1.0 Understand Industrial Heating
4.1.1 Understand Principle and Theory of Induction Heating.
4.1.2 Understand Dielectric heating
4.1.3 Describe electronic welding control system
4.1.4 Describe non destructive testing using ultrasonic transducer
4.1.5 Describe cleaning using ultrasonic transducer
4.1.6 Draw the circuit using Ultrasonic transducer to measure the depth
4.1.7 Understand different types of power supply systems
4.1.8 Understand Servo Controlled Voltage Stabilizer.
4.1.9 Understand Constant Voltage Transformer (CVT)
4.1.10 Compare different types of SMPS

UNIT – V

5.1.0 Study relay logic control, PLC based control, ladder diagram, facilities in PLC
5.1.1 Understand the basic principles of PLC
5.1.2 Understand PLC hardware
5.1.3 Write Ladder program using bit instructions, timer instructions and counter instructions
5.1.4 To know about sensors and actuators, different switches, relays, proximity switches, hall sensors, fibre optic sensor, and rotary encoder.
5.2.1 Apply inputs to PLC through graphic symbols and know the output status of PLC in the graphic symbols
5.2.2 Understand Protocols of RS 485 and field bus.

CONTENT DETAILS

UNIT – I:

Power Devices

Power diode, structure and VI characteristics

Power transistors – structure, static characteristics and ratings-power MOSFETs – structure, characteristics, transient behaviour, and ratings.

Thyristors – Principle of working, characteristics, specifications and ratings

IGBTs – structure, principal of working, VI- characteristics, switching characteristics, series and parallel operation.

TRIAC – structure, working, static characteristics, DIAC – structure, working, static characteristics
Protection devices – snubber circuits and pulse transformer

UNIT – II:

Triggering and Commutation Of SCR

Triggering of SCR - different methods of turn on – R triggering - RC triggering – pulse triggering – triggering using UJT relaxation oscillator

Commutation of SCRs - Line commutation and forced commutation - different method of forced commutation schemes CLASS A, B, C, D, E, F

Converters- Operation of single-phase half wave, full wave midpoint and bridge converters with resistive and inductive loads, expression for output voltage - Three phase converters

AC Controllers- Thyristor ac switches, series switching control of ac loads, phase control with resistance load- Triac light dimming circuit- phase control with R L loads.

Inverters – Pulse width modulation (PWM) – seris and parallel inverter - Single-phase series inverter - single-phase bridge inverter (explanation with relevant wave forms and mathematical expressions). Switching sequence in bridge inverter, timing waveforms- Three phase bridge inverters.

UNIT – III:

AC and DC drives

Dual converters -Single phase and three phase dual converters, principle and operation, waveforms, application., Cyclo converter for single phase - applications

Choppers- Methods of output control, principle of step up and step down chopper, the Jone's chopper principle and working, waveforms AC chopper, application of choppers.

Definition of drives – comparison between AC and DC drive – Requirement of variable speed drive
Speed control of DC drives
Methods of speed control of induction motors – variable voltage and variable frequency
Soft start of AC and DC motors

UNIT – IV:

Industrial Heating and other industrial applications

Industrial heating- types – comparison, Electronic welding control - Industrial applications of Ultrasonic – Non destructive testing – cleaning, depth measurement.

Power supplies – servo controlled voltage stabilizer –Constant Voltage Transformer (CVT) - types of SMPS & Comparison

UNIT – V:

Programmable Logic Controllers

Relay logic control panel – PLC based control panel - Architecture of PLC

Programming software – Bit instructions – Timer/Counter instructions – Compare instructions – Move instructions – Math instructions – Program control instructions - Memory organization in PLC – analog inputs.

Sensors – Proximity switches – Reed Switches – Rotary encoders – Fibre optic sensors – Pneumatic switches and actuators

REFERENCE BOOKS

1. Chapter 12 - Modern Control Technology, Components and Systems. - KILIAN, II Edition, Thomoson and Delmar
2. Power Electronic systems Theory and Design - Jai.P. Agrawal
3. Industrial Electronics and Control - Biswanath Paul (PHI)
4. Modern Power Electronics and AC Drives - Bimal.K.Bose
5. Power Electronics Principles and Applications - Joseph Vithayathil
6. Power Electronics Circuits, Devices and Applications - M.H.Rashid
7. Industrial Electronics and Control - S.K.Bhattacharya, S.Chatterjee
8. User manuals of PLC

SUBJECT TITLE : AUDIO VIDEO SYSTEMS
SUBJECT CODE : EL 503
PERIODS/WEEK : 6
PERIODS/ SEMESTER : 80+16(Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Audio Systems		15
		Test	1
II	Introduction to TV		15
		Test	1
III	TV Receiver		15
		Test	1
IV	Color TV, Transmitter and Receiver		15
		Test	1
V	Satellite, Cable TV & Video Recording		15
		Test	1
		Total	**80+16**

OBJECTIVES

UNIT – I

1.1.0 Understand the characteristics of Sound: -
- 1.1.1 Define speech, music, noise
- 1.1.2 Know the nature of sound, reflection, refraction, diffractions and absorption

1.2.0 Understand the Magnetic Recording of Sound: -
- 1.2.1 Explain the magnetic recording & reproduction of sound
- 1.2.2 Explain the need of dc & ac biasing
- 1.2.3 Comparison of dc & ac biasing
- 1.2.4 Explain the concept of Dolby system

1.3.0 Understand the working principle of Hi-Fi stereo system
- 1.3.1 Know the concept of Hi-Fi & stereo
- 1.3.2 Know the needs of base, treble, balance and loudness control in stereo amplifier
- 1.3.3 Explain with a simple circuit of the above

1.4.0 Understand the compact disk player
- 1.4.1 Explain the optical pick-up system
- 1.4.2 With a block diagram explain compact disk player
- 1.4.3 Explain the recording of compact disk
- 1.4.4 Know the audio CD & MP3 CD

UNIT – II

2.1.0 Understand the working of Monochrome T.V
- 2.1.1 State the basic elements of picture Transmission
- 2.1.2 Explain sequential and interlaced scanning – Advantages of inter laced scanning
- 2.1.3 Define line and frame freq – even and odd lines, aspect ratio
- 2.1.4 Calculation of approx. BW in 625 line system
- 2.1.5 Know the freq requirement of carrier wave – vestigial side band, the placement of sound and picture signals.
- 2.1.6 State the need of blanking retrace pulses – synchronizing pulses and equalizing pulses
- 2.1.7 Draw the composite video signal and explain

2.1.8 State and compare positive and negative modulation
2.1.9 Draw the block diagram of T.V transmitter and explain the function of each block

2.2.0 Monochrome T.V. Receiver and Power Supplies

2.2.1 Explain the T.V Receiver with Block diagram
2.2.2 Explain with figure, the operation of picture tube

UNIT – III

3.1.0 Understand the Tuner, If Amplifier, Video detector, Video Amplifier

3.1.1 Explain the operation of TV tuner – mention the need of ATT, state the factors affecting tuner design
3.1.2 Mention the functions of remote control.
3.1.3 Explain the video IF stage
3.1.4 Draw the video IF characteristic curve and explain
3.1.5 Explain with basic circuit the operation of video detector with filter
3.1.6 Know the importance of polarity of video signal
3.1.7 Explain the concept AGC
3.1.8 Illustrate the video amplifier requirements such as gain, band width, freq distortion, phase distortion, amplitude distortion
3.1.9 Draw a typical video amplifier circuit & Explain
3.1.10 Illustrate manual contrast control and brightness control
3.1.11 State the need of dc reinsertion in video Amp.

3.2.0 Understand Sync Separator and Deflection Oscillator

3.2.1 Know about the vertical and horizontal Synchronization
3.2.2 Explain Sync separator with block diagram
3.2.3 Explain with basic circuit the operation of Sync separator
3.2.4 Explain the operation of integrator and differentiate circuit
3.2.5 Know about deflection oscillators
3.2.6 Explain with a block diagram the operation of AFC in horizontal o/p stage
3.2.7 Know about vertical output stage
3.2.8 Explain EHT generation

3.3.0 Understand the working of TV sound section

3.3.1 Explain with block diagram the operation of sound section
3.3.2 Know about FM detection
3.3.3 Know about audio power amplifier

UNIT – IV

4.1.0 Understand the Basic principles of colour TV transmission

4.1.1 Know the fundamentals of vision, light, colour, basic colours and colour signals
4.1.2 Define luminance, chrominance (hue & saturation)
4.1.3 State the meaning of compatibility
4.1.4 State the method of additive mixing and subtractive mixing of colours
4.1.5 Know about colour difference signal
4.1.6 State the significance of selecting R-Y and B-Y signal

4.2.0 Understand Different Colour TV systems and Picture Tubes

4.2.1 State different colour TV systems
4.2.2 Study encoder & decoder block diagrams of PAL T.V system
4.2.3 Explain with figure construction and operation of PIC, Delta gun & Trinitron tubes
4.2.4 Explain colour synchronization, Colour AFC, Colour killer, and various controls and adjustments of PAL-D colour receiver

