REVISED CURRICULUM OF

COMPUTER SCIENCE & ENGINEERING

IN

MULTI POINT ENTRY & CREDIT SYSTEM

PART-II

For the State of Meghalaya

National Institute of Technical Teachers' Training & Research
Block – FC, Sector – III, Salt Lake City, Kolkata – 700 106

June 2015

C O N T E N T S

1. FOUNDATION COURSES FOR COMPUTER SCIENCE & ENGINEERING:

Sl. No	Code	Course	Study Scheme				Evaluation Scheme						Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory			Practical				
				L	T	P	End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
1	G101	Communication Skill-I	-	2	0	2	70	15	15	0	25	0	125	3
2	G102	Communication Skill-II	G101	2	0	2	70	15	15	0	25	0	125	3
3	G103	Mathematics-I	-	4	1	0	70	15	15	0	0	0	100	5
4	G104	Mathematics-II	-	4	1	0	70	15	15	0	0	0	100	5
5	G105	Applied Mathematics	G103 G104	3	1	0	70	15	15	0	0	0	100	4
6	G106	Physics-I	-	2	0	2	70	15	15	25	25	0	150	3
7	G107	Physics-II	G106	2	0	2	70	15	15	25	25	0	150	3
8	G108	Chemistry-I	-	2	0	2	70	15	15	25	25	0	150	3
9	G109	Chemistry-II	G108	2	0	2	70	15	15	25	25	0	150	3
TOTAL				23	3	12	630	135	135	100	150	0	1150	32

*The marks for assignment (15) should include five (5) marks for attendance.

2. HARD CORE COURSES FOR COMPUTER SCIENCE & ENGINEERING:

Sl. No	Code	Course	Study Scheme				Evaluation Scheme						Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory			Practical				
				L	T	P	End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
10	G201	Engineering Drawing-I		1	0	4	0	0	0	0	50	0	50	3
11	G202	Engineering Drawing-II	G201	1	0	4	0	0	0	0	50	0	50	3
12	G203	Workshop Practice-I		0	0	4	0	0	0	0	25	25	50	2
13	G204	Workshop Practice-II	G203	0	0	4	0	0	0	0	25	25	50	2
14	G205A	Introduction to Information Technology	-	2	0	3	50	0	0	25	50	0	125	4
	G205B	Introduction to Computer Programming												
15	G206A	Engineering Mechanics	-	3	0	2	70	15	15	25	25	0	150	4
16	G206B	*C-Programming	G205B	2	1	2	70	15	15	25	25	0	150	**4**
TOTAL				7/9	0/1	23	190	30	30	75	250	50	625	22

*G205B&G206B for CSE only

3. SOFTCORE COURSE FOR COMPUTER SCIENCE & ENGINEERING:

(G301 and G302 are compulsory and any two from the rest)

Sl. No	Code	Course	Pre0requisite	L	T	P	End Exam	Class Test	Assignment*	End Exam	Sessional	Viva	Total Marks	Credit
				Contact Hour/Week			Theory End	Progressive Assessment		Practical End	Progressive Assessment			
17	G301	Development of Life Skill-I	-	1	0	2	0	0	0	0	25	25	50	2
18	G302	Development of Life Skill-II	G301	1	0	2	0	0	0	0	25	25	50	2
19 & 20	G303	Engineering Economics & Accountancy	-	3	0	0	70	15	15	0	0	0	100	3
	G304	Entrepreneurship Develpoment	-	3	0	0	70	15	15	0	0	0	100	3
	G305	Principles Of Management	-	3	00	0	70	15	15	0	0	0	100	3
	G306	Organizational Behaviour	-	3	0	0	70	15	15	0	0	0	100	3
	G307	Environmental Education	-	3	0	0	70	15	15	0	0	0	100	3
TOTAL				8	0	4	140	30	30	0	50	50	300	10

4. BASIC TECHNOLOGY COURSES FOR COMPUTER SCIENCE & ENGINEERING:

Sl. No	Code	Course	Study Scheme				Evaluation Scheme						Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory			Practical				
				L	T	P	End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
21	CSE401	Electrical Circuits		2	0	2	50	10	15	0	25	0	100	3
22	CSE402	Digital circuits	-	3	0	2	70	15	15	25	25	0	150	4
23	CSE403	Computer Architecture & Organization	-	3	0	0	70	15	15	0	0	0	100	3
24	CSE404	Communication Engineering	-	3	0	2	70	15	15	25	25	0	150	4
25	CSE405	Data Structure & Algorithm	-	3	0	4	70	15	15	25	25	0	150	5
26	CSE406	Microprocessor & Interfacing	CSE402	3	0	2	70	15	15	25	25	0	150	4
27	CSE407	Graph Theory		2	0	0	35	0	15	0	0	0	50	2
28	CSE408	Operating System	CSE405	3	0	4	70	15	15	25	25	0	150	5
29	CSE409	Theory of Computing	CSE405	3	0	0	70	15	15	0	0	0	100	3
30	CSE410	Computer Graphics & Multimedia	CSE405	3	0	3	70	15	15	25	25		150	5
31	CSE411	Electronic Devices & Circuits	-	2	1	2	50	10	15	25	25	0	125	4
TOTAL				30	1	21	695	140	165	175	200	0	1375	42

5. APPLIED TECHNOLOGY COURSES FOR COMPUTER SCIENCE & ENGINEERING

Sl. No	Code	Course	Study Scheme				Evaluation Scheme						Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory			Practical				
				L	T	P	End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
32	CSE501	Database Management System	CSE405	3	0	2	70	15	15	25	25	0	150	4
33	CSE502	Objective Oriented Methodology	CSE405 G206B	2	0	4	50	0	0	25	25	0	100	4
34	CSE503	Computer Communication & Networking	CSE402, CSE403	3	0	4	70	15	15	25	25	0	150	5
35	CSE504	System Programming	CSE408	3	0	0	70	15	15	0	0	0	100	3
36	CSE505	Web Technology	CSE503	3	0	4	70	15	15	50	25	25	200	5
37	CSE506	Software Engineering	CSE501	3	0	0	70	15	15	0	0	0	100	3
38	CSE507	Professional practices I	-	0	0	2	0	0	0	0	50	0	50	1
39	CSE508	Professional practices II	-	0	0	2	0	0	0	0	50	0	50	1
40	CSE509	Professional practices III	-	0	0	3	0	0	0	0	50	0	50	2
41	CSE510	Professional practices IV	-	0	0	2	0	0	0	0	50	0	50	1
42	CSE511	Professional practices V	-	0	0	4	0	0	0	0	50	0	50	2
43	CSE512	Projects	-	0	0	10	0	0	0	100	50	50	200	5
TOTAL				17	0	37	400	75	75	225	400	75	1250	36

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6. ELECTIVE COURSES FOR COMPUTER SCIENCE & ENGINEERING :(Any two to be taken)

Sl. No	Code	Course	Study Scheme				Evaluation Scheme						Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory			Practical				
				L	T	P	End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignm ent*		Sessiona l	Viva		
44 & 45	CSE601	Fault Tolerant Computing	CSE403	3	0	2	70	15	15	25	25	0	150	4
	CSE602	Artificial Intelligence	CSE405	3	0	2	70	15	15	25	25	0	150	4
	CSE603	Mobile Communication	CSE503,	3	0	2	70	15	15	25	25	0	150	4
	CSE604	Soft Computing	CSE405	3	0	2	70	15	15	25	25	0	150	4
	CSE605	VLSI and Embedded System	CSE403	3	0	2	70	15	15	25	25	0	150	4
	CSE606	Image Processing & Pattern Recognition	CSE410	3	0	2	70	15	15	25	25	0	150	4
	CSE607	System & Networking Administration		3	0	2	70	15	15	25	25	0	150	4
	CSE608	PC System Technology & Maintenance		3	0	2	70	15	15	25	25	0	150	4
	CSE609	Multimedia Engineering		3	0	2	70	15	15	25	25	0	150	4
TOTAL				6	0	4	140	30	30	50	50	0	300	8

SAMPLE PATH FOR COMPUTER SCIENCE & ENGINEERING

TERM-I

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva		
1	G101	Communication Skill-I	-	2	0	2	70	15	10	5	0	25	0	125	3
2	G103	Mathematics-I	-	4	1	0	70	15	10	5	0	0	0	100	5
3	G106	Physics-I	-	2	0	2	70	15	10	5	25	25	0	150	3
4	G108	Chemistry-I	-	2	0	2	70	15	10	5	25	25	0	150	3
5	G201	Engineering Drawing-I	-	1	0	4	0	0	0	0	0	50	0	50	3
6	G203	Workshop Practice-I	-	0	0	4	0	0	0	0	0	25	25	50	2
7	G205 B	Introduction to Computer Programming	-	2	0	3	50	0	0	0	25	50	0	125	4
TOTAL				13	1	17	330	60	40	20	75	200	25	750	23

TERM-II

Sl. No	Code	Course	Pre-requisite	Study Scheme Contact Hour/Week			Evaluation Scheme Theory End Exam	Progressive Assessment			Practical End Exam	Progressive Assessment		Total Marks	Credit
				L	T	P	End Exam	Class Test	Assignment*	Atten dance	End Exam	Sessional	Viva		
1	G102	Communication Skill-II	G101	2	0	2	70	15	10	5	0	25	0	125	3
2	G104	Mathematics-II	G103	4	1	0	70	15	10	5	0	0	0	100	5
3	G107	Physics-II	G106	2	0	2	70	15	10	5	25	25	0	150	3
4	G109	Chemistry-II	G108	2	0	2	70	15	10	5	25	25	0	150	3
5	G202	Engineering Drawing-II	G201	1	0	4	0	0	0	0	0	50	0	50	3
6	G204	Workshop Practice-II	G203	0	0	4	0	0	0	0	0	25	25	50	2
7	G206A	Engineering Mechanics	G106 & G107	3	0	2	70	15	10	5	0	50	0	150	4
8	G301	Development of Life Skill-I	-	1	0	2	0	0	0	0	0	25	25	50	2
9	CSE507	Professional Practices-I	-	0	0	2	0	0	0	0	0	50	0	50	1
TOTAL				15	1	20	350	75	50	25	50	275	50	875	26

TERM-III

Sl. No	Code	Course	Pre-requisite	L	T	P	End Exam	Class Test	Assignment*	Atten dance	End Exam	Sessional	Viva	Total Marks	Credit
			Study Scheme				**Evaluation Scheme**							Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignm ent*	Atten dance		Sessiona l	Viva		
1	G105	Applied Mathematics		3	1	0	70	15	10	5	0	0	0	100	4
2	G206B	C Programming	G205B	2	1	2	70	15	10	5	25	25	0	150	4
3	G303-G307	Soft core- I (Environmental Education)	-	3	0	0	70	15	10	5	0	0	0	100	3
4	CSE402	Digital Circuits	-	3	0	2	70	15	10	5	25	25	0	150	4
5	CSE403	Computer Architecture & Organization	-	3	0	0	70	15	10	5	0	0	0	100	3
6	CSE405	Data Structure & Algorithm		3	0	4	70	15	10	5	25	25	0	150	5
7	CSE411	Electronics Devices & Circuits	-	2	1	2	50	10	10	5	25	25	0	125	4
8	CSE508	Professional Practices-II	-	0	0	2	0	0	0	0	0	50	0	50	1
TOTAL				19	3	12	470	100	70	35	100	150	0	925	28

TERM-IV

Sl. No	Code	Course	Study Scheme				Evaluation Scheme								Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory					Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment*	Attendance		Sessional	Viva		
1	G302	Development of Life Skill-II	-	1	0	2	0	0	0	0	0	25	25	50	2
2	CSE401	Electrical Circuit	-	2	0	2	50	10	10	5	0	25	0	100	3
3	CSE404	Communication Engineering	CSE 411	3	0	2	70	15	10	5	25	25	0	150	4
4	CSE407	Graph Theory	-	2	0	0	35	0	10	5	0	0	0	50	2
5	CSE408	Operating System	CSE405	3	0	4	70	15	10	5	25	25	0	150	5
6	CSE409	Theory of Computing	CSE405	3	0	0	70	15	10	5	0	0	0	100	3
7	CSE503	Computer Communication & Networking	CSE403, CSE402	3	0	4	70	15	10	5	25	25	0	150	5
8	CSE509	Professional Practices-III	-	0	0	3	0	0	0	0	0	50	0	50	2
TOTAL				17	0	17	365	70	60	30	75	175	25	800	26

TERM-V

Sl. No	Code	Course	Study Scheme				Evaluation Scheme								Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory					Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment*	Attendance		Sessional	Viva		
1	CSE406	Microprocessor & Interfacing	CSE402	3	0	2	70	15	10	5	25	25	0	150	4
2	CSE410	Computer Graphics & Multimedia	CSE403, CSE405, G206B	3	0	3	70	15	10	5	25	25	0	150	5
3	CSE501	Database Management System	CSE405	3	0	2	70	15	10	5	25	25	0	150	4
4	CSE502	Object Oriented Methodology	CSE405, G206B	2	0	4	50	0	0	0	25	25	0	100	4
5	CSE504	System Programming	CSE408	3	0	0	70	15	10	5	0	0	0	100	3
6	CSE506	Software Engineering	CSE405	3	0	0	70	15	10	5	0	0	0	100	3
7	CSE510	Professional Practices-IV	-	0	0	2	0	0	0	0	0	50	0	50	1
TOTAL				17	0	13	400	75	50	25	100	150	0	800	24

TERM-VI

Sl. No	Code	Course	Study Scheme				Evaluation Scheme								Total Marks	Credit
			Pre-requisite	Contact Hour/Week			Theory				Practical/case study					
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment				
								Class Test	Assignment*	Atten dance		Sessional	Viva			
1	G304	Soft core-II (Entrepreneurship Development)	-	3	0	0	70	15	10	5	0	0	0	100	3
2	CSE505	Web Technology	CSE503	3	0	4	70	15	10	5	50	25	25	200	5
3	CSE511	Professional Practices-V*	-	0	0	4	0	0	0	0	0	50	0	50	2
4	CSE512	Project	-	0	0	10	0	0	0	0	100	50	50	200	5
5	CSE601 -609	Elective-I	-	3	0	2	70	15	10	5	25	25	0	150	4
6	CSE601 -609	Elective-II	-	3	0	2	70	15	10	5	25	25	0	150	4
TOTAL				12	0	22	280	60	40	20	200	175	75	850	23

*This includes seminar on project

FOUNDATION COURSES

APPLIED MATHEMATICS

L   *T*   *P*   **Curri. Ref. No.: G105**
3   *1*   *0*

Total Contact hrs : 60   **Total marks: 100**   *Theory: 100*
Theory: 60   *End Term Exam: 70*
Practical: 0   *P.A.: 30*
Pre requisite: G103,   **Practical: 0**
G104   *End Term Exam: 0*
Credit:4   *P.A : 0*

RATIONALEE: - Mathematics is an important tool to solve wide variety of engineering problems. Most of the technological processes in industry are described effectively by using mathematical framework. Mathematics has played an important role in the development of mechanical, civil, aeronautical and chemical engineering through its contribution to mechanics of rigid bodies, hydrodynamics, aero-dynamics and heat transfer etc.It has become of great interest to electrical engineers through its application to information theory, design of digital computer etc.

AIM:-Through this syllabus we aim to give students a strong foundation in Matrix and Vector with their applications. We also aim to give detail idea of Numerical Integration, Numerical solution of Non-Linear Equation, Gauss Elimination method and Differential Equations with application problems.

UNIT	TOPIC/SUB-TOPIC	Contact Hrs.	Total Marks.
1.0	**Numerical Analysis** **1.1 Interpolation.** (i) Introduction to interpolation. (ii) Lagrange's interpolation formula. (iii) The operators Δ, ∇ and E .Relation between them. (iv) Difference Table. (v) Newton's forward and backward interpolation formula. (vi) Concept of extrapolation. **1.2 Numerical Differentiation and Integration.** (i) Newton's forward and backward difference formula for differentiation $\left(\dfrac{dy}{dx}, \dfrac{d^2 y}{dx^2} \right)$ at any point at $x = x_0 \ or \ x = x_n$ **1.3 Numerical Integration**. (i) Trapezoidal rule and Simpson's $\dfrac{1}{3}$ rd rule. **1.4 Numerical Solution of Ordinary Differential Equation** (i) Introduction. (ii) Runge Kutta's 2nd and 4th order methods.	**15**	**20**

2.0	**Differential Equations (ordinary)**		
	(i) Introduction.		
	(ii) Order and degree of a differential equation.		
	(iii) Formation of Differential Equations.		
	(iv) Solution of a Differential Equation.		
	(v) Differential equation of the first order & first degree.		
	(vi) Variables separable.		
	(vii) Homogeneous Differential Equations.		
	(viii) Linear Differential Equations.		
	(ix) Equations reducible to linear form.	15	15
	(x) Exact differential Equations.		
	(xi) Equations reducible to the exact form.		
	(xii) Linear Differential Equations of second order with constant coefficients.		
	(xiii) Complete solution = Complementary Function + Particular Integral.		
	(xiv) Method of finding Particular Integral.		
	(xv) Applications of differential equations to electrical circuit problems.		
	(xvi) Problems related to other physical systems.		
3.0	**Graph Theory**		
	(i) Introduction.		
	(ii) Basic Terminology.		
	(iii) Simple Graph, Multigraph and Pseudo graph.		
	(iv) Degree of a Vertex.		
	(v) Types of Graphs.	20	20
	(vi) Subgraphs and Isomorphic Graphs.		
	(vii) Operations of Graphs.		
	(viii) Paths, Cycles and Connectivity.		
	(ix) Eulerian and Hamiltonian Graph.		
	(x) Shortest Path Problems using known Algorithm		
	(xi) Representation of Graphs.		
	(xii) Planar Graph.		
	(xiii) Graph Colouring.		
4.0	**Discrete Mathematics**		
	5.1 The principle of Inclusion and Exclusion with examples.		
	5.2 Generating Functions.		
	(i) Introductory examples.		
	(ii) Definition & examples of Calculation Techniques.		
	(iii) Partition of integers with problems.		
	(iv) Exponential Generating function with problems.	10	15
	5.3 Recurrence Relations.		
	(i) First order linear recurrence relations		
	(ii) Second order linear homogeneous recurrence relations with constant coefficients.		
	(iii) Non-homogeneous recurrence relations.		
	(iv) Method of generating functions		
	(v) Problems on all the above topics.		
		Total hours	Total marks
		60	70

Reference Books.

(1)   Integral Calculus by B.C.Das and B.N.Mukherjee.
(2)   Diploma Engineering Mathematics (Volume-II) by B.K.Pal.
(3)   Applied Mathematics-I by Dr.J.S.Bindra and K.S.Gill.
(4)   Applied Mathematics-II by Dr.J.S.Bindra and K.S.Gill.
(5)   Applied Mathematics-III by Dr.J.S.Bindra.
(6)   Engineering Mathematics (Volume-I, Volume-II & Volume-III) by S.Arumugam, A.Thangapandi Issac and A.Somsundaram.
(7)   Discrete and Combinatorial Mathematics by Ralph P.Grimaldi.
(8)   A TEXT BOOK OF DISCRETE MATHEMATICS by Swapan Kumar Sarkar.
(9)   Mathematics for Polytechnic by S.P.Deshpande.
(10)   Higher Engineering Mathematics by B.S.Grewal.
(11)   Introductory Method of Numerical Analysis by S.S.Sastry.
(12)   Calculus of Finite Difference and Numerical Analysis by Gupta-Malik.

SOFTCORE COURSES

DEVELOPMENT OF LIFE SKILL II

L T P   **Curri. Ref. No.: G302**
1 0 2

Total Contact hrs : 45   **Total marks: 50**   *Theory: 0*
Theory: 15   *End Term Exam: 0*
Practical: 30   *P.A.: 0*
Pre requisite: **Practical: 50**
Credit:3   *End Term Exam: 0*
                                                       P.A : 50

Theory
Total Periods : 15
Periods   : 1 P/W

UNITS	CONTENTS	Hours
Unit1	**Inter personal Relation** Importance, Interpersonal conflicts, Resolution of conflicts, Developing effective interpersonal skills communication and conversational skills, Human Relation Skills (People Skills)	1

Unit 2	**Problem Solving**
	I) Steps in Problem Solving (Who? What? Where? When? Why? How? How much?)
	    1. Identify, understand and clarify the problem
	    2. Information gathering related to problem
	    3. Evaluate the evidence
	    4. Consider feasible options and their implications
	    5. Choose and implement the best alternative
	    6. Review
	II) Problem Solving Technique
	    1. Trial and Error,2.Brain Storming3.Thinking outside the Box
		2

Unit 3	**Presentation Skills** Concept ,Purpose of effective presentations, *Components of Effective Presentations*: Understanding the topic, selecting the right information, organizing the process interestingly, Good attractive beginning, Summarising and concluding, adding impact to the ending, *Use of audio visual aids* OHP, LCD projector, White board, *Non verbal communication*: Posture, Gestures ,Eye contact and facial expression, Voice and Language Volume, pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language Handling questions Respond, Answer, Check, Encourage, Return to presentation *Evaluating the presentation* Before the presentation, During the presentation, After the presentation	4
Unit 4	**Looking for a Job** Identifying different sources announcing Job vacancies, Skim, scan and read advertisements in detail, write efficacious CVs, write covering letters to a company CVs, write Job Application Letters in response to advertisements and self-applications	2

	Job Interviews **Prepare for Interviews**: Intelligently anticipating possible questions and framing appropriate answers, Do's and don'ts of an interview(both verbal and non verbal), **Group Discussion:** Use of Non verbal behavior in Group Discussion, Appropriate use of language in group interaction, Do's and don'ts for a successful Group Discussion	
Unit 5		4
Unit 6	**Non verbal graphic communication** Nonverbal codes: A .Kinesics ,.B Proxemics,.C.Haptics.,D.Vocalics,.E.Physical appearance.,F..Chronemics,.G. Artifacts Aspects of Body Language	1
Unit 7	**Formal Written Skills:** Memos, Emails, Netiquettes, Business correspondence Letter of enquiry, Letter of Placing Orders, Letter of Complaint	1
	Total	15

Practical Total Periods : 30 Periods : 2 P/W		
Unit 1 Interpersonal Relation	Case Studies: 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies	2
Unit II Problem Solving	Case Studies: 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies	4
Unit III Presentation Skills	Prepare a Presentation (with the help of a Power point) on a Particular topic. The students may refer to the Sessional activity (sl.No.8) of the Computer Fundamental syllabus of Semester1. For engineering subject oriented technical topics the cooperation of a subject teacher may be sought. Attach hand out of PPT in the sessional copy	8
Unit IV Looking for a job	Write an effective CV and covering letter for it. Write a Job Application letter in response to an advertisement and a Self-Application Letter for a job.	4
Unit V Job Interviews & Group Discussions	Write down the anticipated possible questions for personal interview (HR)along with their appropriate responses Face mock interviews. The cooperation of HR personnels of industries may be sought if possible Videos of Mock Group Discussions and Interviews may be shown	8
Unit VII Formal Written Skills	Write a memo, Write an effective official e-mail, write a letter of enquiry, letter of placing orders, letter of complaint	4
	Total	30

ENGINEERING ECONOMICS AND ACCOUNTANCY

L	T	P	**Curri. Ref. No.: G303**
3	0	0	

Total Contact hrs.:   **Total marks: 100**   **Theory:**
Theory: 45   End Term Exam: 70
Tutorial: 0   P.A.: 30
Practical: 0
Credit: 3

RATIONALE:

The knowledge of Economics and Accountancy is needed by personal dealing with the cost of products of any kind related to quality and standards of production including its financial control. Engineers in general need to know the cost of the final products for marketing purposes. The knowledge of Economics as well as Accountancy is required by all people dealing in any business or enterprises.

This particular subject deals with the Basic Concepts of Economics, Factors of Production, Types of Industries, Market forms, Need of Economics Planning for overall development, Concept of Money, Unemployment causes and measures, Industrial Policy, Public Finance, Business Transactions and Accountancy, Maintenance of Cash and balances, Receipts and Expenditures Accounts, Final Accounts and Cost Concepts.

UNITS	TOPICS/SUB-TOPICS	TOTAL CONTACT HOURS

1.	INTRODUCTION:
	   1.1 Introduction to Economics and its Utility of Study
	   1.2 Importance of the study of economics.
		1

2.	BASIC CONCEPTS OF ECONOMICS:
	   2.1 Definition of Goods, Utility, Value, Price, Income, Capital
	   2.2 Classification of Goods, Human Wants-Classification and Types-Relation between Wealth and Capital
	   2.3 Consumer Behaviour: Basic Law of Demands and Supply
	   2.4 Concepts and measurement of elasticity of demand
		3

3.	PRODUCTION:
	   3.1 Meaning and Factors of Production
	   3.2 Land, Labour, Capital and Organisation – meaning and characteristics
	   3.3 Formation of Capital, Break Even Analysis, Break Even Chart its uses.
		3

4.	SCALE OF INDUSTRIES:
	   4.1 Meaning of Small, Medium and Large Scale production
	   4.2 Advantages and Disadvantages of Small Scale and Large Scale Production
		2

5.	MARKET FORMS: 5.1 Meaning of Market-Forms of Market	3

	5.2 Features of Perfect, Imperfect and Monopoly 5.3 Price Determination under Perfect Competition and monopoly		
6.	ECONOMIC PLANNING: 6.1 Basic features of underdeveloped Economy – Basic features of Indian Economy 6.2 Meaning, Objectives and Needs of Planning 6.3 Current Five Year Plan	2
7.	MONEY: 7.1 Meaning and Function of Money 7.2 Introduction to the concepts of the value of Money	2
8.	UNEMPLOYMENT: 8.1 Meaning, types and causes of Unemployment in India 8.2 Unemployment problems in India-Measures taken by the Government of India.	2
9.	INDUSTRIAL POLICY: 9.1 Current Industrial Policy 9.2 Monopoly Restricted Trade Practices Act (MRTP), Foreign Exchange Management Act (FEMA), Competitions Act	3
10.	PUBLIC FINANCE: 10.1 Meaning of Public Finance-Distinction Between Public and Private Finance 10.2 Sources of Public Revenue.	2
11.	BUSINESS TRANSCTIONS AND ACCOUNTANCY: 11.1 Transactions and classifications, need and objectives of proper records including double entry system 11.2 Classification of accounts and its description (in respect of real accounts, personal accounts and nominal accounts) 11.3 Debit and credit concepts: Golden rules of Debit and Credit. 11.4 Objectives and Principals of Double Entry System of Book Keeping.	5
12.	BOOKS OF ACCOUNTS: 12.1 Journal and Ledger, their subdivisions; posting from journals to ledger. 12.2 Balancing of Accounts	2
13.	CASH BOOK: 13.1 Objectives of Cash Book (in respect of all kinds of Cash Transactions) 13.2 Single Column, Double Column and Triple Column 13.3 Impress System of Petty Cash Book	2
14.	TRIAL BALANCE : 14.1 Objectives, Preparation – Errors and Rectification (In respect of Balance of Accounts for the Total period)	2
15.	FINAL ACCOUNTS: 15.1 Steps of preparing accounts: Trading Accounts, Profit and Loss Accounts 15.2 Revenue and Depreciation Adjustment	5

16.	15.3 Introduction to Balance Sheet	
16.	CAPITAL AND REVENUE EXPENDITURE DISTRIBUTION: 16.1 Receipt and Payments 16.2 Income and Expenditure differences	3
17.	MENAING AND PURPOSE OF COSTING: 17.1 Element of Cost Analysis and Classification of expenditure for Cost Accounts. 17.2 Cost Control: Prime Cost, Overhead Cost and Indirect Material and Tools	3

TEXT BOOKS FOR REFERENCE:

1. Elements of Economics by K. K. Dewett and J. D. Verma
2. An Introduction to Economics Theory by H. L. Ahuja
3. Double Entry Book Keeping by Mohan, Juneja, Chawla and Saxena
4. Double Entry System of Book Keeping by J. R. Batliboy

ENTREPRENEURSHIP DEVELOPMENT

L	T	P		**Curri. Ref. No.: G304**
3	0	0		

Total Contact hrs.: | **Total marks: 100** | **Theory:**
Theory: 45 | | End Term Exam: 70
Tutorial :0 | | P.A.: 30
Practical: 0
Credit: 3

RATIONALE

The course intends to provide the fundamental aspects of entrepreneurship as a means for self employment and culminating in economic development of the country. It deals with basic issues like entrepreneurial characteristics and quality, governmental policy support and overall scenario along with opportunities and the facilities available for entrepreneurship development.

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.

1.0 INTRODUCTION — 10

   1.1 Definition and functions of Entrepreneur, entrepreneurship
quality, entrepreneurial spirit, need for entrepreneurship.
   1.2 Individual and social aspects of business – achievement motivation theory
   1.3 Social responsibilities of Entrepreneurs

2.0 FORMS OF BUSINESS ORGANISATION — 4

   2.1 Types of company
   2.2 Merits and demerits of different types
   2.2 Registration of small scale industries
   2.4 Conglomeration.

3.0 SMALL SCALE AND ANCILLARY INDUSTRIES — 8

   3.1 Definition – scope with special reference to self employment.
   3.2 Procedure to start small scale and Ancillary industries
   3.3 Pattern on which the Scheme/Project may be prepared
   3.4 Sources of finance - Bank, govt., and other financial institutions.
   3.5 Selection of site for factory
   3.6 Factors of selection
   3.7 N.O.C. from different authorities, e.g., Pollution Control Board, Factories Directorate etc.
   3.8 Trade License.

4.0 SYSTEM OF DISTRIBUTION — 1

   4.1 Wholesale Trade
   4.2 Retail trade

5.0	**SALES ORGANISATION**	**3**

   5.1   Market survey, marketing trends, knowledge of
         competitors, product selection & its basis .
   5.2   Sales promotion
   5.3   Advertisement
   5.4   Public relations and selling skills

6.0	**PRICING THE PRODUCT**	**1**

   6.1   Basic guidelines

7.0	**INTRODUCTION TO IMPORT AND EXPORT**	**6**

   7.1   Procedures for export
   7.2   Procedures for import
   7.3   Technical collaboration – international trade
   7.4   Business insurance
   7.5   Rail and road transport
   7.6   Forwarding formalities, FOR, FOB, CIF, etc.

8.0	**BUSINESS ENQUIRIES**	**4**

   8.1   Enquiries: From SISI, DIC, SFC Dept. of Industrial
         Development Banks.
   8.2   Offers and Quotations
   8.3   Orders

9.0	**PROJECT REPORT**	**6**

   9.1   Project Report on feasibility studies for small scale
         industries, proposal for finances from bank and other
         financial institutions for establishing new industries
         and its extension, obtaining License enlistment as
         suppliers, different vetting organizations for Techno
         Economic feasibility report.
         Breakeven analysis, Breakeven point.

10.0	**ENVIRONMENT LEGISLATION**	**2**

   10.1   Air Pollution Act
   10.2   Water Pollution Act
   10.3   Smoke Nuisance Control Act
   10.4   ISO: 14000, OSHA

SUGGESTED LEARNING RESOURCES:

Reference Books:

1.   Entrepreneurship Development

2.   Prepared by CTSC Manila Publishers by Tata Mc Graw Hill Publishing Co. Ltd.

3.   Small Enterprise Management Published by ISTE, Mysore

4.   Motivation Published by ISTE, Mysore

5.   S.S.M. in Environmental Engineering Published by ISTE, Mysore

6. Entrepreneurship New Venture Creations, Holt, Prentice Hall, India.

7. Essence of TQM by John Bank

8. Rathore, B.S. and J.S. Saini(ed), A Handbook of Entrepreneurship – Panchkula : Aapga, 1997

9. Jose Pauletal, Entrepreneurship Development, Mumbai : Himalaya Publishing House, 1996

10. Khanka, S.S., Entrepreneurship Development, New Delhi : S. Chand and Co., 2001

11. Nagarazan, R.S. and A.A. Arivalagar, TQM New Delhi : New Age International Publishers, 2005

12. Bhatia, R.C., Marketing Communication and Advertising, New Delhi : Galgotia Publishing Co., 2003

13. Sinha, J.C., and V.N. Mugali : A Textbook of Commerce, New Delhi : R. Chand and Co., 1994

PRINCIPLES OF MANAGEMENT

L   T   P   **Curri. Ref. No. G305**

3   0   0

Total Contact hrs.:	**Total marks: 100**	**Theory:**
Theory: 45		End Term Exam: 70
Tutorial :0		P.A.: 30
Practical : 0		

Credit: 3

RATIONALE

Management is the integrated component of all areas of technological courses as recognized across the world. Technicians or supervisors coming out of the system hence need to study the basics components of the management relevant to them. Principals of management will enable them to apply basic knowledge of management in their field of work. Keeping with this in mind necessary content details of the course on Principles of Management has been developed. With the assumption that, it will develop some management foundation to the diploma students.