4.3.0 Understand HDTV & Digital TV

4.3.1 Comparison of HDTV with conventional TV regarding its resolution band width and transmission
4.3.2 Know the basic idea about Digital TV & Plasma TV

UNIT – V

5.1.0 Understand the working of Satellite Receiver and Cable TV system

- 5.1.1 Explain with block diagram the operation of satellite TV receiving system
- 5.1.2 Understand the operation of parabolic reflector, feed horn, LNA, LNB & LNC
- 5.1.3 Understand the block diagram of digital satellite receiver
- 5.1.4 Know t\above CCTV, MATV, CATV systems

5.2.0 Understand the working of video recording and VCR

- 5.2.1 Explain the need of Helical scanning rotating head and its speed
- 5.2.2 Explain the VHS & U-matic formats
- 5.2.3 Need of F.M. recording
- 5.2.4 With a block diagram explain the working of an VCR (VHS), Drum & Capstan Servo system, Audio & Video processing
- 5.2.5 Explain the transfer mechanism
- 5.2.6 Explain the need of control track and control head
- 5.2.7 Explain the need of tracking

5.3.0 Understand video processing in VCD, DVD

5.4.0 Discuss about MPEG compression format

CONTENT DETAILS

UNIT – I:

Audio Systems

Speech, Music and Noise – nature of Sound, Reflection, Refraction, Diffraction, Absorption – construction and working principles of various types of Microphones, Directivity, Sensitivity, Equalization, and Frequency response.

Sound recording and reproduction – Recording methods, Magnetic recording, DC & AC bias, Frequency response, speed, equalization and S/N ratio reproduction of sound, concept of Hi-fi, and stereo systems.

CD players – Optical Recorders, Block diagram and explanation of encoding and decoding the CD, Audio CD, MP3CD

UNIT – II:

Introduction to TV, Block Diagram, Picture Tube

Basic elements of picture transmission, working principle of TV Camera tube, the Scanning processes, Sequential and Interfaced scanning, calculation of approximate Band width, necessity of Blanking, Sync and equalizing pulses, Composite Video Signal, Positive and Negative Modulation, Vestigial Side Band, Block diagram of TV Transmitter.

Block diagram of TV Receiver, Picture Tube construction and operation

UNIT – III:

Tuner, If Amplifier, Video Detector, Video Amplifier, Sync Separator, Deflection Oscillator

RF Tuner – Channel selection- RF amplifier, Mixer operation, Video IF section – Trap circuit, VSB correction, Stagger Tuning, Video Detector circuits, inter carrier sound signal, polarity of video signal, video amplifier – gain, band width freq distortion, amplitude distortion DC – re insertion- AGC – keyed AGC, peak AGC, delayed AGC, Sync Separator – separation of Vertical Sync and Horizontal Sync from Composite Video Signal, Vertical Oscillator, Vertical Deflection Circuits, Horizontal Oscillator, AFC, horizontal deflection circuits –. Sound section, FM detector, TV Audio systems

UNIT – IV:

Colour TV Transmitter And Receiver

Fundamentals of vision, light and colour, basic colours, colour signals, luminance, chrominance, compatibility, additive mixing and subtractive mixing of colours –Colour TV camera- colour difference signals, construction and working principle of precision-in-line (PIL), Delta gun, Trinitron colour picture tubes.

Basic Colour TV systems – NTSC, SECAM and PAL system - Advantages and disadvantages of one over the other – PAL D-Coder-Frequency interleaving- PAL-D Colour TV Receiver – AFT-Colour encoder Colour killer - Colour controls and adjustments,
HDTV- Digital TV.

UNIT – V:

Satellite And Cable TV & Video Recording

Block diagram of satellite TV receiving system – Antenna, LNA, LNB, FEC- Digital satellite receiver, CCTV, MATV, CATV systems. Video recording – VHS and U-matic formats, Helical scanning Handy CAM block diagram of VCR (VHS) and function of each block. Tape transport mechanism – Audio, control signals and video tracks – speed of tape and rotating head, drum and capstan drive system – Audio and video processing circuit, VCD, DVD, MPEG.

REFERENCE BOOKS

1. Audio and Video System - Ajay Sharma
2. Complete Guide to Compact Disk Player Trouble-shooting and Repair - John D Lenk
3. Monochrome and Colour T.V - Gulathai.R.R
4. Audio and Video System - Gupta
5. Satellite TV and Cable TV System - R.R.Gulathi
6. Multimedia Sound & Video - Jose'Lozans
7. Consumer Electronics - Bali, Pearson Education

SUBJECT TITLE : COMPUTER HARDWARE & NETWORKING
SUBJECT CODE : EL 504/EC 504/BM 504/EP 504
PERIODS/WEEK : 6
PERIODS/SEMESTER : 80+16(Tutorial)

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Power supply & I/O		15
		Test – I	1
II	Organisation of motherboards		15
		Test – II	1
III	Secondary memory & OS		15
		Test – III	1
IV	Networking		15
		Test – IV	1
V	Internet & Wireless networking		15
		Test – V	1
		Total	80+16

OBJECTIVES

UNIT – I

1.1.0 Understand Power supply and Display adapters

1.1.1 Draw the block diagram of an SMPS and explain its working
1.1.2 List the voltage signals from an SMPS
1.1.3 Identify the power connectors for various components in a PC
1.1.4 Explain the features of AT, ATX and NLX, SMPS illustrating the power supply connectors
1.1.5 Define the display adapter/display controller
1.1.6 Compare the display adapters – MDA, CGA, HGA, EGA, VGA, SVGA on the basis of color, mode, and RAM capability. RAM address, resolution, dot pitch, horizontal frequency etc.
1.1.7 Draw the pin outs of various display adapters
1.1.8 Draw the block diagram of a VGA monitor and explain
1.1.9 Describe AGP
1.1.10 List the advantages of AGP

1.2.0 Understand I/ O Devices

1.2.1 Describe the matrix keyboard organization
1.2.2 Explain the method of encoding a keypress
1.2.3 Discuss the keyboard controllers
1.2.4 Draw the typical keyboard connectors – 5 pin DIN, mini DIN (ps/2), USB
1.2.5 Describe the construction of mouse- optoelectronic mouse, optical mouse
1.2.6 Interfacing of mouse – mouse connectors – serial, PS/2, Bus mouse, USB, wireless
1.2.7 Know the use of scanner
1.2.8 Explain briefly the working of flat-bed and hand held scanners
1.2.9 Discuss other input devices – digital camera
1.2.10 Discuss the different classification of printers
1.2.11 Distinguish between impact and non-impact printer
1.2.12 Describe the different types of printers – Dot matrix, inkjet, laser printers
1.2.13 Explain the working of a dot-matrix printer

1.2.14 Explain the working of an inkjet printers
1.2.15 Explain the working of a laser printer
1.2.16 Describe the centronics Interface, USB interface

UNIT – II

2.1.0 Understand Motherboard organization

2.1.1 Draw the PC, PC/AT , ATX motherboard organization
2.1.2 Explain the different form factors –
2.1.3 Discuss the Microprocessors based on years of design, coprocessors, speed, address lines, data lines, address space, main CPU registers and manufacturers
2.1.4 Explain RAM, DRAM, SRAM, SDRAM, DDRAM, RDRAM
2.1.5 Define Memory Refreshing
2.1.6 Define SIMM and DIMM, RIMM
2.1.7 Explain Cache memory- L1 Cache and L2 Cache
2.1.8 Discuss the chipsets and support chips, CMOS chip- CMOS Setup – BIOS - POST
2.1.9 Discuss expansion cards – I/O card, Graphics Card, Sound card, Network Interface card, Internal Modem etc
2.1.10 Study of ROM – PROM, EPROM, EEPROM, EAPROM, Firmware

UNIT – III

3.1.0 Understand magnetic storage devices

3.1.1 Discuss FAT, Boot sector, directory area, data area
3.1.2 Discuss various file systems FAT16, FAT32, New Technology File System(NTFS), High Performance File System(HPFS), Linux File System (only Hardware view)
3.1.3 Study the physical structure of floppy disk
3.1.4 Know the terms track, sector, cluster, cylinder
3.1.5 Describe the floppy disk drives with the help of a block diagram
3.1.6 Describe the construction of a hard disk
3.1.7 Define Seek time, Latency time
3.1.8 Describe the Hard Disk controller
3.1.9 Explain low level formatting
3.1.10 List the different tools for low level formatting
3.1.11 Explain Partitioning of Disk
3.1.12 State the need for partitioning
3.1.13 List the tools for partitioning
3.1.14 Discuss the various procedures for disk partitioning
3.1.15 Explain high level formatting
3.1.16 List the tools for high level formatting
3.1.17 Discuss the Optical Recording Techniques
3.1.18 Describe the constructional details of Compact Disk
3.1.19 Discuss the trends in optical media – CDROM, CD-R, CD-RW
3.1.20 Explain the recording principle on CDs
3.1.21 Compare CD and DVD
3.1.22 Explain characteristics of DVD
3.1.23 Discuss USB Drives – pendrive, pocket harddrive