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 FRAMEWORK OF MANAGEMENT	**8**
1.1 Nature of management	
1.2 Development of management thoughts	
1.3 Management and process skills	
2.0 PLANNING	**9**
2.1 Fundamentals of planning	
2.2 Planning premises and forecasting	
2.3 Decision making	
2.4 Mission and objective	
3.0 ORGANIZING	**10**
3.1 Fundamentals of organizing	
3.2 Design of organization structure	
3.3 Forms of organization structure	
3.4 Power and authority	
3.5 Authority relationship	
4.0 STAFFING	**8**
4.1 Fundamentals of staffing	
4.2 HR planning	
4.3 Recruitment and selection	
4.4 Training and development	
4.5 Performance appraisal	

5.0   DIRECTING   6
      5.1 Fundamentals of directing
      5.2 Operational control techniques
      5.3 Overall control technique

6.0   TOTAL QUALITY MANAGEMENT   4
      6.1 Concepts and definitions
      6.2 Sages of quality gurus and their contributions
      6.3 Basic tools of TQM

SUGGESTED LEARNING RESOURCES:

Reference books:

1.   Principles of management, by: T.Ramasamy (Himalya publishing house)

2.   Management by: S. P. Robins

3.   Management principles by: Anil Bhat and Arya Kumar

4.   Principles and practice of management by LM Prasad

5.   Principles of management by LM Prasad

6.   Essentials of Management / Joseph L. Massie / Prentice-Hall of India

ORGANIZATIONAL BEHAVIOUR

L	T	P	
3	0	0	

Curri. Ref. No.:G306

Total Contact hrs.:
Theory: 45
Tutorial :0
Practical: 0
Credit: 3

Total marks: 100

Theory:
End Term Exam: 70
P.A.: 30

RATIONALE

Knowledge in behavioural principles in an organization is an important requirement because concepts such as work motivation, behavioural patterns of individuals as also those of group of individuals etc are intimately related to it. Organizational Behavioural principles, its scopes, applicability etc. are therefore important to know by the students irrespective of the branch of specialization. Based of the above facts following content details of the subject on Organizational Behaviour has been suggested.

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 ORGANIZATION: Concept and Definition Structures (line, staff, functional divisional, matrix)	8
2.0 MOTIVATION : Principles of Motivation Aspects of Motivation Job motivation Theories of motivation (Maslow, Herzberg, Theory of X&Y of Mc. Gregar)	10

3.0 DEVELOPING GOOD WORK HABITS:
Principles of habit formation
Attitude and values
Personality-
    - Concepts
    - Theories
    - Personality and Behaviour
	10

4.0 ORGANIZATIONAL CULTURE: Concepts and its importance Determinants of organizational culture Rules & regulations	8

5.0 TEAM BUILDING:
Concepts
    Team and Group
    Formation of Team building
	9

SUGGESTED LEARNING RESOURCES:

Reference Books:

1. Organisational Behaviour — An introductory Text – Huezynski A. & Bucheman C. (Prentice Hall of India)

2. Image of Organisation — Morgan G. (Sage)

3. Understanding Management — Linstoand S. (Sage)

4. Organizational Behaviour — Robbins (Prentice Hall of India)

5. Understanding and Managing – Organizational Behavior — George & Jones

6. Organisational Behaviour, L.M. PRASAD, New Delhi, Sultan Chand & Sons

7. Essentials of Management — Koontz (Tata McGraw Hill)

ENVIRONMENTAL EDUCATION

L	T	P		**Curri. Ref. No. G307**
3	0	0		

Total Contact hrs.:	**Total marks: 100**	Theory:
Theory: 45		End Term Exam: 70
Tutorial : 0		P.A.: 30
Practical : 0		
Credit: 3		

RATIONALE

Management of Environmental Degradation as also its control using innovative technologies is of prime importance in the times we are living in. Since the days of the famed Rio Summit (1992) awareness about degradation of environment we live in an its management through participation of one and all has literally blossomed into a full fledged movement of universal importance. Technically qualified people, such as the Diploma Engineers, should not only be aware about new technologies to combat environmental degradation at their disposal but also various aspects of environment, ecology, bio-diversity, management, and legislation so that they can perform their jobs with a wider perspective and informed citizens. This course can be taken by all diploma students irrespective of their specializations.

DETAILED COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 INTRODUCTION 1.1 Introduction 1.2 Environment and its components 1.3 Environment in India 1.4 Public Awareness	**2**
2.0 ECOLOGICAL ASPECTS OF ENVIRONMENT 2.1 Ecology • Eco-system • Factors affecting Eco-system 2.2 Bio-geochemical cycles • Hydrological cycle • Carbon cycle • Oxygen cycle • Nitrogen cycle • Phosphorous cycle • Sulphur cycle 2.3 Bio-diversity 2.4 Bio-diversity Index	**8**
3.0 NATURAL RESOURCES 3.1 Definition of Natural Resources 3.2 Types of Natural Resources	**5**

3.3 Quality of life
3.4 Population & Environment
3.5 Water Resources
- Sources of Water
3.6 Water Demand
3.7 Forest as Natural Resource
- Forest and Environment
- Deforestation
- Afforestation
- Forest Conservation, its methods
3.8 Land
- Uses and abuses of waste and wet land

4.0 GLOBAL ENVIRONMENTAL ISSUES 9
4.1 Introduction
4.2 Major Global Environmental Problems
4.3 Acid Rain
- Effects of Acid Rain
4.4 Depletion of Ozone Layer
- Effects of Ozone Layer Depletion
4.5 Measures against Global Warming
4.6 Green House Effect

5.0 ENVIRONMENTAL POLLUTION 9
5.1 Introduction
5.2 Water Pollution
- Characteristics of domestic waste water
- Principles of water treatment
- Water treatment plant (for few industries only- unit operations & unit processes - names only)
5.3 Air Pollution
- Types of air pollutants
- Sources of Air Pollution
- Effects of Air Pollutants
5.4 Noise Pollution
- Places of noise pollution
- Effect of noise pollution

6.0 CLEAN TECHNOLOGY 6
6.1 Introduction to Clean Technologies
6.2 Types of Energy Sources
- Conventional Energy sources
- Non-conventional sources of Energy
6.3 Types of Pesticides
6.4 Integrated Pest Management

7.0 ENVIRONMENTAL LEGISLATION 3
7.1 Introduction to Environmental Legislation
7.2 Introduction to Environmental Laws

8.0 ENVIRONMENTAL IMPACT ASSESSMENT 3
    8.1 Introduction to Environmental Impact Assessment
    8.2 Environmental Management (elements of ISO 14001)
    8.3 Environmental ethics

SUGGESTED IMPLEMENTATION STRATEGIES:

The teachers are expected to teach the students as per the prescribed subject content. This subject does not have any practical but will have only demonstration and field visit as stated. The students will have to prepare report of the site visit.

SUGGESTED LEARNING RESOURCES:

(a)   Reference Books:

S. No.	Title	Author, Publisher, Edition & Year
1.	Environmental Engineering	Pandya & Carny, Tata McGraw Hill, New Delhi
2.	Introduction to Environmental Engineering and Science	Gilbert M. Masters Tata McGraw Hill, New Delhi
3.	Waste Water Engineering – Treatment, Disposal & Reuse	Metcalf & Eddy Tata McGraw Hill, New Delhi
4.	Environmental Engineering	Peavy, TMH International New York
5.	Study / training materials, references, reports etc. developed by Central Pollution Control Board, New Delhi as also State Pollution Control Boards	Central Pollution Control Board Postal Address: Parivesh Bhawan, CBD-cum-Office Complex East Arjun Nagar, DELHI - 110 032, INDIA Tel.: 91-11-22307233 Fax: 91-11-22304948 e-mail: ccb.cpcb@nic.in
6.	Environmental Science	Aluwalia & Malhotra, Ane Books Pvt. Ltd, New Delhi
7.	Text Book of Environment & Ecology	Sing, Sing & Malaviya, Acme Learning, New Delhi
8.	Environmental Science & Ethics	Sing, Malaviya &Sing , Acme Learning, New Delhi
9.	Environmental Chemistry	Samir K. Banerji, Prentice Hall of India, New Delhi

(b)   Others:
    1.   Text book mentioned in the references
    2.   Lab Manuals
    3.   OHP Transparencies
    4.   Video film on Environment

SUGGESTED LIST OF DEMONSTRATIONS/FIELD VISIT
- pH value of water sample.
- Hardness of water
- Calcium hardness
- Total Hardness
- Residual Chlorine to a given sample of water
- Turbidity
- B.O.D.
- C.O.D.

Visits: **Following visits shall be arranged by the teachers during the semester:**
- Water Treatment Plant
- Sewage Treatment Plant
- Maintenance work of water supply mains and sewage   system

BASIC TECHNOLOGY COURSES

ELECTRICAL CIRCUIT

L	*T*	*P*	**Curri. Ref. No.: CSE401**
2	*0*	*2*	

Total Contact hrs : 60   **Total marks: 100**   *Theory: 75*
Theory: 30   *End Term Exam: 50*
Practical: 30   *P.A.: 25*
Pre requisite: **Practical: 25**
Credit:3   *End Term Exam: 0*
                                                     P.A : 25

Theory
Total Periods : 2
Periods   : 2 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.

1.   Magnetic Circuits   6
    1.1 To define
        1.1.1   Magnetising force
        1.1.2   Magnetic intensity
        1.1.3   Magnetomotive force
        1.1.4   Magnetic flux
    1.2 Write the relation between Magnetic flux and magnetic intensity
    1.3 To define
        1.3.1   Magnetic Cycle of magnetisation
        1.3.2   Magnetic hysteresis
        1.3.3   Hysteresis loop
    1.4 To define
        1.4.1   Permeability
        1.4.2   Permeance
        1.4.3   Reluctance
    1.5 Describe magnetic circuit and comparison with electric circuit
    1.6 To describe
        1.6.1   Series
        1.6.2   Parallel
        1.6.3   and composite magnetic circuit
    1.7 To enumerate the energy started in a magnetic field
    1.8 To determine the pulling force by an electromagnets
    1.9 To describe the magnetic circuit in relay
        1.10   To solve simple problems on magnetic circuit

2.   Passive Circuit Elements   5
    2.1 Resistance
        2.1.1   To define resistance
        2.1.2   To write equation relating voltage current and resistance
        2.1.3   To state unit of resistance
        2.1.4   To write expression relating resistance, resistivity, length of conductor and
                area
        2.1.5   To write different expression for the energy dissipated in a resistance

      2.1.6   To write the specification of resistance
      2.1.7   To describe the colour code of resistance
      2.1.8   Solving simple problems on resistance

2.2 Capacitor
      2.2.1   To define Capacitor
      2.2.2   Types of Capacitors
      2.2.3   To write simple equation relating
          (a) Capacitance, charge and voltage
          (b) Capacitance current and voltage
          (c) Energy stored in terms of capacitance and voltage
          (d) Capacitance, Area of the plate and distance between plate
      2.2.4   To describe the construction of capacitor
      2.2.5   To write the specification of capacitor
      2.2.6   To solve simple problems on capacitor

2.3 Inductor
      2.3.1   To define inductor
      2.3.2   To write simple equations relating to voltage, current and inductance
      2.3.3   To describe the construction of inductor
      2.3.4   To define self and mutual inductance
      2.3.5   To define coefficient of coupling
      2.3.6   To describe dot convention
      2.3.7   To state the unit of inductance
      2.3.8   To write the expression for energy stored in inductance
      2.3.9   To name different type of inductors and their field of application
      2.3.10 To write the equation of inductor relating to its physical dimensions
      2.3.11 To solve simple problems on inductor

3.   **D.C. Circuits**   **4**
3.1 To define voltage and current source
3.2 To represent graphically the ideal current and voltage source
3.3 To represent graphically the practical voltage and current source
3.4 To describe series parallel combination and determine the equivalent resistance
3.5 To deduce the conversion formulae for Delta to Star and viceversa
3.6 To state
      3.6.1   Kirchhofff's current law
      3.6.2   Kirchhofff's voltage law
      3.6.3   Superposition theorem
      3.6.4   Norton's theorem and Thevenin's Theory
      3.6.5   Maximum power transfer theorem
      3.6.6   To solve the D.C network problems using above theorems and laws

4.   **Sinusoidally excited Circuits**   **5**
4.1 To differentiate between A.C and D.C
4.2 To describe the principle of generation of sinusoidal voltage and its waveform
4.3 To define
    (a) Cycles (b) Frequency (d) Time Period (d) amplitude (e) phase difference
4.4 To define Average and RMS value of simple waves
4.5 To write R.M.S. and average value of sinusoidal quantity
4.6 To define form factor and peak factor
4.7 To represent sinusoidal wave by phases
4.8 To represent sinusoidal quantities in
    4.8.1 To exponential form

4.8.2   Complex form

4.8.3   Polar form

4.9 To state the effect of A.C. quantity through

4.9.1 Resistance

4.9.2 Inductance

4.9.3 Capacitance

4.10 To describe simple RL, RC, & RLC series circuit and to find relation between voltages and current

4.11 To write the expression for power and power factor

4.12 To describe impedance triangle, power triangle and state the concept of Active reactive and apparent power

5. Series and parallel Resonance   **3**

5.1 To state the condition for series resonance

5.2 To determine the expression of frequency at resonance condition

5.3 To define quality factor

5.4 To define band width

5.5 To state the condition for parallel resonance

5.6 To determine the resonance frequency for parallel LC Circuit

5.7 To solve problems on series and parallel resonance

6. Magnetics fields and forces   **4**

6.1 Definition of magnetic poles

6.2 Definition of magnetic flux, flux density

6.3 Characteristics of magnetic field

6.4 Properties of magnetic flux

6.5 To define electromagnetism

6.6 To define magnetic saturation

6.7 To define m.m.f, reluctance

6.8 To define permeability

6.9 Basic magnetic circuit (including Toroid)

6.10   Analog between electrical & magnetic circuit

6.11   To solve simple problem of ampere Turns, flux current etc

7.   Magnetic force field interaction   **3**

7.1 Time varying magnetic field

7.2 Faraday's law of electromagnetic induction

7.3 Flemings right hand rule (examples of simple loop generator)

7.4 Flemings left hand rule (examples of simple loop generator)

7.5 Force acting on a current carrying conductor placed in a uniform magnetic field

7.6 Definition of Induced emf

7.6.1   Statistically induced emf (Example transformer)

7.6.2   Dynamically induced emf (Example transformer)

Practical
Total Periods : 30
Periods   : 2 P/W

LIST OF EXPERIMENTS

1.   Identification of passive components

2.   Performing good bad test of passive components

3.   To verify Kirchhoff's current law and voltage law

4.   To verify super position theorem

5.   To verify Thevenins' theorem

6.   To measure impedance, power and p.f. of series R-L-C circuit and draw the phaser diagram

7.   To verify maximum power transfer theorem

8.   To determine the resonance frequency and Q factor in a parallel L-C circuit

9.   To study a single phase transformer to explain statistically induced e.m.f

10. To study a d.c. generator to explain dynamically induced e.m.f

REFERENCE BOOK:

Electronics and Electrical Engineering; Lionel Warnes (Macmillan)

DIGITAL CIRCUITS

L   *T*   *P*   **Curri. Ref. No.: CSE402**
3   *0*   *2*

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: NA   *Practical: 50*
Credit: 4   *End Term Exam: 25*
                                                   P.A : 25

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.0	**Number System:** Number Systems and Codes : Decimal, Binary, Octal, Hexadecimal number system and conversion from one number system to another, Arithmetic operations using these number systems, Representation of negative number in the different number systems, Complements and complement subtraction, Different codes (8421, Ex~3, 2421, Gray, Alphanumeric, BCD, Seven segment codes etc) and code conversions.	6
2.0	**Boolean Algebra and Logic Gates:** Postulates and different theorems. SOP and POS forms of expression and their conversion. Simplification : using Boolean theorems and k-map (up to 4 variables) Basic logic gates - their symbols, truth table and logic ' expression for the output simple circuit realization using the logic gates. Realization of any expression either using all NAND or NOR gates	6
3.0	**Combinational Logic Circuits :** Arithmetic circuit (Adder/ Subtractor), Multiplexers and their uses, Decoder/demultiplexers and their uses, code converter, Encoder, parity generator/checkers.	8
4.0	**Families of Logic Circuit :** TTL and CMOS family, open collector and tri-state logic gates.	3
5.0	**Storage Devices & Sequential Circuits :** Latches and Flip-flops, Timing diagrams of latches and flip flops, conversion of one flipflop to another, Counters - Binary ripple counters, Asynchronous module counters, UP/Down counter, Synchronous counters (binary, different modulo and UP/Down), Timing diagram of all types of counters. Brief introduction to a few commercially available counter ICs (asynchronous and synchronous).	06+04+02 =12
5.1	Shift-registers-Different types of shift registers and their functional details, A few applications of shift-registers.	

5.2   Memory -Memory types and terminology, Memory organization,
        Semiconductor memory, reading and writing, RAM, ROM, PROM cells
        and circuits, EPROM (Programming and erasing), Dynamic RAM, Memory
        expansion, PLA.

6.0   **Data Converters :**   6
        Digital-to-Analog Conversion - Weighted resistor, R-2R ladder, DAC
        performance and their characteristics.
        Analog-to-Digital Conversion - Counter type ADC, dual slope type,
        successive approximation type, tracking type and flash type, ADC
        performance and their characteristics.

7.0   **Display and Display Drives :**   4
        Introduction to LED, LCD, 7-segment displays, Bar graph display and
        Dot matrix displays. Decoder drivers for 7-segment display, Bar graph
        display and LCD. Multiplexing of display.

                                                                        45

Practical
Total Periods : 30
Periods   : 2 P/W

1.   Verification of truth tables of different basic logic gates.

2.   Realisation of logic expressions using different basic logic gates.

3.   Realisation of logic expressions using either all NAND or all NOR gates.

4.   Adder circuits (Half, Full-adder) design.

5.   Design of a multiplexer using logic gates (4 to 1 Multiplexer)

6.   Use of commercially available multiplexer ICs to realise two logic functions.

7.   Design of a decoder using logic gates (2 to 4 decoder)

8.   Use of commercially available decoder ICs to realise two logic functions.

9.   Design of RS, JK, D latches using logic gates.

10. Design of master/slave JK flip-flop.

11. To study the functional behaviour of some commercially available flip-flop ICs (JK and
     D)

12. Counter design (modulo 6 and 10 asynchronous and synchronous counters) using flip-
     flop and to display the counts on 7-segment display units.

13. To study the performance of some commercially available counter ICs (asynchronous
     and synchronous), cascading of counter ICs, Different modulo (MOD-6 and MOD-10)
     counter design using counter ICs.

14. To design a shift register using flip-flops and to study its behaviour.

15. To study the different functional features of shift register ICs.

REFERENCE BOOKS

1.   Digital Systems – by Ronald J. Tocci, PHI
2.   Digital Design – by Mano, PHI
3.   Digital Logic & Comp. Design – by Mano, PHI

LIST OF EQUIPMENT

1.   Digital Trainer Kit

2.   Powered Project board containing
      i)   Solderless breadboard with
      ii)   Power supply
      iii)   Power lead and connector plate

3.   Logic Trainer lab with
      i)   DC power supply (+5V, 1A, 5V at 500 mA +/- 15V at 500 mA)
      ii)   Logic Switches (slide)
      iii)   Pulse generator 1Hz, 10Hz & 100 Hz sq. wave
      iv)   Logic gates (30 built in logic gates comprising dual input for each of AND, OR, NAND, NOR, XOR & NOT gates)
      v)   Power supply

4.   Flip-flop trainer kit

5.   Counter trainer kit

COMPUTER ARCHITECTURE & ORGANIZATION

L   *T*   *P*   **Curri. Ref. No.: CSE403**
3   *0*   *0*

Total Contact hrs : 45	**Total marks: 100**	***Theory: 100***
Theory: 45		*End Term Exam: 70*
Practical:		*P.A.: 30*
Pre requisite: NA		***Practical:***
Credit: 3		*End Term Exam:*
		P.A :

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Evolution of Computers :** Brief history of development; Babbage's machines, Von Neumann Concept, Difference between calculators and computers, Generations of Computer -SSI, LSI, VLSI, Classification - micro, mini, main frames and supercomputers. PC's and portable systems.	5
2.	**Number Representation :** Positional Number Systems – Decimal, Binary, Octal, Hexadecimal Signed numbers, Signed - magnitude 1's complement, 2's complement and excess notations, numbers, Fixed and floating point numbers and operations, Booth's Algorithm, Common errors in arithmetic truncation errors, round of errors. Codes : weighted and non-weighted, BCD, ASCII, EBCDIC	5
3.	**Central Processing Unit :** Components of Arithmetic Logic Unit (in block diagram only), Different types of instructions, Instruction format, addressing modes, different CPU registers - Accumulator, Flag, Program Counter, Instruction Register and General Purpose registers. Hardware control unit - its different functions	8
4.	**Microprocessor :** Intel 8085 architecture and simple assembly language programming concept, Brief introduction to Intel 8086/8088 and Pentium processor (relative study), Brief introduction to RISC processor	7
5.	**Memory :** Concept of bits, bytes and words; Storage of numbers and characters, RAM, ROM, EPROM; Concept of cache memory - its role in performance improvement, memory hierarchy	6
6.	**I/O Devices :** Printers - Dot Matrix, Ink Jet, Line, Laser; Visual display unit – alphanumeric and graphic, Keyboard, Graphics devices - mouse, joy-stick, Scanners and digitizers, Auxiliary storage devices - floppy and Hard disk : Sectors, tracks and cylinders, accessing mechanisms (brief idea) Magnetic tapes - description and accessing mechanisms, CD ROM	10

7.	**PC Architecture**	4

		45

REFERENCE BOOKS

1. Computer Organisation & Architecture – by Stallings, PHI
2. Computer Organisation – by V. C. Hamacher, Z. G. Vranesic & S. G. Zaki, MGH
3. Computer Architecture & Organisation – by J. P. Hayes, MGH
4. Computer Organisation & Design – by Pal Chaudhuri, PHI
5. Computer System Architecture – by Mano, PHI

COMMUNICATION ENGINEERING

L   T   P   **Curri. Ref. No.: CSE404**
3   0   2

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: CSE411   *Practical: 50*
Credit: 4   *End Term Exam: 25*
                                                         P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

Unit	Topic/Sub Topic	Hours

1.   Introduction to Electronic Communication   4

Importance of communication – Elements of a communication system – Types of electronic communication - Electromagnetic spectrum – Bandwidth – Basic idea of Fourier series and Fourier transform

2.   Analog Modulation   8

2.1   Concept and necessity of modulation
2.2   Definition of amplitude, frequency and phase modulation
2.3   Derivation of sidebands in AM systems – Evaluation of power – Sideband depth – Percentage of modulation
2.4   Expression of sidebands in FM and PM systems and its interpretation – Modulation index and bandwidth requirement
2.5   Comparison of AM, FM and PM
2.6   Basic ideas of Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) – Principle of generation and reception of PAM, PWM & PPM with block diagram and their applications

3.   Transmitting Systems   5

3.1   Block diagram and function of different stages of AM and FM broadcast transmitter
3.2   Working principles of SSB systems with block diagram: Filter Method – Phase Shift Method – Third Method

4.   Demodulation   4

4.1   Principle of detection with diode detector
4.2   AGC circuit delayed AGC
4.3   Foster-Seeley discriminator – Ratio Detector – Limiter – Standard AFC Circuits (basic principles only, no derivation), PLC

5. **Receiving System**   **5**

    5.1   Block diagram and principle of operation of super heterodyne receiver – IF amplifier and choice of IF – Mixer and converter – Alignment and tracking – Tone and volume control – Band spreading – Receiver characteristics – Testing

    5.2   Block diagram and principle operation of FM receiver – Pre-emphasis and de-emphasis – AFC and alignment of FM receiver

6. **Pulse Code Modulation**   **6**

    6.1   Idea of digital communication – Advantages of digital communication over analog communication

    6.2   Basic steps in PCM system: Filtering – Sampling – Quantizing – Encoding.

    6.3   Block schematic description of transmitter and receiver of PCM system

    6.4   Principles of linear and non-linear quantization – Companding, DPCM

7. **Delta Modulation**   **3**

    7.1   Block schematic description of delta modulation technique.

    7.2   Limitations of delta modulation – Slope overload and granular noise.

    7.3   Concept of adaptive delta modulation technique

8. **Multiplexing**   **4**

    8.1   Idea of multiplexing and its necessity.

    8.2   Types of multiplexing**:** TDM and FDM

    8.3   PCM – TDM in modern applications TI Carrier.

    8.4   Merits and demerits of TDM and FDM.

9. **Basic Telephony**   **6**

    9.1   Telephone transmitter – Receiver – Dial tone, side tone and antisidetone circuits – Handset – Ringer – Switch hook – Hybrid – Local loop – Tone dialling – DTMF, SPC

Practical
Total Periods : 30
Classes   : 2 P/W

LIST OF EXPERIMENTS

1.   To study the amplitude modulation and demodulation technique.
2.   To study the frequency modulation and demodulation technique.
3.   To study the frequency spectrum of AM and FM with the help of spectrum analyzer.
4.   To study the analog signal sampling and reconstruction of the effect of: —
    (a) different sampling frequencies on reconstructed signals;
    (b) varying duty cycle of sampling frequency on the amplitude of reconstructed signal.
5.   To study some radio receiver measurements: (a) sensitivity, (b) selectivity and (c) fidelity.
6.   To study EPABX:

(a) to study the electrical behaviour of different tones – dial tone, ringing tone, ring back tone and busy tone (both subscriber and exchange);

(b) to study some extension features-redial, burgling, extension privacy, call forwarding, follow me etc.

REFERENCES BOOKS:

1. Communication Electronics by Frenzel,Tata McGraw-Hill

2. Electronic Communication System by Kennedy, Tata McGraw-Hill

3. Principles of Communication System by Taub& Schilling, Tata McGraw-Hill

4. Electronic Communication by Roddy&Coolen, Prentice Hall of India, N. Delhi

5. Communication System by Simon Haykin, WI Ltd.

6. Telemetry Principles by D. Patranabis, Tata McGraw-Hill

7. Electronic Communication System by Dungan, Vikash Publishing House

DATA STRUCTURE & ALGORITHM

L	*T*	*P*	**Curri. Ref. No.: CSE405**
3	*0*	*4*	

Total Contact hrs : 105	**Total marks: 150**	*Theory: 100*
Theory: 45		*End Term Exam: 70*
Practical: 60		*P.A.: 30*
Pre requisite:		*Practical: 50*
Credit: 5		*End Term Exam: 25*
		P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
	7.6 Definition of Induced emf	
	7.6.1 Statistically induced emf (Example transformer)	
1.	**Introduction and Overview**	2
	1.1 Introduction	
	1.2 Basic Terminology	
	1.3 Elementary Data Organization	
	1.4 Data Structures	
	1.5 Data Structure Operation	
	1.6 Algorithms; Complexity; Time- space Trade-off	
2.	**Preliminaries**	3
	2.1 Introduction	
	2.2 Mathematical notation and Functions	
	2.3 Algorithmic Notation	
	2.4 Control Structures	
	2.5 Complexity of Algorithms	
	2.6 Sub algorithms	
	2.7 Variables	
	2.8 Data Types	
3.	**String Processing**	5
	3.1 Introduction	
	3.2 Basic Terminology	
	3.3 Storing Strings	
	3.4 Character Data Type	
	3.5 String Operation	
	3.6 Work Processing	
	3.7 Pattern matching Algorithms	
4.	**Arrays, Records and Pointers**	8
	4.1 Introduction	
	4.2 Linear Arrays	

4.3 Representation of Linear Arrays in Memory
4.4 Traversing Linear Arrays
4.5 Inserting and Deleting
4.6 Sorting; Bubble Sort
4.7 Search; Linear Search
4.8 Binary Search
4.9 Multidimensional Arrays
    4.91   Pointers; Pointer Arrays
    4.9.2   Records; Record Structures
    4.9.3   Representation of Records in Memory; parallel Arrays
    4.9.4   Matrices
    4.9.5   Spares Matrices

5. **Linked Lists**   5
    5.1 Introduction
    5.2 Linked Lists
    5.3 Representation of Linked Lists in Memory
    5.4 Traversing a Linked List
    5.5 Searching a Linked List
    5.6 Memory Allocation Garbage Collection
    5.7 Insertion into a linked list
    5.8 Deletion from a Linked List
    5.9 Header Linked Lists
        5.9.1   Two –Ways Lists

6. **Stacks, Queues, Recursion**   6
    6.1 Introduction
    6.2 Stacks
    6.3 Array Representation of Stacks
    6.4 Arithmetic Expression; Polish Notation
    6.5 Quicksort, an Application Stakes
    6.6 Recursion
    6.7 Towers of Hanoi
    6.8 Implementation of Recursive Procedures by Stacks,
    6.9 Queues
        6.9.1   Defuse
        6.9.2   Priority Queues

7. **Trees**   5

    7.1 Introduction
    7.2 Binary Trees
    7.3 Representing Binary Trees in Memory
    7.4 Travelling Binary Trees
    7.5 Traversal Algorithms using Stacks
    7.6 Header Nodes; Threads
    7.7 Binary Search Trees,
    7.8 Trees, Searching and Inserting in a Binary Search Tree
    7.9 Deleting in a Binary Search Tree
        7.10   Heap, Heap sort
        7.11   Path Lengths; Huffman's Algorithm
        7.12   General Trees

8.   **Graphs and Their Application**   4

     8.1   Introduction
     8.2   Graph Th. Terminology
     8.3   Sequential Representation of Graphs; Adjacency matrix, path matrix
     8.4   Warshall's Algorithm, Shortest Paths
     8.5   Linked Representation of a Graph
     8.6   Operations on Graphs
     8.7   Traversing a Graph

9.   **Sorting and Searching**   5
     9.1   Introduction
     9.2   Sorting
     9.3   Inserting Sort
     9.4   Selection Sort
     9.5   Merging
     9.6   Merge-sort
     9.7   Radix Sort
     9.8   Linear searching
     9.9   Binary searching
     9.10   Interpolation searching
     9.11   Hashing

10.   **Introduction to File Organization**   2
     Sequential, Index-Sequential and Direct file Organization

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                                                                                      45

Practical
Total Periods : 60
Classes   : 4 P/W

Program Related to
1. Creation of singly & doubly linked list
2. Insertion, deletion and updation of (1) above
3. Creation of stack, queue and insertion/deletion operation on Stack/Queue
4. Conversion amongst infix, prefix & postfix expressions
5. Creation of tree and insertion/deletion of a node
6. Tree traversal problem
7. Graph search algorithms
8. Searching & Sorting Algorithm

REFERENCE BOOKS:

1. Data Structures - by Seymolur Lipschutz (Schaum Series)
2. Fundamentals of Computer Algorithms - by Horowitz,E & Sahani, S - Galgotia
3. Data Structures Theory Applications - by Trembly & Sorenson, TMH

LIST OF EQUIPMENT

Hardware :   Stand alone PC
               (for detail, please refer Annex – I)

Software :   C Compiler

MICROPROCESSOR & INTERFACING

L   T   P   **Curri. Ref. No.: CSE406**
3   0   2

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: CSE402   **Practical: 50**
Credit: 4   *End Term Exam: 25*
                                                         P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	Introduction to Microprocessor - Evolution of Microprocessors, Specific features of Microprocessors, Application in our daily life (a few examples)	2
2.	Internal architecture of a microprocessor (using block diagram); Explanation of each block in brief, Concept of bus structure, Register-to-register transfer, Communication with I/O and memory (This part can be explained using the specific microprocessors like 8085 or 8086/8088). Pin details of 8085 and 8086/8088 CPU and their functions in brief.	6
3.	Addressing modes in general (may be limited to 8085 and 8086/8088 CPU),Instruction cycles, Instruction set, timing diagram (may be limited to 8085 and 8086/8088 CPU). Concept of assemblers and compilers	3
4.	Interfacing of Memory and I/O devices : Concept of address space, address/data bus demultiplexing, address and data bus buffering, address decoding, I/O concepts, memory interfacing concept of I/O mapped I/O and memory mapped I/O. Interrupts - Types of interrupts, Hardware and software data transfer schemes - Synchronous, asynchronous and interrupt driven.	5
5.	Assembly Language Programming : (This part may be limited to the use assembly language of 8085 or 8086/8088 CPU)	10

    i)   Example for register to register, register to memory, memory to register, block of data movement from one area of memory to another, merging of two blocks of data, data block exchange.

    ii)   Examples of arithmetic addition, subtraction, multiplication and division

    iii)   Examples of searching and sorting (simple)

    iv)   Examples using of look up tables

    v)   Use subroutines and delay programme.

6.	Peripheral chips and their Interfacing :	6
	Functional description of 8255, 8253, 8251, 8257, 8237 and 8259.	
	Interfacing of these chips with some standard CPU. Simple assembly	
	language programme to explain the function of these chips.	

7. Special Purpose Interfacing Devices and their Interfacing :   4
Keyboard interfacing, 7 segment and dot matrix display
interfacing, A/D and D/A interfacing, Stepper motor interfacing

8. Recent standard μp : Intel family, HP family and motorola family.   4
Concepts of embedded μp.

9. PC Interfacing : Simple interfacing of Input/Output peripherals   5
like LED, 7 segment LED display modules, steppes motor, relays
through digital I/O card or through the parallel port. Serial
link between microprossor trainer kit and PC serial port,
EPROM programming using PC port.

45

Practical
Total Periods : 30
Periods   : 2 P/W

I.   EXPERIMENTS WITH MICROPROCESSOR

1. Acquaintance with the microprocessor trainer kit hardware and the user's commands (Dynalog / Vinyties/ALS)

2. Assembly language programme development : Data transfer programme - Register to Register, Register to Memory and Vice-Versa

   Arithmetic Operation - 8 bit addition and subtraction, multibyte addition and subtraction, BCD addition and subtraction, multiplication using repeated addition, multiplication using shift-add process, signed multiplication, Binary division, BCD division

3. Array processing - Adding one entry to an array, checking of an ordered list, replacing of one or more entires in a list, sorting and searching, block movement, block exchange and data insertion

4. Look-up table - finding squares, cubes etc., of a number using look-up table, code conversion using look-up table

5. Delay program, use of subroutine (use the above programme as a subroutine in a main programme)

6. Data Input/Output - Programming 8255 with the basic I/O modes, programming 8253, interfacing 7-segment display, bar graph display, multiplexed display, programming 8253, in different modes, waveshape generation using 8253, Interfacing of ADC and DAC with microprocessors/microcontroller, keyboard interfacing (using interrupts or polling) to microprocessor/microcontroller, relay interfacing, stepper motor interfacing.