3.2.0 Understand Operating Systems

3.2.1 Study Windows Operating system features – Installation
3.2.2 Explain free software
3.2.3 Study Linux OS features - Installation

UNIT – IV

4.1.0 Understand the Computer Networks

4.1.1 State the need for networking
4.1.2 Study ISO- OSI 7 layer reference model
4.1.3 State the functions of each layer

4.1.4 Understand the different network topologies – mesh- star-Tree- Bus – Ring etc
4.1.5 Compare LAN , MAN, WAN
4.1.6 Understand media – guided(coaxial, twisted pair, optical fibre) – unguided (satellite, microwave etc)
4.1.7 Understand Network Components
4.1.8 Describe different types of modems – Dial up Modem, Cable Modem
4.1.9 Study Network Interface Card
4.1.10 Compare Router- Bridge- Gateway – Hub- Switch
4.1.11 Study ISDN

UNIT – V

5.1.0 Understand Internet & Wireless Networking

5.1.1 Study the concept of Internet
5.1.2 List the internet applications
5.1.3 Explain e-mail, world wide web
5.1.4 Outline the steps in installing Dial up internet connectivity
5.1.5 Describe Digital Subcriber Line (DSL)
5.1.6 Discuss Virtual Private Network

5.2.0 Study wireless Networks

5.2.1 Outline the Wireless LAN Standard – architecture & service
5.2.2 Study Infrared LAN, Spread Spectrum LAN, Marrowband Microwave LAN
5.2.3 Explain wireless access point, Wireless node , Wifi

CONTENT DETAILS

UNIT – I

SMPS –working-signals- AT-ATX, Display adapters, comparison-pin outs – VGA monitor- AGP-features & advantages
I/O Devices- matrix organization of keyboard- encoding a keypress- keyboard controller, mouse- opto electronic-optical – interfacing , scanners- hand held & flat bed, digital camera
Printers- impact- non-impact – dot matrix- inkjet – laser printer- working – interfacing

UNIT – II

Motherboard organization – form factor-, microprocessors- comparison, RAM, DRAM, SRAM, SDRAM- Memory refreshing- memory modules – cache memory – chipset- CMOS- BIOS- POST , ROM – types, Expansion cards

UNIT – III

Magnetic storage devices- File Allocation Table types- Floppy Disk – physical & logical organization- disk drive working principle – hard disk organization – construction , Formatting – high level- low level- partitioning
Optical recording – Compact disk – working – DVD – comparison, USB drives
Operating Systems – Windows, Linux – features- installation

UNIT – IV

Computer Networks- ISO-OSI reference model – Topologies- LAN, MAN, WAN, Media – guided-unguided- coaxial cable, twisted pair, optical fibre – Unguided , Network components – modems – Network Interface card – Repeater, Router, bridge, gateway, Hub, switch – ISDN

UNIT – V

Internet –concept – application- email – world wide web, dial up networking installation – DSL, Virtual Private Network

Wireless Networking – architecture & service – Infrared LAN, Spread spectrum LAN, Narrow Band microwave LAN, access point, node, Wifi

REFERENCE BOOKS

1. Troubleshooting, maintaining & repairing PCs - Stephen.J.Bigelaw
2. IBM PC clones - B.Govinda Rajulu
3. Upgrading and repairing PCs - Scott Muller
4. Modern All about Series - Manohar Lotia BPB- Publications
5. Data communication - Praksh C Gupta
6. Data & Computer Communications - Willianm Stallings
7. Wireless Broad band communication - John R Vacca
8. Wireless Communications & Networks - William Stallings

SUBJECT TITLE : INDUSTRIAL ELECTRONICS & PLC LAB
SUBJECT CODE : EL 505 / EI 505 / EP 505
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

CONTENT DETAILS

1. VI characteristics of SCR, Triac, and Diac
2. Single Phase control using resistance triggering circuit plot waveform. Across the load and SCR. Also find the maximum firing angle
3. Single-phase control using RC trigger circuit. Plot the waveform across the resistor load and SCR
4. Study the UJT trigger circuit. Plot the necessary waveform
5. Study of the phase control rectifier using SCR and load (resistive). Find the minimum and maximum values of firing angle.
6. TRIAC Firing Using DIAC
7. Study of DC motor speed control using SCR
8. Design and construct a time delay relay circuit
9. Design and construct an automatic street lamp
10. Set up an emergency lamp circuit using SCR
11. Set up a chopper and observe the waveform
12. Set up an inverter circuit using BJT and observe the waveform
13. Battery Charger circuit

PLC Programming

1. Study of PLC
2. Writing Direct On Line (DOL) starter program, compile it, download it to the PLC and executing the program by giving physical inputs
3. Stair case light
4. Counting pulses from a source and check for the pre determined value
5. Writing sample programs using jump
6. Writing sample programs using subroutine
7. Water level controller
8. Traffic light control
9. Conveyor control
10. Lift control

SUBJECT TITLE :PCB DESIGN &SPICE LAB
SUBJECT CODE : EL 506/EC506/EI 506
PERIODS/WEEK : 3
PERIODS/ SEMESTER : 48

CONTENT DETAILS

1. Preparation of PCB
   (a) Drawing the circuit diagram of analog and digital circuit functions
   (b) Layout and artwork procedure –
   (c) Translating circuit schematic into layout
   (d) Taping art work for single sided board
   (e) Print and etch by screen printing wet film and dry film
   (f) Drilling the board, surface preparation, PTH processing, solder mark testing the boards
   (g) Cross sectioning the plate through holes
   (h) Mounting/fixing procedure of components on PCB

2. Soldering and De-soldering Practice

   Soldering Iron – specification and selection of Iron – soldering film and solder – simple soldering with tag boards and prepare PCB – precaution in soldering with PCB's and IC's base – principle of wave soldering

3. PCB design and Practice using available computer soft ware

4. Electrical wiring
   - Switch board assembly
   - Exercises in Tube light internal wiring
   - Exercises in using switches and relays

5. Introduction to SPICE
   - component model & sources
   - units & values
   - types of analysis, operating point transient, A.C & D.C
   - simulation of circuts (transient, A.C & D.C)
     (a) characteristics of diode, BJT
     (b) Regulated power supply
     (c)Single stage amplifier
     (d)R C phase shift oscillator
     (e)Astable multivibrator using transistor
     (f)Astable multivibrator using 555

6. Construction of simple projects (minimum one)
   (a) Musical alarm
   (b) Emergency lamp
   (c) Moving display
   (d) Audio amplifier
   (e) Digital clock
   (f) Radio Receiver (AM and FM) etc.

Note: Each student must submit the above said project along with Lab record.

SUBJECT NAME : COMPUTER HARDWARE AND NETWORKING LAB
SUBJECT CODE : EL 507/ EC 507/ BM 507/ EP 507
PERIODS / WEEK : 3
PERIODS /SEMESTER : 48

EXPERIMENTS

Study and Installation

1. Study of different parts of Computer System
2. Study of different parts of Mother Board
3. Study of various types of connectors
4. Draw the pin details of the various connectors
5. Disassemble the computer systems
6. Assemble the computer systems
7. Using the CMOS Setup
8. Partitioning and formatting the Hard disc
9. Installing the CD drive
10. Installing the OS
11. Installing the Office software
12. Installing the Printer, Mouse, Sound card
13. Using PC diagnostic tools
14. Installing the Scanner
15. Installing and using Antivirus software
16. Installation of Network card
17. Connecting Systems in Network to Switch
18. Connecting the systems in Peer to Peer Network
19. Installing Modem and connecting Internet
20. Installing Multiple Network cards
21. Preparing the UTP cable for cross and direct connections using crimping tool
22. Installing Domain Controller OS
23. Installing and practicing remote administration
24. Installing and configuring a Web server Apache, IIS (Internet Information Service) and Netscape I planet or Netscape Enterprise Server
25. Installing and configuring E-mail server
26. Installing and configuring E-mail client
27. Downloading and uploading files using FTP in DOS prompt and cute FTP in Windows
28. Installing and configuring Proxy Server using Win proxy or Wingate
29. Configuring Browser for Internet access using Proxy server
30. Installing and configuring Virtual Private Network (VPN) on Windows servers

Troubleshooting

Troubleshoot the following faults

1. Computer crashes
2. Computer operation is slow
3. Start up – Blank Screen
4. Start up – Not booting
5. Blank display after booting
6. Color and brightness problem in display
7. CMOS check sum errors
8. Registry problems
9. Unable to access floppy drive – Floppy drive related problems