38

7.   PC Interfacing : Experiments on ADC/DAC interfacing, to stepper motor interfacing and display interfacing, Other interfacing problems may be repeated using PC interfacing and run by using any High level language.

REFERENCE BOOKS

1.   Introduction to Microprocessor - by A.P. Mathur, TMH
2.   Microprocessor - by Ramesh S. Gaonkar, PHI
3.   Microprocessor - by D.Hall, MGH
4.   IBM PC & Clones - by Govindarajalhe, TMH
5.   Computer Organization & Architecture - by William Stalings, PHI

LIST OF EQUIPMENT

1.   PC (for detail, please refer Annex – I)
2.   UPS
3.   Printer
4.   Digital real-time oscilloscope
5.   Function Generator
6.   Digital Multimeter
7.   CBT/CAI Interface Base Unit
8.   Light Sensor Module
9.   Temperature Sensor Module
10.   Pressure Transducer Module
11.   Sensor Module – Semiconductor Temperature, Light Sensor, Pressure Sensor & Magnetic Sensor
12.   Stepper Motor Control Module
13.   Intel MCS-51 Microcontroller System
14.   EPROM Programmer
15.   32-Bit Microprocessor, 8085 Microprocessor kit (trainer)
16.   LED Display
17.   Peripheral chips, 8255, 8253, 8251, 8237, 8259
19.   Micro assembler

GRAPH THEORY

L   *T*   *P*   **Curri. Ref. No.: CSE407**
2   *0*   *0*

Total Contact hrs : 30   **Total marks: 100**   *Theory: 50*
Theory: 30   *End Term Exam: 35*
Practical: *P.A.: 15*
Pre requisite: *Practical:*
Credit: 3   *End Term Exam:*
                                                            P.A :

Theory
Total Period   : 30
Periods   : 2 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Basic Concepts**	5
	1.1 Graphs and Sub graphs	
	1.2 Isomorphism and Degrees	
	1.3 Walks and Connected Graphs	
	1.4 Cycles in Graphs	
	1.5 Cut-vertices and Cut-edges	
	1.6 Matrix Representations of Graphs	
2.	**Eulerian and Hamiltonian Graphs**	4
	2.1 Eulerian Graphs	
	2.2 Hamiltonian Graphs	
	2.3 Weighted Graphs	
3.	**Bipartite Graphs**	4
	3.1 Bipartite Graphs	
	3.2 Perfect Matchings – The Marriage Problem	
	3.3 Trees	
	3.4 Spanning Trees	
4.	**Planar Graphs**	5
	4.1 Definitions	
	4.2 Euler Formula	
	4.3 Characterization of Planner Graphs – Kuratowaski's Theorem (without proof)	
	4.4 Colourings of Planar Graphs (vertex colouring only)	
5.	**Directed Graphs**	6
	5.1 Definitions and Representation	
	5.2 Connectivity in Digraphs	
	5.3 Strong Orientation of Graphs	
	5.4 Eulerian Digraphs	
	5.5 Tournaments	

6. **Graph Algorithms**   6
   6.1   Depth-First and Breadth-First Algorithms
   6.2   Shortest Path Algorithms
   6.3   Minimal Spanning Trees

                                              Total   30

REFERENCE BOOKS

1.   Graph Theory and Applications – by N Deo - Prentice Hall
2.   Graph Theory – by F.Harary - Narosa Publishing House
3.   Discrete Mathematics for Computer Scientists – by J.K.Truss - Addison-Wesley

OPERATING SYSTEM

L   T   P   **Curri. Ref. No.: CSE408**
3   0   4

Total Contact hrs : 105   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 60   *P.A.: 30*
Pre requisite: CS405   **Practical: 50**
Credit: 5   *End Term Exam: 25*
                                                       P.A : 25

Theory
Total Period   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction**	2
	1.1 Definition of O.S	
	1.2 History of O.S	
	1.3 Concepts	
	1.4 Structure	
2.	**Processes**	4
	2.1 Definition of process & thread	
	2.2 Interprocess communication	
	2.3 Classical I.P.C. problems	
	2.4 Process Scheduling	
3.	**Process Scheduling Algorithm**	5
	3.1 Resident Monitor(Single user)	
	3.2 Multi user system	
	3.3 Time sharing system	
	3.4 FIFS	
	3.5 Round Robin Fashion/Time quantum. Concept.	
	3.6 Multiple queues	
	3.7 Priority queues	
	3.8 Shortest job first	
4.	**Memory Management**	7
	4.1 Resident Monitor	
	4.2 Multiple Partition	
	4.3 Garbage collection and compaction	
	4.4 Paged memory management	
	4.5 Page Replacement Algorithms	
	4.6 Swapping	
	4.7 Segmentation	
	4.8 Segmented paged memory management	
	4.9 Demand paged memory management	
	4.10 Virtual Memory	

5.   **File Systems**   5
     5.1   Concept of Files & Directories
     5.2   File System Implementation
     5.3   Security Issues in Files
     5.4   Protection Mechanisms
     5.5   Case studies of Unix file system

6.   **Input/Output**   4
     6.1   Principles of I/O Hardware
     6.2   Principles of I/O Software
     6.3   Disk
     6.4   Clocks
     6.5   Serial and Parallel port access
     6.6   Terminal Access

7.   **Device Management**   3
     7.1   Techniques for Device Management – Dedicated, shared, virtual
     7.2   Device allocation considerations I/O traffic control & I/O Schedule, I/O Device handlers
     7.3   SPOOLing

8.   **Dead Locks**   5
     8.1   Concept of deadlock
     8.2   Resources
     8.3   Dead lock Prevention :
              Blanker Algorithm & Safety Algorithm
     8.4   The Ostrich Algorithm
     8.5   Deadlock Detection and Recovery
     8.6   Deadlock Prevention

9.   **Distributed O.S.**   5
     9.1   Definition
     9.2   Types of Distributed O.S
     9.3   Workstation server model
     9.4   The processor pool model
     9.5   The hybrid model
     9.6   Case study SUN NFS File Server

10.   **Case Studies**   5
     10.1   UNIX & LINUX O.S
     10.2   MS-DOS & WINDOWS XP
     10.3   WINDOWS – NT

45

Practical

Total Period   : 60
Periods   : 4 P/W

UNIX

1.   Overview of UNIX/LINUX
      UNIX/ LINUX as an Operating system, Kernel, Shell and User, UNIX File
      System, Files and Directories, Access permission, File system hierarchy

2.   Basic UNIX/LINUX Commands
      Listing of files and directories, Copying, Deletion, Renaming and Comparing files,
      Creation, Navigation and Removing directories, Access permission of files and
      directories, Editors in UNIX/LINUX, Status of users, terminals, date and time,
      Displaying blown-up message, Paging and printing of files, Background jobs

3.   Advance Features of UNIX/LINUX
      I-nodes, Trees, Pipes and Filters, Cutting, Pasting and Sorting of files, Searching for a
      pattern in a string

4.   Programming with the Shell
      System variables and shell variables, Interactive shell scripts, shell termination,
      Conditional statements, Looping statements, Special parameters in shell Computation
      and string handling

REFERENCE BOOKS

1.   Operating System – Madnick and Donovan - MGH
2.   Operating System Concepts – A. Silberschatz and P. Galvin - ADP
3.   The UNIX Programming Environment – by Kernighan & Pike - PHI
4.   UNIX – Concepts & Application – by Sumitabha Das – TMH
5.   LINUX Administration Hand book ***

LIST OF EQUIPMENT

Hardware :   Unix/Linux Server with Clients
              (for detail, please refer Annex – I)

Software :   Unix/Linux Operating System

THEORY OF COMPUTING

L	*T*	*P*	**Curri. Ref. No.: CSE409**
3	*0*	*0*	

Total Contact hrs : 45   **Total marks: 100**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: *P.A.: 30*
Pre requisite: CSE405   *Practical:*
Credit: 3   *End Term Exam:*
    P.A :

Theory
Total Period   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Theory of Automata**	8
	1.1 Strings over an Alphabet and their properties	
	1.2 Finite Automation	
	1.3 Transition Diagram and Transition Matrix	
	1.4 Accepatability of a String by a Finite Automation	
	1.5 Nondeterministic Finite Automation	
	1.6 Equivalence of DFA and NFA	
	1.7 Mealy and Moore Models	
	1.8 Minimization of Finite Automata	
2.	**Formal Languages**	4
	2.1 Basic Definitions	
	2.2 Operations of Languages	
	2.3 Grammar and the Language generated by a Grammar	
	2.4 Chomsky Classification of Languages	
3.	**Regular Sets and Regular Grammars**	7
	3.1 Regular Expressions and Regular Sets	
	3.2 Finite Automata and Regular Expressions	
	3.3 Pumping Lemma for Regular Sets	
	3.4 Closure Properties of Regular Sets	
	3.5 Regular Sets and Regular Grammars	
4.	**Context-Free Languages**	8
	4.1 Context-Free Languages	
	4.2 Derivation Trees	
	4.3 Ambiguity in Context-Free Grammars	
	4.4 Closure Properties of Context-Free Languages	
	4.5 Chomsky and Greibach Normal Forms	
	4.6 Pumping Lemma for Context-Free Languages	
5.	**Pushdown Automata**	4
	5.1 Basic Definitions	
	5.2 Acceptance by Pushdown Automata	
	5.3 Pushdown Automata and Context-Free Languages	

REFERENCE BOOKS

1. Introduction to Language and the Theory of Computation – by J. C. Martin – Tata McGraw Hill
2. Theory of Computer Science – by K.L.P. Mishra & N. Chandansekaran – Prentice Hall of India
3. Introduction to Antomata Theory, Languages and Computation – by J. Hopcroft & J. Ullman – Narosa Publishing House

COMPUTER GRAPHICS & MULTIMEDIA

L   T   P   **Curri. Ref. No.: CS410**
3   0   3

Total Contact hrs : 90   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 45   *P.A.: 30*
Pre requisite: CSE403,   *Practical: 50*
CSE405, G206B   *End Term Exam: 25*
Credit: 5   *P.A : 25*

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction to Computer Graphics**	5
	1.1 Introduction	
	1.2 Image Processing ans Picture analysis	
	1.3 Conceptual frame work for interactive graphics	
	1.4 Classification	
2.	**Hardware**	4
	2.1 Various display devices	
	2.2 Video controller	
	2.3 Random - scan display processor	
	2.4 Image scanners	
	2.5 Interaction hardware	
3.	**Raster Graphics Techniques**	8
	3.1 Interaction handling	
	3.2 Raster graphics features	
	3.3 Line drawing algorithms	
	3.4 Circule drawing algorithms	
	3.5 Scan conversion	
	3.6 Polygon filling	
	3.7 Pattern filling	
	3.8 Halftoning	
	3.9 Clipping techniques	
4.	**Geometric Transformation and Viewing** :	3
	4.1 2D and 3D transformation	
	4.2 Representation and composition	
	4.3 3D viewing	
5.	**User Interfacing**	5
	5.1 Interaction handling models	
	5.2 Window management	
	5.3 Input/Output handling	
	5.4 Tool kits	

6. **Curves & Surfaces and Solid Modeling**   7
   6.1   Polygon merhes
   6.2   Parametric cubic curves
   6.3   Quadric surfaces, Bezier and B-spline curves
   6.4   Representing solids : sweep representation, boundary representation
   6.5   Spatial partitioning

7. **Visibility**   5
   7.1   Hidden line and Hidden surfaces
   7.2   Floating horizon algorithm
   7.3   Roberts algorithm, Z-buffer
   7.4   List priority alogrithms

8. **Rendering**   4
   8.1   Illumination models
   8.2   Shadows
   8.3   Shading
   8.4   Transparency

9. **Animation**   4
   9.1   Convertion & Computer Aided animation
   9.2   Rules & Technology

                                                                       45

Practical
Total Periods   : 45
Periods   : 3 P/W

1. **Sound Forge**
   Sound recording and editing through sound forge XP
   1.1   The main screen
   1.2   The data window
   1.3   Opening an existing file - playing a sound file
   1.4   Playing a section of a file
   1.5   Copying data to a new file
   1.6   Saving a file
   1.7   Simple editing
   1.8   Advanced editing
   1.9   Editing sound formats
          1.10   Applying sound processing functions
          1.11   Recording sound using sound forge.

2. **Adobe Premiere**
   2.1   Creating desktop video with Adobe Premiere
   2.2   Creating on Adobe Premiere movie
   2.3   Starting a new project importing clips, assembling the cliping construction window, previewing the movie, changing duration of a cell, creating a transition, adding other clips and transitions.
   2.4   Applying filters to a clip
   2.5   Changing the time unit in the construction window
   2.6   Using preview command to preview the transition and filter effects
   2.7   Adding sound to movie
   2.8   Connecting and capturing source video through broadway cord
   2.9   Editing and compressing the video

3. **Adobe Photoshop**
    3.1   Scanning image
    3.2   Creating new images
    3.3   Changing foreground and background colours
    3.4   Creating and using paths
    3.5   Editing and retouching
    3.6   Duplicating images
    3.7   Layers - linking with layers
    3.8   Grouping a images
    3.9   Rubber stamp and pattern stamp tool
          3.10   Painting - paintbrush tool, air-brush tool, pencil tool, eraser tool, gradient tools
          3.11   Photoshop filters

4. **Authorware Attain**
    4.1   Introduction - system requirements, installing, general features
    4.2   Knowledge objects - introduction to knowledge objects, choosing a knowledge object, adding a knowledge object file, authorware knowledge objects
    4.3   Authoring basics - icon based authoring what each icon does the toolbar, working with icons on the flow line, authoring - step by step, distribution requirements, packaging an AW piece, packaging an AW piece for the web
    4.4   Creating interactions - components of an interaction, How an interaction works, tracing the flow through an interaction, setting up an interaction step by step
    4.5   Directing the flow - Decision structure, frameworks, navigation structures -step by step
    4.6   Transitions, Positioning and motion - using transition for special effects, positioning objects using the motion icon, making objects move step by step.

5. **Director**
    5.1   Introduction - system requirement, installing director
    5.2   Basic - Overview, work area, adding interactivity with lingo, using the score, using markers, selecting and editing frames in the scores using xtras
    5.3   Sprites - creating, selecting and layering sprites positioning, splitting and joining sprites
    5.3   Working with cast members and casts - using the cast window, creating cast members
    5.4   Behaviours - attaching behaviour, creating and modifying behaviour
    5.5   Colour, Tempo and transitions - animation, navigation and user interaction, movies in a window, sound, video and synchronization, distributing movies.

6. **Tool book Instructor**
    6.1   Introduction - system requirement, installing instructor
    6.2   Understanding Instructor concepts - planning the project, building an application, using open script
    6.3   Exploring the Instructor interface - about the Instructor, Visual interface using tools in Instructor
    6.4   Using the book specialist - working with books and pages, working with Toolbook II catalogues, working with objects, setting object properties, adding buttons, working with text & hotwords, working with list boxes and combo boxes, adding graphics, using multimedia, hiding, showing and animating objects, creating a quiz using question objects.

REFERENCE BOOKS

1.   Multimedia Communication – by Keno et al – PH
2.   Fundamentals of Computer Graphics & Multimedia – by Mukherjee – PHI
3.   Multimedia – An Introduction – by John Villamil & Louis Molina – Prentice Hall
4.   Multimedia – Production Planning & Delivery – by John Villamil & Louis Molina – Prentice Hall
5.   Multimedia – Sound & Video – by Jose Lozano – Prentice Hall
6.   Multimedia Graphics – by John Villamil & Leony Fernandez, Elias – Prentice Hall
7.   Manuals for Sound Forge, Adobe Premiere, Adobe Photoshop, Authorware Attain, Director, Toolbook Instructor

LIST OF EQUIPMENT

Hardware :   Multimedia PC
                       (for detail, please refer Annex – I)

Software :   Sound Forge, Adobe Premiere, Adobe Photoshop, Authoreware, Director, Tool book

ELECTRONIC DEVICE & CIRCUITS

L   T   P   **Curri. Ref. No.: CSE411**
2   1   2

Total Contact hrs : 75   **Total marks: 125**   *Theory: 75*
Theory: 45   *End Term Exam: 50*
Practical: 30   *P.A.: 25*
Pre requisite: **Practical: 50**
Credit: 4   *End Term Exam: 25*
                                                             P.A : 25

Theory
Total Periods : 30
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.

1.   SEMICONDUCTOR DIODES   **12**
  1.1 Semiconductor Physics
     To describe
       1.1.1   The properties of semiconductor
       1.1.2   The principle of conduction in crystal
       1.1.3   Doping
       1.1.4   Unbiased diode
       1.1.5   Forward and reverse biased diode

  1.2   Characteristics and application of diodes
       1.2.1   To describe the volt amps, characteristics of diode
       1.2.2   To explain the property of ideal diode
       1.2.3   To define the resistance of diode and describe the method of measurements
       1.2.4   To describe practical diode
       1.2.5   To state the important specifications of semiconductordiode
       1.2.6   To describe the half wave and full wave rectifier circuits
       1.2.7   To calculate the efficiency of rectifier circuit
       1.2.8   To write the formulae of calculating the parameters offilter circuit

  1.3   Special purpose diodes
       1.3.1   To describe the characteristics and field of application of
                (a) zener diode (b) capacitive diode (c) Light emitting diode (d) photo diode (e) schottky diode (f) constant current diode (g) step recovery diode (h) tunnel diode (i)PIN diode (j) gun diode

2.   TRANSISTOR   **22**
  2.1 To describe the construction of transistor
  2.2 To describe the working principle of transistor
  2.3 To state the types of transistor
  2.4 To describe the characteristics of transistor and method of drawing characteristics curves
  2.5 To describe the amplifying characteristics

2.6 To describe the amplifying characteristics in (a) common base (b) common emitter (c) common collector configuration

2.7 To define (a) current amplification factor (b) collector current (c) emitter current (d) leakage current (e) input resistance (f) output resistance (g) base current amplification factor

2.8 To establish the relation between a and b

2.9 To describe the method of drawing the (a) input characteristics curve (b) output characteristics curve

2.10 To compare the characteristics of three different configurations e.g. CB, CE, CC

2.11 To analyze the load line of a transistor (both for dc and ac)

2.12 To describe the function of the heat sink of a transistor.

2.13 To write the Specification of a transistor.

2.14 To state the conditions for faithful amplification.

2.15 To define transistor biasing and essential requirement of a transistor Biasing circuit.

2.16 To define the function of a small single stage amplifier, and calculate its voltage and power gain.

2.17 Classification of Amplifiers.

2.18 To define the multistage amplifiers and different type of coupling.

2.19 To describe the different types of power amplifiers

2.20 To describe and draw the different stages of an amplifier used in PA system.

2.21 To study the feedback amplifier(concept of feedback, gain

3.   PULSE WAVEFORMS AND RC NETWORKS.   3

3.1 To study RC charging, discharging and calculations and RC frequency response.

3.2 To describe the ideal and actual rectangular waveforms with respect to rise time, fall time, duty cycle, tilt and average value.

4.   SINUSOIDAL OSCILLATORS: 5

4.1 To state the type of Electronic Oscillators

4.2 To describe damped and undamped oscillations

4.3 To state the conditions of oscillation

4.4 To study different types of oscillators like Hartley, Colpitt, Phaseshift, Wein Bridge and Crystal oscillators and their application.

5.   WAVE SHAPING CIRCUITS: 3

5.1 To study the working of Diode clipping and Diode Clamping Circuits.

Practical
Total Periods : 30
Periods   : 2 P/W

LIST OF EXPERIMENTS:

1.   To identify the active and passive components
2.   To determine the forward and reverse characteristics of PN junction diode
3.   To determine the input and output characteristics of Junction transistor
4.   To determine the forward and reverse characteristics of a zener diode
5.   To connect the (a) common base (b) common emitter (c) common collector Amplifiers and to compare their gain

6. To assemble (a) two stage R.C. coupled (b) transformer coupled (c) Direct coupled amplifier and check the amplification of the input signal
7. To connect a single stage amplifier and check the cut off, saturation and normal biasing conditions on input signal by varying the biasing.
8. To determine the frequency response curue of a two stage R.C. coupled amplifier
9. To determine the (a) current amplification factor in common base configuration (b) base current amplification factor in common emitter configuration
10. To determine the input and output characteristics of transistor, (a) draw the D.C. load line (b) draw the collector dissipation curve
11. To construct a multistage amplifier with (a) power Amplifier and check the amplification of input signal with and without negative feedback
12. (1) Construct Hartley Oscillator and adjust (a) gain to obtain sinusoidal wave output and (b) LC to vary the frequency (2)Determine the resonance frequency and amplitude of oscillation
13. Construct a phase shift Oscillator and adjust its gain to obtain sinusoidal output. Determine (a) gain and (b) frequency of oscillation during Oscillation
14. Construct the diode clipping and clamping circuit and observe the clipping level with change in biasing voltage
15. Construct a differentiating and integrating circuit by using RC network.

REFERENCES BOOKS:
1. Electronic Principles; Sahdev (Dhanpat Rai & Sons)
2. Electronic Devices and circuits; Mothershead (TMH)
3. Electronic Devices; Floyd
4. Electronic Principles; Malvino; (TMH)

APPLIED TECHNOLOGY COURSES

DATABASE MANAGEMENT SYSTEM (DBMS)

L	*T*	*P*	**Curri. Ref. No.: CS501**
3	*0*	*2*	

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical:30   *P.A.: 30*
Pre requisite: CSE405   *Practical: 50*
Credit: 4   *End Term Exam: 25*
                                                       P.A : 25

Theory
Total Period   : 45
Period   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction to Database Management System**	5
	1.1 Database System environment	
	1.2 File oriented Approach	
	1.3 Database Approach	
	1.4 Users of DBMS	
	1.5 Intended use of DBMS	
	1.6 Benefit of using database approach	
	1.7 Concepts of Client Server Architecture and distributed system	
2.	**Database System Concept and Application**	5
	2.1 Date Models, Schemes and instances	
	2.2 DBMS architecture and Independence	
	2.3 Database Languages and Interfaces	
	2.4 The database system environment	
	2.5 Classification of DBMS	
3.	**E-R diagram**	2
	3.1 Defining relations, Entity Set	
	3.2 E-R Model concept with examples	
4.	**SQL**	12
	4.1 Data definition in SQL	
	4.2 Queries in SQL	
	4.3 Create, Update, Insert statements in SQL	
	4.4 Views in SQL	
	4.5 Specifying additional constraints as assertions	
	4.6 Specifying indexes	
5.	**Functional Dependencies and Normalization for Relational Database**	4
	5.1 Functional dependencies	
	5.2 Normal forms based on primary keys	
	5.3 General definitions of second and third normal forms	
	5.4 Boye Codd normal form	

6. **Transaction Processing Concepts** 3
   6.1 Introduction to transaction processing
   6.2 Transaction and System concept
   6.3 Desirable properties of transactions
   6.4 Schedules and recover ability

7. **Concurrency Control Techniques** 3
   7.1 Basic Concepts; Concepts of Locks : live lock, dead lock; Serializability

8. **Security and Integrity** 5
   8.1 Security and integrity violation
   8.2 Authorization
   8.3 Authorization and Views
   8.4 Granting of Privileges
   8.5 Security specification in SQL
   8.6 Encryption

9. **Distributed Databases**
   Principles of distributed database; data fragmentations, 6
   transparency, integrity, allocation of fragments, translation of
   global query to fragment query; concurrency control – elementary
   ideas

   45

Practical
Total Periods : 30
Classes   : 2 P/W

1. **Oracle**
   1.1 Introduction to Oracle
   1.2 Datatypes and attributes constraints, primary key, unique, foreign key, check, not null

2. **Introduction to Structured Query Language (SQL)**
   2.1 Data definition language (DDL) - Create, alter, drop table
   2.2 Data manipulation language (DML) - Select, insert, update, delete
   2.3 Data control language - Grant, revoke
   2.4 Creating and deleting views, index

3. **Introduction to PL/SQL**
   3.1 Block structure, variable and types, looping constructs, expression and operators, functions
   3.2 Cursors variable, cursor fetch, loops
   3.3 procedure, functions, triggers
   3.4 Error handling and exceptions
   3.5 Composite datatypes

4. **Developer 2000/IDS**
   4.1 Oracle forms - Form modules, blocks, items, windows, canvas views, triggers, master detail forms, menu, alert, LOV
   4.2 Oracle reports – report generation with parameters

5   Visual Basic

    5.1   Windows programming. Creation of forms, menus, etc

    5.2   Basic Programming Constructs of Visual Basic-Array handling
Common controls of Visual Basic-Creation of Label control, command button, textbox, checkbox, option button, frame, list box, combo box, scroll bars, timer, shape, line.

    5.3   File System Control - Dirlist box, dDrivelist box, filelist box, and synchronization of above controls Common Dialog Controls, Connectivity with Databases (with RDBMS like Oracle), Ideas on implementing ODBC Object Orientation in Visual Basic, Creation of Active X Control using Visual Basic

6.   DBA function :

    5.1   Installation of Oracle & D2K

    5.2   Creation of a database

    5.3   Routine maintenance of database

    5.4   Backup & Recovery of database

    5.5   Concept of inet.ora

REFERENCE BOOKS

1.   Fundamentals of Database System - by Elmasri and Navathe - Addison-Wesley
2.   An Introduction to Database Systems – by C.J. Date – Addison-Wesley
3.   Principles of Database Systems – by John E. Hopcroft & Jeffrey D. Ullman – Galgotia Pub.
4.   Developing personal oracle7 applications – by David Lockman – Sams Pub.
5.   Oracle8 DBA handbook – by Kevin Loney – TMH

LIST OF EQUIPMENT

Hardware :   Unix/NT based Client-Server environment
(for detail, please refer Annex – I)

Software :   Oracle & D2K/IDS
(Latest Version)

OBJECT ORIENTED METHODOLOGY

L	*T*	*P*	**Curri. Ref. No.: CSE502**
2	*0*	*4*	

Total Contact hrs : 90	**Total marks: 200**	*Theory: 50*

Theory: 30
Practical: 60

End Term Exam: 50
P.A.: 0

Pre requisite: G206B, CSE405
Credit:4

Practical: 50
End Term Exam: 25
P.A : 25

Theory
Total Period   : 30
Period   : 2 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Overview** Introduction to object oriented approach Need of object oriented programming Identifying objects Characteristics of object oriented language Defining objects	2
2.	**Introduction to Object Oriented Methodology** Object oriented development Object oriented theme Comparison of object oriented language and procedure oriented language Basic concepts of OOPs objects, classes, data encapsulation, inheritance Polymorphism and overloading	3
3.	**Object Oriented Analysis & Design** Introduction to software engineering paradigms Requirement analysis and problem statement – Identifying objects, specifying attributes, defining operation & inter object communication Object oriented analysis & prototyping Object oriented design concepts Object oriented design methods Object & class definition	3
4.	**Object Oriented Language C++ Features** Common statement Basic data types Operators Arithmetic, relational, logical operators Manipulators, assignment and conditional operators New and delete operators Control structure	2

FOR loop
WHILE loop
If-else statement
Switch statement
Break and continue statement

5.   **Arrays and Pointers**   4
Defining an array and accessing it's elements
Array as class member data
Array of objects
Addresses and pointers
Pointers and functions

6.   **Structure and Functions**   3
Specifying the structure
Defining a structure variable
Accessing the members of a structure
Enumerated data types
Function definition and declaration

7.   **Objects and Classes**   3
Definition and declaration
Private, public, protected
Constructor, destructor
Access specifier
Structures and classes

8.   **Operator Overloading**   3
Basic concepts of overloading
Overloading unary operators
Overloading binary operators
Advantages of operator overloading

9.   **Inheritance**   3
Definition of inheritance
Basic concepts of `Base class' and `derived class'
Derived class constructor
Class hierarchies
Public and private inheritance
Multiple & multilevel inheritance

10.   **Virtual Functions**   2
Definition of virtual function
Friend function and friend classes
Use of `this' pointer

11.   **Templates**   2
Introduction to templates
Class templates
Member function template

                                                                   30

Practical

Total Periods : 60
Periods : 4 P/W

Problems on :-

- Objects and classes
- Declaring and creating objects
- Constructors
- Modifiers
- Passing objects to methods
- Instance variables and class variables
- Instance method & class method
- Scope of variables interface and packages
- Introductory Problems on Class Inheritance Super classes and sub class
- Calling super class constructors
- Calling super class methods
- Object class
- Number class
- Processing date and time
- Class Templates and Exceptional handling

REFERENCE BOOKS

1. Object Oriented Programming – by E. Balaguruswamy, TMH
2. Software Engineering – by Roger S. Pressman, PHI
3. Object Oriented Modeling & Design – by James Rumbaugh, Michael Blaha, William Premerlani, Frederick Eddy, William Lorensen, PHI

LIST OF EQUIPMENT

Hardware : Stand alone PC
(for detail, please refer Annex – I)

Software : C++ Compiler/Java compiler

COMPUTER COMMUNICATION & NETWORKING

L   T   P   **Curri. Ref. No.: CSE503**
3   0   4

Total Contact hrs : 105   Total marks: 150   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 60   *P.A.: 30*
Pre requisite: CSE403,   ***Practical: 50***
CSE402   *End Term Exam: 25*
Credit: 5   *P.A : 25*

Theory
Total Period   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction**	6
	1.1 The uses of Computer Network	
	1.1.1 Network Goals	
	1.1.2 Application of Network	
	1.2 Network Structures	
	1.3 Network Architecture	
	1.3.1 Protocol Hierarchies	
	1.3.2 Design Issues for the Layers	
	1.4 The O.S.I Reference Model	
	1.5 Services	
	1.5.1 OSI Terminology	
	1.5.2 Connection-oriented and Connectionless services	
	1.5.3 Service primitives	
	1.5.4 The Relationship of services to protocols	
	1.6 Example Network	
	1.6.1 Public Networks	
	1.6.2 ARPANET	
	1.6.3 Novell Netware	
2.	**The Physical Layer**	6
	2.1 Transmission Median	
	2.2 Wireless Transmission	
	2.3 Telephone System	
	2.4 ISDN	
	2.5 Transmission and switching	
3.	**The Medium Access Sub layer**	5
	3.1 ALOHA	
	3.2 CSMA	
	3.3 Collision Free protocols	
	3.4 IEEE Standard 802 for LAN	
	Ethernet, Token Bus,Token ring	
	3.5 Bridges	

4.   The Data Link Layer   4
  4.1   Data Link Layer Design Issue
  4.2   Error Detection and Correction
  4.3   Elementary Data Link Protocols
  4.4   Sliding windows protocols

5.   The Network Layer   4
  5.1   Network Layer Design Issues
  5.2   Ponting Algorithms
  5.3   Congestion Control Algorithms

6.   The Transport Layer   4
  6.1   The Transport Services
  6.2   Elements of Transport Protocols
  6.3   A simple Transport Protocols

7.   The session Layer   4
  7.1   Design Issues
         7.1.1   Concept of Data exchange dialog management, activity
                 management
  7.2   Remote Procedure Call
         7.2.1   Client-server model
         7.2.2   Semantics of R.P.C

8.   The Presentation Layer   4
  8.1   Design Issue
  8.2   Data Compression Techniques
  8.3   Elementary idea of cryptography

9.   The Application Layer   3
  9.1   Design Issue
  9.2   File Services
  9.3   E Mail

10.   **Concepts of internet and www, Html, TCP/IP**   5

                                                                            45

Practical
Total Periods : 60
Periods   : 4 P/W

1.   Study and describe the differences between centralised distributed and collaborative
      computing. (Students may be told to identify from given specification of system).
2.   Case studies of LAN, MAN, WAN
3.   Study and describe client, server, peers
      (identify from given specification)
4.   Study network services - remote login, telnet, ftp
      (Either from internet or a network being made available)
5.   Determine how a specific network service is affected given a network architecture
      (centralised and distributed).
6.   Demonstrate different transmission media
      Twisted pair, Co-axial cables, Wireless, Identify advantages and disadvantages

7. Identify, describe - Network connectivity devices like Media connector, Interface boards, Modems, Repeaters, Hubs, Switch, Bridges, Multiplexer, Routers
8. Study main protocols through Windows 95/98/NT (any two in details)
   (TCP/IP, SLIP, PPP, FDDI, X.25, ISDN, ATM)
9. Laboratory setting-up of ethernet, installation of ethernet card and testing
10. Design LAN
11. Configure Network Server
    Windows NT, Server installation, network printing, network application, client server
12. Configure Network Clients
13. Preventing Problems in a Network
    Physical, electrical, virus, warm security
14. Troubleshooting
    Isolating a problem, recovery from disaster, study of Tools, terminators, cable protocol analysers
15. Network Administration

REFERENCE BOOKS

1. Computer Network – by A. S. Tanenbaum, PHI
2. Data Communication & Computer Networks – by W. Stallings, PHI

LIST OF EQUPMENT

Hardware : i)   Stand alone PC (for detail, please refer Annex – I)
              ii)   Unix/Linux-based Server (for detail, please refer Annex – I)
              iii) Wndow-based Server (for detail, please refer Annex – I)
              iv)   Hub (8 port/16 port)
              v)   Switch
              vi)   Bridge
              vii) Multiplexer
              viii) Modems
              ix)   Router
              x)   Network Interfacing Cards
              xi)   Wire Cutter and Stripper
              xii) UTP Cables fitted with RJ-45 connectors
              xiii) STP Cables
              xiv) Coaxial Cables
              xv)   Terminators
              xvi) Interface Boards
              xvii) Printers (Dot Matrix/Laser/Deskjet)