10. Unable to access CD drive – CD drive related problems
11. Disk Boot failure – Hard disc related problems
12. IDE card problems
13. Software driver problems
14. Sound card problems
15. Fatal error problems
16. Script error problems
17. Typomatic errors – Keyboard problems
18. Mouse not detected – Mouse problems
19. Unable to take print out – Printer related problems
20. Unable to scan – Scanner related problems
21. System gets hanging after 5 minutes due to SMPS
22. IDE Port problem in Mother board
23. FDD Port problem in Mother board
24. PCI Slot problems
25. Network card errors
26. Unable to connect domain as well as client in Network
27. Using Network diagnostic software Ping, Netstat, Tracert, Route, Ipconfig and Winipcfg
28. Accessing Network resources using Net at command prompt

REFERENCE:

1. Trouble shooting your PC by M.David Stone and Alfred Poor
2. Hardware Bible by Rosch
3. IBM PC and Clones by Govindarajulu
4. Enhanced guide to managing and maintaining your PC – Third Edition, Thomson
5. Peter Norton's New Inside the PC - Peter Norton, Scott Clark

SUBJECTS OF STUDY AND SCHEME OF EVALUATION

SEMESTER VI

Branch:Electronics

Code	Subject	Periods Per Week			Evaluation (Marks)			
		Theory	Practical/ Tutorial	Total	Theory	Practical	Internal	Total
GE 601	Industrial Management & Entrepreneurship	5	1	6	75		25	100
EL601/ EP601	Modern Communication Systems	5	1	6	75		25	100
EL602/ EC602/ EP602	Embedded Systems	5		5	75		25	100
EL603	Medical electronics	5	1	6	75		25	100
EL604	Embedded Systems Lab		3	3		75	25	100
EL605	VLSI Lab		3	3		75	25	100
EL606	Project work& Seminar : Seminar Project Work		 3 3	 3 3		50	 25 25	100
	TOTAL	20	15	35	300	200	200	700

SUBJECT TITLE : INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP
SUBJECT CODE : GE 601 (COMMON TO ALL)
PERIODS/WEEK : 5 + 1 Tutorial
PERIODS/ SEMESTER : 80 + 16

TIME SHEDULE

UNIT	TOPIC	PERIODS
I	1.1 Principles of Management	10
	1.2 Human Resource Management	5
II	2.1 Quality Planning and Control	5
	2.2 ISO-9000 & Installation	5
	2.3 TQM and Organizational Excellence	5
	Test – I	2
III	3.1 Project Management PERT / CPM	6
	3.2 Marketing & Sales	2
	3.3 Wages & Incentives	4
	3.4 Material Requirement Planning (MRP)	3
IV	4.2 Operations Research and Applications	10
	4.3 Management by Objectives (MBO)	3
	4.4 Management Information System (MIS)	2
	Test – II	2
V	5.1 Industrial Psychology	3
	5.2 Entrepreneurship Development	4
	5.3 Industrial Safety	4
	5.4 Environmental Pollution & Control	4
	Test – III	1
	Total	80 + 16

OBJECTIVES

UNIT – I

1.1.0 Understand the Principle of Management

1.1.1 Explain the meaning and concepts of management
1.1.2 Outline the characteristics of management
1.1.3 Illustrate the development of management theory
1.1.4 Illustrate the Taylor's scientific management and contributions
1.1.5 Illustrate Henry Fayol's principles of management
1.1.6 Compare the contributions of Taylor and Fayol
1.1.7 State the functions of management
1.1.8 Explain various administrative steps of each function
1.1.9 Describe different types of ownership
1.1.10 Explain different types of organization structure
1.1.11 Explain the concept of Leadership, Motivation & communication.

1.2.0 Appreciate the functions of Human Resource Management

1.2.1 Outline the importance of HRD
1.2.2 Explain the process of man power planning
1.2.3 Explain Job analysis, job evaluation, merit rating, performance appraisal
1.2.4 Training & Methods of Training

UNIT – II

2.1.0 Understand quality planning & control

2.1.1 Define quality
2.1.2 List the dimensions of quality
2.1.3 List the objectives of quality planning
2.1.4 Describe various quality control measures in brief
2.1.5 Explain quality assurance concept and definition
2.1.6 Describe in brief the Three Prong Approach to Quality Planning
2.1.7 Explain the need for quality management system
2.1.8 Draw quality loop

2.2.0 Understand the elements of ISO 9000, its Installation and audit

2.2.1 Describe the concept and role of ISO 9000
2.2.2 List the elements of ISO 9000
2.2.3 List the steps for installing quality system
2.2.4 Explain different ways of quality audit
2.2.5 Identify the agencies who give ISO certification
2.2.6 Discuss the role of accreditation board
2.2.7 Explain various stages of ISO 9000 implementation
2.2.8 Describe briefly the benefits of becoming an ISO 9000 company

2.3.0 Understand the concept of TQM and Organizational Excellence

2.3.1 Explain the concept of TQM
2.3.2 Outline the ten "Manthras" of TQM
2.3.3 Discuss in brief the link between ISO 9000 and TQM with TQM model
2.3.4 Draw the organizational structure of TQM
2.3.5 Explain the different techniques of TQM
2.3.6 Discuss the concepts and characteristics of Quality Circle
2.3.7 Discuss the brain storming technique used in quality circle for arriving at solutions
2.3.8 Explain the organizational excellence by TQM approach and through "SWOT" analysis
2.3.9 Write mission statement

UNIT – III

3.1.0 Apply the principles of CPM & PERT

3.1.1 Outline the network technique
3.1.2 List different applications of CPM & PERT
3.1.3 Out line scope of PERT & CPM

3.1.4 Define the terms used in CPM & PERT
3.1.5 Explain the procedure for finding the critical path
3.1.6 Compute the project duration, slack and critical path by using AON &AOA
3.1.7 Distinguish between CPM & PERT
3.1.8 Define the terms used in PERT
3.1.9 Explain the procedure for pert
3.1.10 Estimate activity time
3.1.11 Compute the project duration slack and mark the critical path
3.1.12 Solve the problems in PERT & CPM

3.2.0 Understand various steps in Marketing & Sales planning

3.2.1 Define marketing
3.2.2 List the objectives of marketing
3.2.3 Outline the core marketing concepts with the help of block diagrams
3.2.4 Discuss in brief the marketing mix, buying process and behaviour
3.2.5 Outline the importance of sales of products and services
3.2.6 List the functions of sales department
3.2.7 Explain the steps in market planning, market segmentation
3.2.8 Discuss the importance and functions of sales management
3.2.9 Discuss sales planning
3.2.10 Explain the market research and market information system

3.3.0 Understand the Principles of a good Wage Payment System

3.3.1 Outline the importance of a good wage plan
3.3.2 Define the different types of wages
3.3.3 List the requirements of a good wage plan
3.3.4 Define Incentives
3.3.5 Identify financial, non financial and semi financial incentives
3.3.6 Discuss different types of financial incentives plan
3.3.7 Compute the wages under different incentive plans with examples
3.3.8 Understand the concept of MRP
3.3.9 Understand the application of MRP

UNIT – IV

4.1.0 Understand various methods in Operations Research and its application

4.1.1 Outline the concept of optimization
4.1.2 Outline the scope of O.R
4.1.3 List the phases and processes of O.R
4.1.4 List the different methods of O.R.
4.1.5 Explain Linear programming graphical method & analytical method
4.1.6 Compute maximization of profit by linear programming - graphical method and analytical method (simple problems only)
4.1.7 Compute minimization of total cost by Linear programming - graphical method and analytical method (simple problems only)
4.1.8 Explain the transportation problem
4.1.9 Compute the initial feasible solution by north west corner rule and Vogel approximation method (simple problems only)
4.1.10 Explain the game theory
4.1.11 Compute the saddle point of the game two – person – zero sum using maximize and minimize principle (simple problems only)
4.1.12 Explain the queuing theory
4.1.13 List information required for formulating a mathematical model

4.2.0 Understand the concept of Management By Objective (MBO)

4.2.1 Outline the nature and purpose of MBO
4.2.2 Identify sequential MBO processes
4.2.3 List the merits and demerits of MBO
4.2.4 List the steps required for MBO

4.3.5 List the guidelines for setting objectives for MBO

4.3.0 Appreciate Management Information System (MIS)

4.3.1 Define MIS
4.3.2 Distinguish between data and information, data processing & MIS
4.3.3 State the need for information
4.3.4 Discuss the systems concept of management
4.3.5 Discuss a firm and its environment
4.3.6 List the objectives and inputs of an effective MIS
4.3.7 Explain the integrated MIS
4.3.8 List major functional and activity subsystems in MIS
4.3.9 Describe MIS development (system development) with the help of a line diagram
4.4.10 List applications of MIS

UNIT – V

5.1.0 Justify the concept of Industrial Psychology

5.1.1 Describe the meaning of Industrial Psychology
5.1.2 Outline the importance of good working conditions and environment
5.1.3 Explain the concept of Behavioural dynamics
5.1.4 Distinguish the interpersonal behaviour and interpersonal needs
5.1.5 Discuss the development of interpersonal relationship
5.1.6 Describe the development of better qualities (personality traits)