Software : i)   Unix/Linux Operating System
             ii)   NT Operating System
             iii) Windows XP/7/8
             iv)   Network Interfacing Card Drivers
             v)   Anti-virus Software
             vi)   Firewall Software

SYSTEM PROGRAMMING

L   *T*   *P*   **Curri. Ref. No.: CSE504**
3   *0*   *0*

Total Contact hrs : 45   **Total marks: 100**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: *P.A.: 30*
Pre requisite: CS408   *Practical:*
Credit: 3   *End Term Exam:*
                                                        P.A :

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Assembly Language**	6
	1.1 Introduction to assembly language	
	1.2 Description of functional characteristics, addressing modes,	
	1.3 Data types and instruction structure	
	1.4 Registers	
	1.5 Indexing	
	1.6 Instruction set description	
2.	**Macros**	4
	2.1 Recursive macros	
	2.2 Sub-routines	
	2.3 Stacks, procedures, exception handling.	
3.	**Assemblers**	8
	3.1 Overview of assembly process	
	3.2 Processing of imperative, declarative and assembler directive statements	
	3.3 Relocation, linking and loading concepts	
	3.4 One and two pass assembler	
	3.5 Symbol table organization, program sections, output forms	
4.0	**Macro-assembler**	7
	4.1 Macro defintions and parameters	
	4.2 Macro call expansion	
	4.3 Macro defintion and macro call within a macro	
	4.4 Conditional assembly macro-processor	
5.	**Loaders**	6
	5.1 Review of loading, linking and relocation	
	5.2 Absolute, dynamic and direct loading schemes	
	5.3 Program linking schemes and resolution of external references	
	5.4 Optional features in loaders and linkage editors	
	5.5 Overlay structures and dynamic loading	

REFERENCE BOOKS

1.   System Programming – by John Donovan, TMH
2.   Introduction to System Software – by D. M. Dhamdhare, TMH

WEB TECHNOLOGY

L	*T*	*P*	**Curri. Ref. No.: CSE505**
3	*0*	*4*	

Total Contact hrs : 105   **Total marks: 200**   ***Theory: 100***
Theory: 45   ***End Term Exam: 70***
Practical: 60   ***P.A.: 30***
Pre requisite: CSE503   ***Practical: 100***
Credit: 5   ***End Term Exam: 50***
   P.A : 50

Theory
Total Period   : 45
Period   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Internet Fundamentals**	3
	1.1 Motivation for internetworking	
	1.2 History and scope of internet	
	1.3 Internet protocol and standardization	
	1.4 Role of ISP & Factors for choosing an ISP	
	1.5 Internet service providers in India	
	1.6 Types of connectivity such as Dial Up, Leased, VSAT etc.	
	1.7 Internet server and client modules on various operating systems	
2.	**TCP/IP**	12
	2.1 TCP/IP internet layering model	
	2.2 Reliable stream transport service (TCP)	
	2.2.1 Need for stream delivery	
	2.2.2 Properties of reliable delivery service	
	2.2.3 Providing reliability	
	2.2.4 Idea behind slide windows	
	2.2.5 Ports connections and end points	
	2.2.6 Segment, stream, sequence number	
	2.2.7 TCP segment format	
	2.2.8 TCP header	
	2.2.9 TCP Checksum computation	
	2.2.10 Acknowledgement and retransmission	
	2.2.11 Time out and retransmission	
	2.2.12 Response to congestion	
	2.2.13 Establishment of a TCP connection	
	2.2.14 Source and destination address	
	2.2.15 Protocol number	
	2.2.16 Checksum	
	2.2.17 Closing TCP connection	
	2.2.18 TCP connection reset	
	2.3 Connection less data gram delivery (Internet Protocol)	
	2.3.1 Concept of unreliable delivery	
	2.3.2 Connection less delivery system	

6.12   Special characters
6.13   CGI (Common Gateway Interface)
6.14   Active X
6.15   VB Script
6.16   Java Script and java.
6.17   PERL

7.   **Introduction to ASP**   5
    7.1   Concepts of ASP
    7.2   Benefits of using ASP
    7.3   Creating ASP pages
    7.4   Generating web pages dynamically with ASP

8.   **Search Engines**   3
    8.1   Technology overview
    8.2   Popular search engines
    8.3   Registration of web site in a search engines

                                                       45

Practical

Total Periods   : 60
Periods   : 4 P/W

1.   Installation of network components under NT or 95/98/ LINUX
2.   Installation of TCP/IP
3.   Installation of Intranet
4.   Configuration of one web server including Apache, ISS
5.   Deployment of HTML files in Intranet servers
6.   Creation of simple HTML pages, using the following tags.
       <Hn> ..... </Hn>
       <P> ..... </P>

       <A HREF> ..... </A>
       <Img>
       <FONT>

7.   Creation of tables and lists using HTML
8.   Creation of simple forms incorporating GUI components (command button, text box, radio button, check box, combo box) in HTML pages
9.   Practical on different Internet services (WWW, Mail, FTP, Chat)
10.   Simple application using conditional statements
11.   Develop application using loop constraints
12.   Creation of classes, interfaces and packages
13.   Simple application using threads and runable interface
14.   Simple application using thread synchronization methodology
15.   Creating application to create user defined exception
16.   Simple application to handle inbuilt exceptions
17.   Write application to incorporate simple I/O classes
18.   Creating application for text file handling
19.   Creating application for random file handling
20.   Writing applet and embedding it into HTML file

21. Create applet to display different graphical shapes (line, circle, ellipse, arcs, rectangle) and incorporate colour in those shapes
22. Create applet to incorporate GUI components (command button, text box, text area, list box, combo box, check box, frame, check box group)
23. Create applet-using layout manager
24. Write applet to incorporate events
25. Create multi threaded applet
26. Elementary problems on CGI
27. Elementary problems on Active X
28. Elementary problems on VBscript
29. Elementary problems on Java Script
30. Elementary problems on PERL
31. Elementary ideas on PHP, MySQL, JSP

REFERENCE BOOKS

1. Internet working with TCP/IP Vol – I : principles, protocols and architecture – by Douglas E. Comer – PHI
2. Internet working with TCP/IP Vol – II : design, implementation and internals – by Douglas E. Comer & David L. Stevens – PHI
3. Internet working with TCP/IP Vol – III : client server programming and applications – by Douglas E. Comer & David L. Stevens – PHI
4. HTML : the definitive guide – by Chuck Musciano & Bui Kennedy - SPD
5. E-MAIL security : how to keep your electronic messages private – by Bruce Schneier – John Wiley
6. Dynamic HTML : the definitive reference – by Danny Goodman – SPD
7. Dynamic HTML in Action – by Schurman & Pardi – PHI/Microsoft Press

LIST OF EQUIPMENT

Hardware :   Stand alone PC
(for detail, please refer Annex – I)

Software :   Web browser (Internet Explorer & Netscape Navigator) with internet connection

SOFTWARE ENGINEERING

L   T   P   **Curri. Ref. No.: CSE506**
3   0   0

Total Contact hrs : 45   **Total marks: 100**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: *P.A.: 30*
Pre requisite: CSE405   *Practical:*
Credit: 3   *End Term Exam:*
                                                        P.A :

Theory
Total Period   : 45
Period   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.0	**Introduction to Software Engineering**	4
	1.1 The evolving role of software	
	1.2 Software crisis-problems and causes	
	1.3 Software engineering paradigms	
	1.4 Classic life cycle	
	1.5 Prototyping	
	1.6 Spiral Model	
	1.7 Generic view of software engineering	
2.0	**Software Requirement Analysis**	6
	2.1 Requirement analysis fundamentals	
	2.2 Structured analysis : Basic notation and its extension, object oriented analysis and data modeling, process modeling	
3.0	**Software Design**	5
	3.1 Evolution of software design	
	3.2 Design fundamentals: Abstraction, refinement, modularity, software architecture	
	3.3 Flow oriented design and object-oriented design	
4.0	**Quality Assurance**	4
	4.1 Software quality factor	
	4.2 Software quality Assurance (SQA)	
	4.3 SQA activities	
	4.4 Software reliability, errors and faults	
	4.5 Software reliability models	
5.0	**Verification and Validation**	3
	5.1 Software testing strategies & techniques	
	5.2 Elementary ideas of black box & white box testing	

6.0	**Software Evaluation**	2
7.0	**Software Documentation**	3
8.0	**Software Project Management**	15

    8.1 Basic concepts of software project management process objectives, scope, estimation, COCOMO model
    8.2 Project planning
    8.3 Project scheduling, Gantt chart, pert chart
    8.4 Managing people, project staffing, group working, working environment
    8.5 Project monitoring, milestone, methods of project monitoring
    8.6 Risk analysis, tracking and control, version management

9.0	**Case Tools :**	3

    Rational University Seed Programme (Rational Rose)

<div align="right">45</div>

REFERENCE BOOKS

1. Software Engineering Beginners Approach – by Pressman – TMH
2. Software Engineering – by Pankaj Jalote – Narosa Pub. House
3. Fundamentals of Software Engg- Carlo Ghezzi, Mehdi Jazayeri, & Dino Mandrioli – PHI.
4. Software Engineering – by Sommerville – Addison-Wesley

PROFESSIONAL PRACTICES -II

L   T   P   **Curri. Ref. No.:CSE508**
0   0   2

Total Contact hrs : 30   **Total marks: 50**   Practical:
Theory: 0   *End Term Exam: 25*
Tutorial: 0   *P.A : 25*
Practical: 30
Credit : 1

Aim :- The course aims to equip students with basic knowledge and skills about Basic concept of PC assembly and installation of operating system software

Objective: - On completion of this course, the Student will be able to:
- Assembly different PC system
- Install various kind of operating system

Suggested List of activities to be done:
- Assemble of PC System with 3 to 4 types of motherboard
- Installation of more than 3 to 4 types of operating system (Linux, different types of Window OS, Ubuntu & etc)

SUGGESTED LEARNING RESOURCES

1. Hardware and Software of Personal Computers – by S.K. Bose, New Age International

PROFESSIONAL PRACTICES -III

L   T   P   **Curri. Ref. No.:CSE509**
0   0   3

Total Contact hrs : 45   **Total marks: 50**   Practical:
Theory: 0   *End Term Exam: 25*
Tutorial: 0   *P.A : 25*
Practical: 45

 Credit : 2

Aim :- The course aims to equip students with basic knowledge and skills about PC system and Computer networking.

Objective: - On completion of this course, the Student will be able to:

- Understand and perform basic system repairing and maintenance
- Identify various internetworking devices
- Setup and administer LAN
- Understand and able to use basic internetworking protocol

Suggested List of activities to be done:

- Upgrade a PC/ Laptop with newer devices such as RAM / hard disk
- CMOS setup of Pentium.
- Hard Disk Partitioning.
- Study of HDD: Identify various components of HDD and write their
- functions.
- Study and installation of any one display cards: VGA or SVGA display
- cards.
- Study of SMPS (ATX)
- Installation of Scanner, Printers and Modems.
- LAN setup
- Networking configuration

SUGGESTED LEARNING RESOURCES

1.   A practical guide to computer communications and networking by   Richard J. Deasington & Ellis Horwood
2.   Local area Networks by Peter Hudson
3.   Understanding Local Area Network by Neil Jenkin
4.   Computer Troubleshooting – by K. MacRae, G. Marshal, Haynes Publishing.
5.   Handbook of Computer Troubleshooting – by M. Byrd, J. Pearson, R.A. Saigh, The Glen Lake Publishing Company.

PROFESSIONAL PRACTICES –IV

L   T   P   **Curri. Ref. No.:CSE510**
0   0   2
Total Contact hrs :30   **Total marks: 50**   Practical:
Theory: 0   *End Term Exam: 25*
Tutorial: 0   *P.A : 25*
Practical: 30
 Credit : 1

Aim :- The course aims to equip students with basic knowledge and skills about Computer networking, data communication and troubleshooting of common problems.

Objective: - On completion of this course, the Student will be able to:

- Install different types of software
- Perform System maintenance & trouble shooting
- Communicate between PC and other related device

Suggested List of activities to be done:

- Installation of Operating system and other software
- Installation of Open source software application
- Installation of database (SQL/MySQL)
- System maintenance and troubleshooting
- Communication between PC and other devices like mobile or palmtop through Bluetooth or other technologies.

SUGGESTED LEARNING RESOURCES

1.   Computer Troubleshooting – by K. MacRae, G. Marshal, Haynes Publishing.
2.   Handbook of Computer Troubleshooting – by M. Byrd, J. Pearson, R.A. Saigh, The Glen Lake Publishing Company.

PROFESSIONAL PRACTICES -V

L   T   P   **Curri. Ref. No.:CSE511**
0   0   4
Total Contact hrs :60   **Total marks: 50**   Practical:
Theory: 0   *End Term Exam: 25*
Tutorial: 0   *P.A : 25*
Practical: 60
 Credit : 2

Aim :   To familiarise and expose students more extensively with the
                    methodology of their own subject.

Objective:
On completion of this course, the Student will be able to:
- Increase their understanding of ideas as presented by the work at hand.
- Be actively involved in their own learning
- Speak more articulately
- Listen better
- Read more thoroughly
- Learn to justify/ qualify opinions
- Prepare a report on the seminar presentation topic

Suggested List of Activities:

1.   Arrangement of expert talks and attending those talks
2.   Each student will be assign a suitable topic related to the subjects being taught in the
      respective semester on which they have to self-study, prepared a small report (5-10
      pages)
3.   Develop (10-15 minutes) presentation (power point presentation preferably with
      animation) and deliver it as seminar.
4.   Presentation follows by group discussion
5.   Industrial visits

PROJECTS

L T P
0 0 10

Curri. Ref. No.:CSE512

Total Contact hrs :150
Theory: 0
Tutorial: 0
Practical: 150
 Credit : 5

Total marks: 50

Practical:
End Term Exam: 100
P.A : 100

Aim: The main aim of the final year project is to develop student's knowledge for solving technical problems in order to produce competent and sound engineers.

The objectives of a final year project are to:

- Allow students to demonstrate a wide range of the skills learned during their course of study
- Allow students to develop problem solving, analysis, synthesis and evaluation skills.
- Encourage teamwork.
- Improve students' communication skills through the production of professional reports

Suggested List of activities to be done:

1. Allow the student to choose their Project
2. Collect information, Planning, Executing, and Managing the Project
3. Documenting the Project
5. Project Assessment and Marking

ELECTIVE COURSES

FAULT TOLERENCE COMPUTING

L	*T*	*P*	**Curri. Ref. No.: CSE601**
3	*0*	*2*	

Total Contact hrs : 75	**Total marks: 150**	***Theory: 100***
Theory: 45		*End Term Exam: 70*
Practical: 30		*P.A.: 30*
Pre requisite:		***Practical: 50***
Credit: 4		*End Term Exam: 25*
		P.A : 25

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.