5.2.0 Formulate the feasible project report to start a small scale industry

5.2.1 Explain the concept of entrepreneurship
5.2.2 Describe the profile of an entrepreneur
5.2.3 List the functions of an entrepreneur
5.2.4 List the risk taking qualities of an entrepreneur
5.2.5 Explain the concept of entrepreneurial development
5.2.6 List the different factors contributing to the failure of entrepreneurial ventures
5.2.7 Identify industrial support needed programs existing in India
5.2.8 State the concept of small scale and ancillary industrial undertaking
5.2.9 List the steps involved in starting small-scale industry
5.2.10 Describe the procedure of registration of SSI
5.2.11 Identify the net work of financial assistances given to SSI
5.2.12 Identify the different constituents of feasibility study
5.2.13 Prepare the feasibility report / project report

5.3.0 Recognize the features of Industrial Safety

5.3.1 Explain the importance and need for safety measures in industries
5.3.2 Define the meaning of the term – factory, accident, frequency rate, security rate, accident pronnes, unsafe acts, unsafe conditions, job safety analysis, plant safety inspections
5.3.3 Identify the various accident factors, mechanical factors, environmental factors, personal factors
5.3.4 Discuss the 4 E's of accident prevention technique
5.3.5 List the precautions to be observed while working in an hazardous environment
5.3.6 Explain briefly the artificial respiration methods

5.4.0 Recognize the causes of environmental pollution and steps to be taken to control the pollution

5.4.1 Define the terms Ecology and Ecosystem
5.4.2 Explain the impact of industrial development on environment
5.4.3 Explain the causes and effects of air and water pollution on plant, animal life and materials
5.4.4 Identify the characteristics of industrial and municipal waste
5.4.5 Outline the various treatment processes
5.4.6 Identify the sources of air pollutants
5.4.7 State the effects of air pollution

5.4.8 Outline the methods of prevention and control of air pollution
5.4.9 Explain the term solid waste management
5.4.10 List the salient features of environmental pollution control legislation
5.4.11 State the functions of pollution control board
5.4.12 Define NOISE
5.4.13 Identify the causes of noise pollution
5.4.14 Explain the various methods of noise control

CONTENT DETAILS

UNIT – 1

1. Principles of management

Introduction – meaning of management: - Management as an art of getting things done, management as a process, management as an activity

Management and administration – Development of management theory: - Taylor's scientific management, contributions of F.W. Taylor, Henry Fayols principles of management (Brief description), compare F.W. Taylor & Henry Fayol's contributions

Functions of management: -

a) Planning: - concept, steps in planning
b) Organizing: - concept and process steps, steps in organizing
c) Staffing: - concept, list functions of staffing
d) Directing: - concept, list the elements of directing
e) Controlling: - Concept, list the steps in controlling process
f) Decision making: - concept, steps in decision making, scientific approach to decision making

Different types of ownership: - Sole proprietorship, partnership, private Ltd., company, public Ltd., company, co-operative society (brief description only)

Organizational structure: - Definition of organization, different types of organizational structure: - line, functional, line & staff organization (brief description with advantages & disadvantages)

Leader ship - Define leadership, different types of leadership, qualities of a good leader

Motivation - characteristic of motivation, importance, Marlow s need hierarchy theory, Techniques of motivation

Communication – Types of communication, Barriers in communication.

2. Human Resource Management

Concept of HR Management – Development of HR Management – Components of HRD – Job analysis – Job description – Job speciation , Manpower planning – Requirements of manpower planning – Factors affecting the manpower planning – Job evaluation – Steps required for job evaluation – Methods for job evaluation – Merit rating – objectives and methods – performance appraisal. Training – Importance of training – Methods of training – advantages of training (Brief description only)

UNIT - II

1. Quality Planning and Control

Definitions of quality, Requirements of quality, list objectives of quality planning – quality control: - operator's quality control, inspectors quality control, Mangers quality control, total quality control.

Quality Assurance: - Concept, definition, responsibility of quality assurance department, planning for quality assurance – three prong approach to quality planning: - (1) Product planning (2) Managerial & Operational planning (3) Documentation. Quality management system, quality loop.

2. ISO 9000 & Installation

Concept and role of ISO 9000, what is ISO 9000, whom does it help, elements of ISO 9000, steps for installation of quality system - preparatory step, implementation step, registration & certification step.

Quality Audit - objectives, types off audits: - Adequacy audit, compliance audit, system audit, product audit, first party audit, second party audit, third party audit. Steps required to apply for ISO – 9000 Registration. Benefits of becoming an ISO 9000 company.

3. Understand the concept of TQM and Organizational Excellence

Concept, ten mantras of TQM, the link between ISO 9000 and TQM with the help of TQM Model – organization of TQM. Techniques of TQM - PDCA, Total Employee Inolvement (TEI), POKA – YOKA – Failure proofing, JIT manufacturing.

Quality Circles - concept, characteristics, Brain storming method for solving Q.C. Problems. Organizational excellence through TQM - List the strength, weakness, opportunity and threat (SWOT analysis) of an organization by an example and analyse the current status – mission statement.

UNIT – III

1. Management Techniques – CPM & PERT

Introduction to Network analysis, application of CPM & PERT, scope of CPM & PERT commonly used terms in CPM: - Operation, pre-operation, post operation, concurrent operation, earliest finish time EFT), latest finish time (LFT), Critical activities, critical path, EVENT, SLACK or FLOAT, Dummy activity, - procedure for CPM, problems on CPM, projects duration, slack, mark critical path (by AOA and AON method).

PERT - comparison between CPM & PERT, procedure for PERT, Estimation of activity time, commonly used terms in PERT, Event, Activity, successor Event, Predecessor event, Earliest Expected Time, Latest allowable time, slack – problems in PERT.

2. Marketing & Sales

Marketing - introduction, definitions, objectives, core concepts: - block diagram, distinguish between marketing and sales, marketing MIX. Buying process & behaviour of consumer, steps in market planning – market segmentation. Sales - importance of sales, functions of sales management, market research, market information system. Fore casting related to marketing and sales

3. The Principles of a good wage payment system

Importance of good wage plan, types of wages - nominal, real, living, fair, minimum wages – requirement of a good wage payment system. Incentives - definitions, types of incentive plan for direct workers - non financial and semi financial incentives – financial incentive plans - straight piece rate system, straight piece rate with guaranteed minimum wage, differential piece rate system, Halsey plan, Rowan plan, Gantt (simple illustrative problems)

4. Material requirement planning (MRP)

MRP objectives & functions – Terminology – MRP systems – MRP outputs – Management information from MRP – Lot sizing considerations – Examples – applications – introduction to MRP – II - Just in time (JIT). (Brief description only)

UNIT – IV

1. Operations Research & Application

Concepts of OR, scope of OR, phases and process of OR, methods of OR -

1. Linear programming: - a) graphical & analytical method b) transportation method: - North west corner rule, Vogel approximation method
2. Waiting line or Queuing theory
3. Game theory

Linear programming: - concepts, formulation of LPP, Do problems on maximization of profit, minimum of total cost (by graphical & analytical method)

Transportation problem: - meaning, compute the initial feasible solution by northwest corner rule & Vogel approximation method (simple problems)

Game theory: - concept, two-persons zero sum game, the maxi-min- mini-max principle –optimal strategy, saddle point, example problems to compute saddle point – waiting line or queuing theory - concept, the information required for formulating a mathematical model (simple problems)

2. Management by objectives (MBO)

Concepts & definition, contents of MBO, sequence of MBO process with block diagram, steps required for MBO, guidelines for setting objectives

3. Management Information Systems (MIS)

Definition of MIS, Data, Information, management, systems concepts of management, a firm and its environment, objectives, contents of MIS, need for information, integrated MIS, functional and

activity subsystems, MIS development - line diagram, application of MIS - inventory management, Human resource management, personal decision making.

UNIT – V

1. Industrial Psychology

Meaning, importance of good working conditions and environment: - physical working conditions, psychological working conditions, working conditions related to time, related to social situation. Behavioural dynamics: - self concept and self understanding, inter personal needs, developing interpersonal relationship: - framing fint impression, developing mutual expectations, hounouring psychological contracts, developing trust & influence, projecting positive qualities and hiding negative points – developing better behaviour and qualities a TQM approach: - conducting 'SWOT' analysis for self understanding, prepare incremental projects to reduce weakness and threats - mission statement

2. Small Scale Industries – Entrepreneur

List steps required to start small scale industry, procedure for registration (provisional and permanent registration) – sources of financial assistance, govt., assistance for development of SSI, preparation of project report, Tax: - an overview of income tax – excise duty, sales tax – procedure to be followed for sales tax

3. Industrial Safety

Define Accident, Frequency rate, severity rate, and accident proneness.

List the causes of accidents: - Mechanical, Environmental, personnel factors accident prevention techniques – 4 E'S of Accident prevention technique

4. Environmental Pollution and control

Ecology and Eco system, Impact of industrial development on environment, Causes and effects of air and water pollution on plant, animal life and material, Characteristics of industrial and municipal waste, Treatment processes:- Primary, secondary and territory, Sources of air pollutants on human beings, Effects of air pollutants on human beings, Prevention and control of air pollution, Solid waste management, Environment pollution control legislation and functions of pollution control boards, Causes of noise pollution and its control

Special Instruction to Question Setters

1. All units should be given equal weightage of marks
2. Problems from wage plan, CPM-PERT, and O.R should be included in every question paper in order to measure the application capability of students

REFERENCE BOOKS

1. Industrial Engineering & production management – Martand.T.Telsang S.chand & Company
2. Industrial Engineering & Management - O. P. Khanna
3. Operations Research - Premkumar Guptha, D.S. Hira
4. TQM - Productivity Council
5. ISO - Tapan.P.Bagachi
6. Entrepreneurship Development - Jagmer Singh Saihi
7. Industrial Management & Engineering Economics - Banga & Sharma
8. TQM - B. Senthil Arasu & J.Praveen Paul Scitcch Publications

SUBJECT TITLE : MODERN COMMUNICATION SYSTEMS
SUBJECT CODE : EL 601/EP601
PERIODS/WEEK : 5+1(Tutorial)
PERIODS/ SEMESTER : 80+16

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Telephone switching		16
		Test - I	1
II	Microwave Communication		14
		Test - II	1
III	Satellite Communication		15
		Test - III	1
IV	Fiber Optic Communication System		15
		Test - IV	1
V	Mobile Communication		15
		Test - V	1
		Total	80+16

OBJECTIVES

UNIT – I

1.1 Understand Strowger Switching system and signaling tones
1.2 Understand crossbar switching system
1.3 Understand Electronic space division switching
1.4 Understand Electronic Time division switching
1.5 Understand the basics of ISDN

UNIT – II

2.1.0 Understand Microwave Communication
- 2.1.1 Describe working klystron with a diagram
- 2.1.2 Explain the working of TWT with a neat sketch
- 2.1.3 Explain the working of Reflex Klystron with a neat sketch
- 2.1.4 Describe working of a Gunn diode
- 2.1.5 Describe working tunnel diode
- 2.1.6 Explain the function wave guides
- 2.1.7 Explain the working principles of Horn Antenna
- 2.1.8 Describe the function of Microwave transmitter
- 2.1.9 Describe the function of a Microwave receiver
- 2.1.10 Explain a micro wave link repeater

UNIT – III

3.1.0 Understand Satellite Communication
- 3.1.1 Describe satellite frequencies
- 3.1.2 Give an over view of satellite communication
- 3.1.3 Explain TDMA
- 3.1.4 Explain FDMA
- 3.1.5 Explain CDMA
- 3.1.6 Describe communication satellite orbit
- 3.1.7 Explain station keeping
- 3.1.8 Define path loss
- 3.1.9 Explain passive and active satellites

3.1.10 Give concepts of Geo stationary satellite
3.1.11 Give details of various equipments used in satellite Earth station
3.1.12 Describe Dish antenna reception
3.1.13 Describe a satellite digital receiver
3.1.14 Explain VSAT
3.1.15 Give applications of satellite (G&S & GPS)
3.1.16 Give a list of important satellites

UNIT – IV

4.1.0 Understand Fiber Optic communication

4.1.1 Give block diagram of fiber optic communication system
4.1.2 Give advantages of fiber optic communication
4.1.3 Explain acceptance angle
4.1.4 Explain numerical aperture
4.1.5 Give comparison between single mode and multimode fibers
4.1.6 Describe graded index fiber
4.1.7 Explain cable losses
4.1.8 Describe LED
4.1.9 Describe Lasers
4.1.10 Explain the working of PIN diodes, used in fiber optics
4.1.11 Explain avalanche diodes used in fiber optics
4.1.12 Give application of fiber optics in data communication

UNIT – V

5.1.0 Understand Mobile Communications

5.1.1 Know the principle of cellular network
5.1.2 Explain the operation of cellular system
5.1.3 Explain power control methods
5.1.4 Describe the GSM network architecture
5.1.5 State GSM standards
5.1.6 Understand CDMA technology
5.1.7 Explain the DECT operation.
5.1.8 Describe the operation of mobile IP
5.1.9 Know WAP & WML.
5.1.10 Know the concept of cell,frequency reuse,Handoff,Channel fading and mitigation

CONTENT DETAILS

UNIT - I:

Telephone Switching

Signalling tones, Strowger system-Strowger switching components-Step by step switching-design of a 100 line switching system

Cross bar switching- principle- switch configurations- cross bar exchange organization

Electronic space division switching- Stored Program Control(SPC)- Central SPC and distributed SPC-two stage and three stage networks

Basic time division time switching – phased and slotted operations

Introduction to ISDN- architecture- signaling.

UNIT – II:

Microwave Communication

Microwave tubes and circuits – Klystron – TWT, Reflex Klystron - Microwave devices – Gunn diode, Tunnel diode, wave guides, Horn Antennas

Microwave transmitter and Receiver – Microwave link and repeaters

UNIT – III

Satellite Communication

Satellite communication – Introduction, satellite frequencies – up link and down link – transponder – modulation – TDMA, FDMA, CDMA, Communication satellite orbit – station keeping, transmission path and path loss – passive and active satellites – concepts of Geo stationary synchronous satellite – Earth station – Direct reception from satellite by low power transmitter station – Dish antenna – reception – satellite digital receiver. VSAT for Data communication - land survey satellite – GIS and GPS applications – Important satellites

UNIT – IV

Fiber Optical Communications System

Fiber optic system – Block diagram, advantages – optical fibers – wave guides, refraction, acceptance angle, numerical aperture – single mode Vs multimode – grade index fiber – pulse dispersion – cable construction, cable losses – connectors – splices – connector assembly high sources – LED, LASERs – Light detectors – PIN diodes – Avalanche diodes – systems components – application in data communication.

UNIT – V

Mobile Communication

Principles of cellular networks -Operations of cellular systems-Power control-Global system for Mobile communication (GSM) & 3GSM- CDMA- Cordless systems- Digital Enhanced Cordless Telecommunication (DECT)- Wireless Local Loop (WLL)- Mobile IP- WAP- WML – Concept of Cell, frequency reuse, Handoff, Channel fading and mitigation

REFERENCE BOOKS

1. Telecommunication Switching - Viswanathan (PHI)
2. Microwave Devices - Liao
3. Electronic communication systems - George Kennedy
4. Electronic communication - Robert. J. Schoenbeck, 2nd Edition – 2002
5. Electronic Communication system - Roy Blake 2nd Edition, Thomson & Delmar
6. Satellite Communication - Roddy
7. Satellite Communication - Timothy Pratt
8. Optical Fiber Communication - Senior
9. Wireless Communication - Rappaport
10. Electronic and radio Engineering F E Terman

SUBJECT TITLE : EMBEDDED SYSTEMS
SUBJECT CODE : EL602/EC602/EP602
PERIODS/WEEK : 5
PERIODS/SEMESTER : 80

TIME SCHEDULE

UNIT	TOPIC	PERIODS
I	Introduction to PIC Architecture	15
	Test - I	1
II	PIC Instructions	15
	Test - II	1
III	Advanced Features	15
	Test - III	1
IV	Introduction to Embedded Systems	15
	Test - IV	1
V	Architecture of Embedded Operating Systems	15
	Test - V	1
	Total	80

OBJECTIVES

UNIT – I

Introduction to PIC architecture

1.1.0 Discuss PIC

1.1.1 Discuss PIC series of controllers
1.1.2 General features of PIC, and compare 16 C 6X/7X family
1.1.3 Discuss architecture of PIC 16C6X / 7X
1.1.4 Discuss pin details, memory organization, program/data
1.1.5 Define SFR, CPU Registers etc

UNIT – II

Programming of PIC

2.1.0 Discuss addressing modes

2.1.1 Direct addressing
2.1.2 Indirect Addressing

2.2.0. Discuss instruction set

2.2.1 Byte level instructions
2.2.2 Bit level instructions
2.2.3 Literal and Control instructions

2.3.0 Explain different types of instructions

2.3.1 Arithmetic instructions
2.3.2 Logical instructions
2.3.3 Increment/Decrement Instructions
2.3.4 Data Transfer, Clear, Rotate Instructions
2.3.5 Branch and miscellaneous instructions

UNIT –III

Built in advanced features of PIC 16F6X / 7X

3.1.0 Discuss various Timer functions

- 3.1.1 List available built in timers – Timer 0, Timer 1, Timer 2
- 3.1.2 Discuss Timer 1 modes – Compare and Capture Modes
- 3.1.3 Discuss about Timer 2 mode – PWM mode

3.2.0 Discuss about Synchronous Serial Port modes

- 3.2.1 List SSP modes – Serial Peripheral Interface and Inter Integrated Circuit
- 3.2.2 Briefly explain different modes in Serial Peripheral Interface (SPI)

3.3.0 Discuss about built in USART

- 3.3.1 Explain Transmit mode
- 3.3.2 Explain Receiver Mode
- 3.3.3 Mention various registers in connection with USART

3.4.0 Discuss about Analog to Digital converter

3.5.0 Discuss other special features

- 3.5.1 Configuration Word
- 3.5.2 Oscillator types
- 3.5.3 Reset Types
- 3.5.4 Interrupts
- 3.5.5 Watch Dog Timer
- 3.5.6 Power Down or SLEEP Mode
- 3.5.7 Serial Programming

UNIT – IV

Introduction to Embedded System

4.1.0 Define an embedded System

- 4.1.1 Discuss about different application area
- 4.1.2 Mention different categories of embedded systems, like Stand alone, Real Time, Networked and Mobile

4.2.0 Know the specialties of an Embedded System compared to desktop, workstations and mainframes

- 4.2.1 Reliability
- 4.2.2 Performance
- 4.2.3 Power Consumption
- 4.2.4 Cost
- 4.2.5 Size
- 4.2.6 Limited User Interface
- 4.2.7 Software Up-gradation capability
- 4.2.8 Processor Power
- 4.2.9 Memory
- 4.2.10 Operating Systems
- 4.2.11 Communication capabilities / Network capabilities

4.3.0 Discuss a general architecture of an embedded system – block diagram

4.4.0 Discuss different Hardware development Platforms

- 4.4.1 Explain 89C51 Based Development Board
  - 4.4.1.1 Features
  - 4.4.1.2 Hardware description (Block Diagram)
  - 4.4.1.3 Different components
- 4.4.2 Explain AVR ATmega 128 Microcontroller based Development Board
  - 4.4.2.1 Features
  - 4.4.2.2 Hardware Description
  - 4.4.2.3 Description of AVR ATmega 128 Microcontroller
  - 4.4.2.4 Components
- 4.4.3 Explain Intel StrongARM microprocessor based development Board
  - 4.4.3.1 Features of StrongARM Processor

4.4.3.2 Discuss Prayog
4.4.3.3 Features of Prayog, Block diagram and Components
4.4.3.4 Applications on ARM platform

UNIT – V

Architecture of an Embedded Operating System

5.1.0 Different activities of embedded system operating system

5.1.1 Discuss various activates of an embedded OS like , Task, Task Scheduling , Context Switching , Mutual Exclusions, Inter task communications, Memory Management and Timer services (Brief explanations only)

5.2.0 Embedded System OS architecture

5.2.1 Discuss a general architecture of an embedded OS
5.2.2 Discuss the role of Kernal in embedded OS
5.2.3 Explain how Device Manager interface different applications with hardware
5.2.4 Discuss the duties of Network Communication Software in an embedded OS
5.2.5 Discuss about library and its use in an embedded OS
5.2.6 Discuss about file systems in an embedded OS

5.3.0 Introduce different categories of embedded OS and give examples for each

5.3.1 Non-Real Time OS
5.3.2 Real-Time OS
5.3.3 Mobile/Handheld OS

CONTENT DETAILS

UNIT – I

Introduction to PIC, Features, Compare 16C 6X / 7X family members – Architecture of PIC 16F74A – Block Diagram – Features of 16F74A – Pin configuration – Memory Organization – Program Memory – Data Memory – Define SFR – CPU Registers

UNIT – II

Addressing modes – Direct Addressing – Indirect Addressing – Instruction Set – Byte Oriented – Bit Oriented – Literal and Control Instructions – Arithmetic – Logical – Increment/decrement – Data transfer – Clear instructions – Rotate instructions – Branch (Conditional & unconditional) – and Miscellaneous Instructions – Simple programs

UNIT – III

Built in advanced features of 16C 6X / 7X PIC – Timers – Features of Timer 0– Timer 1 and Timer2 – Timer1-Compare mode-Capture Mode – Timer2-PWM Mode
Synchronous Serial Port (SSP) – Modes in SSP module-Serial Peripheral Interface (SPI) and Inter Integrated Circuit (IIC) – SPI module modes
USART – Transmitter mode – Receiver mode – Registers
Analog to Digital Converter – Features – Special feature – Configuration word – Oscillator configuration – Reset types – Interrupts – Watch Dog Timer – Power Down Mode and In – Circuit Serial Programming

UNIT – IV

Introduction to Embedded systems – Application Areas – Categories of embedded systems – Specialties of Embedded Systems – Architecture of Embedded System (Block Diagram)
Hardware Platforms: Types of Hardware Platforms – Single Board Computers, PC add-on Cards and Custom-Built Platforms
Custom-Built Platforms – 89c51 microcontroller based development board – Feature of 89c51 – Development board Features – Hardware Description and Components
AtmelAVR ATmega128 microcontroller based development board–Feature of AVR ATmega128 – Development board Features – Hardware Description and Components

Intel StrongARM processor based development board–Feature of StrongARM – Development board - PRAYOG– PRAYOG block diagram – components applications on ARM Platforms

UNIT – V

Architecture of Embedded Operating System – Activities of embedded OS – Tasks – Task Scheduling – Context Switching – Mutual Exclusion – Inter Task Communications – Memory Management – Timer Services

Embedded OS – block diagram–Embedded OS Parts – Kernal – Device Manager – Networking Protocol Software – Libraries and File Systems

Categories of Embedded System OS – Non Real Time OS – Real Time OS – Mobile and Hand held OS – Examples for each category

REFERENCE BOOKS

1. Micro Controller based System Design - P.S. Manoharan & P.S. Kannan (Sci Tech)
2. Embedded/ Real Time Systems - Dr. K.V.K.K. Prasad (Dreamtech)
   Concept, Design & Programming.
   The Ultimate Reference

SUBJECT TITLE : MEDICAL ELECTRONICS
SUBJECT CODE : EL 603
PERIODS/WEEK : 5+1(Tutorial)
PERIODS/ SEMESTER : 80+16

TIME SCHEDULE

UNIT	TOPIC		PERIODS
I	Bioelectric Potentials & Transducers		15
		Test	1
II	Diagnostic Medical Instruments		15
		Test	1
III	Therapeutic and Analytical Instruments		15
		Test	1
IV	Imaging Systems & Bio telemetry		15
		Test	1
V	Safety Precautions & Computer applications in Medical Field		15
		Test	1
		Total	80+16

OBJECTIVES

UNIT – I

1.1.0 Bioelectric Potentials

1.1.1 Explain resting and action potentials. Sodium pump and transmission of impulses. Describe the wave forms

1.1.2 Explain different types the different types of electrodes used for ECG, EEG and EMG.

1.2.0 Understand the working of different physiological transducers

1.2.1 List the different types of pressure transducers used in biomedical instruments

1.2.2 Describe with sketches, the working principle of variable capacitance pressure transducers, LVDT, Bonded and un bonded strain gauges

1.2.3 Describe the working principle of thermo couple and thermistors used in Biomedical measurement

1.2.4 List the selection procedure

1.2.5 Explain the working principle of optical fiber temperature sensors

1.2.6 State the working principle of photo electric pulse transducers

1.2.7 State the principle of piezo-electric arterial pulse receptor

1.2.8 Explain the working principle of strain gauge type respiration sensor.

UNIT – II

2.1.0 Diagnostic Medical

2.1.1 Draw the diagram and explain electrical activity heart

2.1.2 Explain the origin and significance of ECG wave form,

2.1.3 Lead system of ECG.

2.1.4 Study ECG recording and effects of errors in recording

2.1.5 ECG block diagram explanation
2.1.6 Explain the electrical activity of Brain
2.1.7 Indicate the different frequency regions & Lead system of EEG
2.1.8 EEG Block diagram explanation
2.1.9 List the types of electrodes used and their arrangement while monitoring EEG
2.1.10 Explain the bio-electrical potentials associated with muscle activity,
2.1.11 EMG Block diagram explanation.
2.1.12 Explain the waveform of EMG.
2.1.13 Explain the significance of EEG.

UNIT – III

3.1.0 Understand the different types of therapeutic instruments

3.1.1 State the need of pacemakers
3.1.2 Classify different types of pacemakers
3.1.3 Compare the advantages of implantable pacemakers over external pacemakers
3.1.4 Draw the block diagram of a ventricular synchronous demand pacemaker and explain its operation
3.1.5 State the need of defibrillators
3.1.6 Compare ac defibrillators and dc defibrillators
3.1.7 Explain the functions of dialysis machine
3.1.8 List different types of themodialysis machine
3.1.9 State the working principle of a portable Hemo-dialysis machine with a diagram
3.1.10 State the use respirators
3.1.11 Explain the classification of respirators according to pressure cycling and volume cycling
3.1.12 Explain & List the different types of diathermy equipments
3.1.13 Draw the methods of applying electrodes in short wave diathermy treatment
3.1.14 List the advantages and disadvantages of short wave diathermy treatment
3.1.15 Draw the schematic diagram of microwave diathermy unit and explain its working

3.2.0 **Understand the functions of different types of analytical instruments**

3.2.1 State the necessity of blood cell counting
3.2.2 List the different methods of blood cell counting
3.2.3 Explain blood gas analyzer

UNIT – IV

4.1.0 Understand the methods of producing X-rays

4.1.1 Describe the construction and operation of an X-ray machine with a block diagram
4.1.2 Describe the working principle of CAT Scanner
4.1.3 Explain the working principle of an ultrasonic imaging system
4.1.4 Explain the working principle of nuclear magnetic resonance imaging system

4.2.0 Bio telemetry

4.2.1 State the need of Bio telemetry
4.2.2 Draw the bio telemetry system block diagram and explain
4.2.3 State the application of Bio telemetry system with example

UNIT – V

5.1.0 Patients safety

5.1.1 list the effect of electricity ,electromagnetic radiation & magnetism in the Human body
5.1.2 State the precautions to be taken while handling biomedical instruments
5.1.3 List the precautions to be taken while handling X-ray machines
5.1.4 List the electrical safety considerations with respect to machine operators and patients – Macro shock – Micro shock (explanation)

5.2.0 Understand the use of computers in bio medical field

5.2.1 State the method of using computer for medical field
5.2.2 List the information networks for medical education and patient care
5.2.3 Understand the video conferencing
5.2.4 Explain the concept of Telemedicine

5.3.0 Lasers and its applications

5.3.1 Working Principles of Nd –Yag Laser
5.3.2 Application of laser in medical field

CONTENT DETAILS

UNIT – I

Introduction

physiological systems of a body. Bio electricity – Resting and action potential - transmission of impulses - Electrode used for Bio potential measurement

Physiological Transducers (Principles of operation, types and selection criteria)

Pressure Transducers - Transducers for body temperature measurement - Optical – Fiber temperature sensors - Photo electric pulse transducers - Piezo – electric arterial pulse receptor - Respiration sensors

UNIT – II

Diagnostic Medical Equipments

Electrical activity of the heart; ECG waveform – ECG lead system Electro cardio graph (ECG) Electrical Activity of the brain, EEG wave form -frequency bands-10-20 lead system -Electro encephalograph (EEG), Electrical Activity of the muscles; EMG Wave form -Electro mayo graph (EMG) - (Principle of operation & specifications only)

UNIT – III

Therapeutic and analytical instruments

Therapeutic Instruments (Basic Principles only) - Cardiac Pacemakers- types- Cardiac Defibrillators – types-–diathermy- Short wave diathermy - Micro wave diathermy

Hemo-dialysis machine – Respirators-ventilators

Analytical Instruments - - Blood cell counters - Blood gas analyzer

UNIT – IV

Imaging systems and Bio – Telemetry

X-Ray Machine & Computed Axial Tomography(CAT), Ultrasonic Imaging - Magnetic resonance Imaging , Biotelemetry system – components in Biotelemetry system - Application of Bio telemetry

UNIT – V

Safety Precautions

Intrinsic Safety - Electrical safety – macro shock – micro shock computer applications

Computers in medical field

Hospital Administration System-Computer assisted therapy - Computer care of critically ill patient - INTERNET, INTRANET,LAN application in medical field – video conferencing – telemedicine

Lasers in Medical Field

Nd- Yag Laser, Applications of lasers in medical field

REFERENCE BOOKS

1. Hand Book of Biomedical Instrumentation - R. S. Kandpur
2. Principles of Applied Bio medical Instrumentation - L. A. Taddes & Baker
3. Biomedical Instrumentation and Measurements - Leslie Cromwell & Free. J.Weibell
4. Medical Instrumentation - John. G. Webster
5. Biomedical Instruments - Dr. Arumugham.
6. Advanced Biomedical Engineering - Levine
7. Computer the Machine - LELE
8. Biomedical Digital Signal Processing - Tampkins
9. Neural Networks & Artificial Intelligence for Biomedical Engg. - Hudson and Cohen
10. Introduction to Biomedical equipment Technology- Joseph Carr & Joseph Brown

SUBJECT TITLE : EMBEDDED SYSTEMS LAB
SUBJECT CODE : EL 604/EC 604
PERIODS/WEEK : 3
PERIODS/SEMESTER : 48

CONTENT DETAILS

PIC Programming

1. Familiarization of PIC development Kit
2. Addition of two 8 bit data
3. Subtraction of two 8 bit data
4. Multiplication of two 8 bit data
5. Block transfer of data
6. Programs that makes the processor into SLEEP mode
7. Programs that includes Watch Dog Timer programming
8. Counter programs using Timer
9. PWM using Timer 2
10. Programs for communicating with other microprocessors using Synchronous Serial port
11. Programs for communicating with an external ADC
12. Serial transmit type programs using in built USART
13.

REFERENCE BOOKS

1. Micro Controller based System Design - P.S. Manoharan & P.S. Kannan (Sci Tech)
2. Embedded/ Real Time Systems - Dr. K.V.K.K. Prasad (Dreamtech)
   Concept, Design & Programming.
   The Ultimate Reference

SUBJECT TITLE : VLSI LAB
SUBJECT CODE : EL 605 / EC 605 / EP 605 / EI 605
PERIODS/WEEK : 3
PEIODS/ SEMESTER : 48

EXERCISES

1. Writing sample program and test bench using Verilog editor and test it using simulator software

   Program exercises-

   a) Basic gates
   b) 4 to 1 multiplexer
   c) Decoder
   d) Full adder
   e) 4 bit full adder
   f) Magnitude comparator
   g) SR flip-flop
   h) T flip-flop
   i) Ripple counter
   j) Traffic signal controller
   k) Bi- directional switches
   l) 4 bit synchronous counter with clear and count enable

2. Writing simple decoder program using PALASM assembler
3. Programming PAL using the programmer and test the IC
4. Design PAL for IC 74138, write the program, assemble and program the PAL and test it
5. Design PAL for traffic light controller, write and assemble and program the PAL and test it
6. Simple projects in PAL
7. Simple projects in Verilog

SUBJECT TITLE : PROJECT WORK AND SEMINAR
SUBJECT CODE : EL 606
PERIODS/WEEK : 6
PERIODS/SEMESTER : 96

CONTENT DETAILS

The project gives an opportunity to the student to apply all his knowledge and skill acquired throughout his/her study. The finished project will show the students skill in the fabrication of the Electronic circuits. Hence, students should employ his/her ingenuity to reflect his/her own desire and requirement. The project will make the student confident of his/her ability to apply to all the skills in constructing the circuit or equipment of which he /she can be proud of it.

The following are the steps involved in doing the project work

Problem definition
Gathering information/data needed for solution
Identification of the best solution
Design of the circuit
Collection of the suitable materials
Planning and fabricating
Testing and correcting
Preparation of the project report

The internal and end evaluation marks are awarded on the basis of the above along with the viva voce at the end.
Every student must present a seminar on any emerging area in Electronics in third year.

List of Faculty who made Contributions to the Curriculum Revision 2006

Sl. No	Name	Designation
1	Shri. C.C. Joseph	Scientist, VSSC
2	Shri. Thiagarajan	Professor, NITTTR, Chennai
3	Shri. Dhanasekharan	Professor, NITTTR, Chennai
4	Shri. Saji A.J	Asst. Professor, CET
5	Sri. Philip Kurian	Asst. Professor&Head in Charge, NITTTR Extn Centre, Kalamassery
6	Sri. Cyriac Jose	Head of Section in Electronics
7	Sri. Subair P.H	Head of Section in Electronics
8	Smt. Anitha C.G	Head of Section in Electronics
9	Sri. Sanjeevan B.K.	Head of Section in Electronics
10	Sri. Jayakumar R	Head of Section in Electronics
11	Sri. Rajesh	Head of Section in Electronics
12	Smt. Geetha Devi R.	Head of Section in Electronics
13	Sri. Stanly John	Head of Section in Electronics
14	Smt. Geetha S.	Head of Section in Electronics
15	Smt. Ajitha Kumari	Head of Section in Electronics
16	Smt Chandrakantha	Head of Section in Electronics
17	Sri. Soju S.S.	Lecturer in Electronics
18	Sri. Assainar M	Lecturer in Electronics
19	Smt. V. Sulochana	Lecturer in Electronics
20	Sri. Padmakumar P.K	Lecturer in Electronics
21	Sri. Ajith Kumar	Lecturer in Electronics
22	Sri. Shajan Jacob	Lecturer in Electronics
23	Smt. Sheeja T.S	Lecturer in Biomedical Engg
24	Sri. Pradeep T.G	Lecturer in E&I
25	Smt. Manju A.R	Lecturer in E&I