Fault Tolerant Computing

1. Review of Digital circuits   10
2. Testing: Finding the faults, Test objective: digital/analog, logical/timing, Detection and location   8
3. Fault-models: Stuck-at fault model and the Single fault assumption   6
4. Combinational test generation: Boolean difference, D-notation, Single path propagation and its limitations, D- algorithm and its notation, Testability, controllability and observability   10
5. Testing sequential systems: Without feedback: BIST, With feedback: DFT, serial/parallel scan   6
6. Reliability Analysis   5

                                                                                    Total= 45

Practical:
Total Periods   : 30
Periods   : 2 P/W

Suggested List of practical to be done:
- Design, Implement, simulate & testing of different digital circuit
- Mini project on some relevant topic of this subject

Text book :
1. Abramovici et. al. ,Digital System testing and Testable Design, Jaico Publishing House

ARTIFICIAL INTELLIGENCE

L	*T*	*P*	**Curri. Ref. No.: CSE602**
3	*0*	*2*	

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: CSE405   *Practical:50*
Credit: 4   *End Term Exam:25*
                                                      P.A : 25

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction & Scope of A.I** Nature of intelligence, Definition of A.I. and it's problem domain, Characteristics of an AI systems, Achievements, Scope, Turing Test.	2
2.	**Predicate Logic** Propositional calculus, First Order Predicate Logic (FOPL), Well-formed formulae (wff), Rules of inference, Clauses, Conversion of a well-formed-formula to a set of clauses, Resolution, Resolution refutation system for theorem proving.	5
3.	**Fuzzy Systems** Fuzzy sets and operation on Fuzzy sets, Fuzzy Relations and its Operation, Fuzzy Measures & Fuzzy Arithmetic, Fuzzy Logic, Application of Fuzzy Theory	4
4.	**State Space Search** Concept of state space, State space search as a problem solving strategy, exhaustive search – DFS, BFS, Heuristic search – hill climbing, best first search, A and A* algorithms, Production systems	6
5.	**Knowledge Representation Techniques** The knowledge pyramid, Limitation of predicate logic for knowledge representation, Semantic networks, Conceptual dependencies, Scripts.	6
6.	**Expert Systems** Structure of an expert system, Knowledge engineering, Goal oriented reasoning – forward chaining, backward chaining, Expert shells.	2
7.	**Statistical and Probabilistic Reasoning** Bayesian reasoning – it's limitations, Measure of belief & measure of disbelief, Certainty factor, Dampstar-Shafter theory.	4

8.	**Natural Language Processing**	4
	Generative grammars, Problems with natural language processing, Morphological analysis, Syntactic analysis, Semantic analysis, Discourse integration, Pragmatic analysis.	
9.	**Logic Programming**	6
	Basic concepts, Horn clause, Elements of PROLOG – facts, rules, goals, Problem solving with PROLOG.	
10.	**Game Playing**	3
	Adversarial search, Mini-max procedure, Alpha-beta pruning.	
11.	**Planning**	3
	Relevance of planning in problem solving, Goal-stack planning	
		Total=45

Practical

Total Periods : 30
Periods   : 2 P/W

Suggested List of practical to be done:
- Study and simulate different area of artificial intelligence
- Mini project on some relevant topic of this subject

REFERENCE BOOKS

1. Introduction to Artificial Intelligence and Expert Systems – by D. W. Patterson – PHI.
2. Expert System Principles and Programming – by J. Giarratano & G. Riley – Vikas Publishing House.
3. Prolog Programming for Artificial Intelligence – by I. Bratko – Pearson Education.
4. Introduction to Artificial Intelligence – by E. Charniak & D. M. Dermott – Addison-Wesley.

MOBILE COMMUNICATION

L	T	P	**Curri. Ref. No.: CSE603**
3	*0*	*2*	

Total Contact hrs.:75 **Total marks: 150** **Theory: 100**
Theory: 45   *End Term Exam: 70*
Practical:30   *P.A.: 30*
Pre-requisite: CSE503   **Practical: 50**
Credit: 4   **End Term Exam:25**
                                                 P.A: 25

Theory
Total Period   : 45
Period   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.0	**Introduction to Wireless and Mobile Network**	5
	Historic background; Cellular Industry, advantages & disadvantages of Mobile systems, cell concepts	
2.0	**Basics of Wireless & Mobile System**	4
	Wire based and wire less systems, infrared systems, cellular radio, concepts of wireless LANS, voice signals-its characteristics, frequency spectrum, digital signal broadband and base band signals	
3.0	**Cellular Systems**	10
	Cell layout, pathloss, propagation delay, fading, size and shape of cell-concepts of frequency reuse, spectrum efficiency, cell capacity to handle calls, call demand in a cell, channel requirement, cell splitting, cell sectoring-introductory concepts	
4.0	**Channel Utilization Schemes**	10
	Concepts of Multiplexing:- FDM,FDMA,TDD,TDM,TDMA, CDMA, Concepts of spread spectrum and frequency hopping. Introductory idea on AMPS; Compression operations -voice compression and data compression, V.42, fax compression-introductory idea.	
5.0	**Global System for Mobile Communication (GSM)**	8
	Historical background, SIM and GSM, overview of GSM operations-Registration, Call Establishment, Roaming, GSM channel and operations	
6.0	**Blue tooth and Wireless LANS**	4
	Need of compatibility, Blue tooth concepts, Comparison with IR system Architecture, potential applications. IEEE802.11Wireless LAN standard-basic configuration and architecture, concepts of wireless home networking	

7.0 **Security and Privacy** 4

Introduction, frequency hopping spread spectrum, Encryption concepts,
Public key Encryption, Authentication Model, Smart Card,
Biometric Authentication

45

Practical:
Total Periods : 30
Periods : 2 P/W

Suggested List of Practical **to be done:**
- Design, implementation & simulate of mobile communication environments
- Analysis of the performance indicators for a mobile communication environment

REFERENCE BOOKS

1. Mobile Communications – Jochen H Schiller – Pearson Education
2. Mobile and Wireless Networks - U. Black - Prentice Hall PTR
3. Data over Wireless Networks - Blue tooth, WAP & Wireless LANs - Gil Held - TMH

SOFT COMPUTING

L	*T*	*P*	**Curri. Ref. No.: CSE604**
3	*0*	*2*	

Total Contact hrs : 75	**Total marks: 100**	***Theory: 100***
Theory: 45		*End Term Exam: 70*
Practical: 30		*P.A.: 30*
Pre requisite: CS405		***Practical:50***
Credit: 4		*End Term Exam:25*
		P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**Introduction and overview**	5
	1.1 Introduction	
	1.2 Intelligent Systems	
	1.2.1 Artificial Neural Network	
	1.2.2 Fuzzy Theory	
	1.2.3 Genetic Algorithms	
	1.2.4 Rough Sets	
	1.2.5 Chaotic Systems	
	1.2.6 Multisets	
2.	**Fuzzy Systems**	10
	2.1 Fuzzy sets and operation on Fuzzy sets	
	2.2 Fuzzy Relations and its Operation	
	2.2.1 Fuzzy Relational Equations	
	2.2.2 Fuzzy Rule-base	
	2.3 Fuzzy Measures	
	2.3.1 Belief Measures	
	2.3.2 Probability Measures	
	2.3.3 Possibility Measures	
	2.3.4 Measures of Fuzziness	
	2.3.5 Fuzzy Arithmatic	
	2.4 Fuzzy Logic and Approximate Reasoning	
	2.4.1 Truth values in Fuzzy logic	
	2.4.2 Approximate Reasoning	
	2.4.3 Fuzzy Expert Systems	
	2.5 Application of Fuzzy Theory	
	2.5.1 Fuzzy Pattern Recognition	
	2.5.2 Fuzzy Clustering	
	2.5.3 Fuzzy Relational Database	
	2.5.4 Human Machine interaction	
3.	**Artificial Neural Network**	10
	3.1 Introduction	
	3.2 Supervised Learning and Feedforward networks	

                               45

Practical:

Total Periods : 30
Periods   : 2 P/W

Suggested List of practical to be done:
- Design, implementation and simulate of different algorithm related to soft computing
- Mini project on some relevant topic of this subject

REFERENCE BOOKS

1. Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain – by Amit Konar - CRC Press
2. Neural Networks: Algorithms, Applications and Programming Techniques - by James A Freeman and David M. Skapura - Addison Wesley Publishing Company
3. Fuzzy Logic and Expert systems Applications - by Cornelius T. Leondes
4. Practical Applications of Computational Intelligence Techniques - by Lakhmi Jain and Philippe De Wilde Kluwer - Academic Publishers
5. Genetic Algorithms – by David Goldburg - Addison Wesley

VLSI & EMBEDDED SYSTEM

L	*T*	*P*	**Curri. Ref. No.: CSE605**
3	*0*	*2*	

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: CS403   *Practical:50*
Credit: 4   *End Term Exam:25*
                                                                     P.A : 25

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
1.	**VLSI Design**	
	1.1 Introduction to VLSI design, design styles and parameters, popular technologies	3
	1.2 Logic implementation with nMOS, CMOS & PLAs	4
	1.3 Pass vs. transistor logic, transit time, clocking, scaling, PLA minimization & folding	4
	1.4 Testing & testability issues	3
	1.5 Physical design Algorithms : partitioning, floor planning & placement, routing, compaction, gate arrays, FPGAs	4
	1.6 Data structures for layout design magic	3
	1.7 Design rule checking, symbolic layout, complexity of layout algorithms	5
2.	**Embedded Systems**	
	2.1 Introduction to embedded systems, architecture of embedded systems, specifications of embedded systems, design methodologies	4
	2.2 Real time issues – modeling, specification, communication, scheduling, protocols etc.	5
	2.3 Hardware software partitioning, approaches to software and code generation, operating issues, memory and low power issues, validation approaches, distributed embedded systems	10

Practical:
Total Periods   : 30
Periods   : 2 P/W

Suggested List of Practical to be done:
- Simulates the different operation of digital circuit
- Simulate of the different concept related to embedded system
- Mini project on some relevant topic of this subject

REFERENCE BOOKS

1. Introduction to VLSI Systems - by C. Mead & L. Conway – Addition Wesley
2. Introduction to VLSI Design – by Fabricus – Prentice Hall
3. Layout Design & Verification – by T. Ohtsuki – North Holland
4. An Introduction to VLSI Physical Design - by M.Sarafzadeh & C.K.Wong - MHI
5. Hardware Software Co-design of Embedded Systems – by Falf Niemann – Kluwer Academic
6. Design Principles of Distributed Embedded Applications – by Hermann Kopetz – Kluwer Academic
7. Real Time System Design – by Levi & Agrawal - MH

IMAGE PROCESSING & PATTERN RECOGNITION

L	*T*	*P*	**Curri. Ref. No.: CSE606**
3	*0*	*2*	

Total Contact hrs : 75	**Total marks: 150**	*Theory: 100*
Theory: 45		*End Term Exam: 70*
Practical: 30		*P.A.: 30*
Pre requisite: CSE410		*Practical:50*
Credit: 4		*End Term Exam:25*
		P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.

1. Introduction: Digital image processing – problems and applications, Image representation and modeling, 2D systems and necessary mathematical preliminaries.   5

2. Image Transforms: 2-D orthogonal and Unitary transforms, 1-D DFT, 2- D DFT, Cosine transforms, KL transforms.   10

3. Image Enhancement: Point operations, Histogram modeling, Spatial operations, Transform operations.   10

4. Image Filtering: Inverse and Wiener filtering, FIR Wiener filters, Filtering using image transforms, smoothing splines and interpolation, least square filters.   10

5. Image Analysis: Spatial feature extraction, edge detection, boundary extraction, boundary representation, region representation, moment representation.

6. Pattern Recognition: Pattern vectors & pattern classes, pattern pre-processing, pattern classification methods- statistical approach. Use of decision functions. Clustering techniques, MMD and KNN approaches, Automatic cluster formation, memory network. Approach to pattern Recognition.   10

Practical:
Total Periods : 30
Periods   : 2 P/W

Suggested List of Practical to be done:
- Implementation of various image processing and pattern recognition algorithm
- Mini project on some relevant topic of this subject

Reference **Books:**

1. Fundamentals of Digital Image Processing – A.K. Jain (PHI)
2. Introductory Computer Vision and Image Processing – A. Low (MGH)
3. Pattern Recognition Principles – J.T. Tou, R.C.Gonzalez (Addison-Wesley)

SYSTEM & NETWORKING ADMINISTRATION

L   T   P
3   0   2

Curri. Ref. No.: CSE607

Total Contact hrs : 75	**Total marks: 150**	*Theory: 100*
Theory: 45		*End Term Exam: 70*
Practical: 30		*P.A.: 30*
Pre requisite: NA		**Practical: 50**
Credit: 4		*End Term Exam: 25*
		P.A : 25

Theory
Total Periods : 45
Periods   : 3 P/W

UNIT TOPIC/SUB-TOPIC	TOTAL HRS.
Unit 1.	**11**

Introduction :
Introduction to UNIX, Linux, GNU and Linux distributions Duties of the System Administrator The Linux System Administrator, Installing and Configuring Servers, Installing and Configuring Application Software, Creating and Maintaining User Accounts, Backing Up and Restoring Files, Monitoring and Tuning Performance, Configuring a Secure System, Using Tools to Monitor Security.

Booting and shutting down : Boot loaders-GRUB, LILO, Bootstrapping, Init process, rc scripts, Enabling and disabling services.

The File System : Understanding the File System Structure, Working with Linux-Supported File Systems, Memory and Virtual File Systems, Linux Disk Management, Network Configuration Files.

Unit 2.   12
System Configuration Files :
System wide Shell Configuration Scripts, System Environmental Settings, Network Configuration Files, Managing the init Scripts, Configuration Tool, Editing Your Network Configuration.

TCP/IP Networking : Understanding Network Classes, Setting Up a Network Interface Card (NIC), Understanding Subnetting, Working with Gateways and Routers, Configuring Dynamic Host Configuration Protocol, Configuring the Network Using the Network.

The Network File System : NFS Overview, Planning an NFS Installation, Configuring an NFSServer, Configuring an NFS Client, Using Auto mount Services, Examining NT'S Security.

Unit 3.   4
Connecting to Microsoft Networks :
Installing Samba, Configuring the Samba Server, Creating Samba Users 3, Starting the Samba Server, Connecting to a Samba Client, Connecting from a Windows PC to the Samba Server.

Unit 4.   **6**
Domain Name System :
Understanding DNS, Understanding Types of Domain Servers, Examining Server Configuration Files, Configuring a Caching DNS Server, Configuring a Secondary Master DNS Server, Configuring a Primary Master Server, Checking Configuration

Unit 5.   **6**
Configuring a Web Server :
Introducing Apache, Configuring Apache, Implementing SSI, Enabling CGI, Enabling PHP, Creating a Secure Server with SSL.

Unit 6.   **6**
Optimizing Internet Services :
Optimizing LDAP Services, Optimizing DNS Services, Optimizing Mail Services, Optimizing FTP Services, Optimizing Web Services

Practical
Total Periods : 30
Periods   : 2 P/W

1. System Administration

1.1 Linux and Windows Fundamentals -
Logging into your account. Understanding and using files protection, date/time, etc.
Customizing the environment. Introduction to System and Network Administration, Overview of Hardware and System Software and Networks, Operating Systems (Linux, Windows, Network Software and Protocols).System administrator's login and privileges, user and group management, managing disk space, device files.

1.2 Linux and Windows File System Management-
File System Organizations and File Types,
System Folders and Files, User Folders and Files, File Security, File Properties
Changing file ownership and permission.
Configuration and .ini files, The Windows Registry, Modifying User Account Properties.

2.Network Administration

2.1 TCP/IP & Networking Basics – : Understanding Network Classes, Setting Up a Network Interface Card (NIC), Understanding Subnetting, Working with Gateways and Routers, Configuring Dynamic Host Configuration Protocol, Configuring the Network Using the Network.

2.2 The Network File System : NFS Overview, Planning an NFS Installation, Configuring an NFS Server, Configuring an NFS Client, Using Auto mount Services, Examining NT'S Security.

2.3 Trouble Shooting networking devices
Additional Network Services : Configuring a Time Server, Providing a Caching Proxy Server, Optimizing Network Services

2.4 Internet Services : Secure Services, SSH, scp, sftp Less Secure Services (Telnet, FTP, sync, rsh, rlogin, finger, talk and ntalk, Linux Machine as a server, Configuring the xinetd Server, Comparing xinetd and Standalone, Configuring Linux Firewall Packages.

2.5 Configuring Mail Services : Tracing the Email Delivery Process, Mail User Agent (MUA),Introducing SMTP, Configuring Sendmail, Using the Postfix Mail Server, Serving Email with POP3and IMAP, Maintaining Email Security

2.6 Configuring' FTP Services : Introducing vsftpd, Configuring vsftpd, Advanced FTP Server Configuration Using SFTP.

2.7 System Administration: updating system, upgrading and customizing kernel, Administering Usersand Groups Installing and Upgrading Software Packages

2.8 Providing Web Services: Creating Mailing Lists, Setting Up Web-Based Email, Configuring an RSS Feed, Adding Search Functionality.

2.9 LAN and WAN Troubleshooting: Use of tools like Ping , IPCONFIG, IFCONFIG, Trace route etc.

REFERENCE BOOKS :
1.   Computer Network – by A. S. Tanenbaum, PHI
2.   Data Communication & Computer Networks – by W. Stallings, PHI

PC SYSTEM TECHNOLOGY AND MAINTENANCE

L   T   P   **Curri. Ref. No.: CSE608**
3   0   2

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: NA   **Practical: 50**
Credit: 4   *End Term Exam: 25*
                                                            P.A : 25

Theory
Total Periods   : 45
Periods   : 3 P/W

UNIT TOPIC/SUB-TOPIC	TOTAL HRS.
1. Processor	**8**
1.1 Functional component of a microprocessor	
1.2 General purpose and Special purpose registers	
1.3 Stack and Instruction Pointers	
1.4 Instruction set	
1.5 Single / Dual / Quad Core Processor Core	
1.6 RISC and CISC Processor	
2. Memory	**6**
2.1 Main Memory: ROM and RAM	
2.2 Static RAM – Cache memory	
2.3 Dynamic RAM, DDR2 and DDR3 RAM	
2.4 Front Side Bus and memory Interface	
2.5 Memory hierarchy	
3. Motherboard & Chipset	**8**
3.1 Functional Component of Motherboard	
3.2 Memory slots	
3.3 Hard Disk Controller	
3.4 RAID Controller (SERVER)	
3.5 Integrated Graphics Card	
3.6 Integrated Sound Card	
4. Interfaces	**10**
4.1 USB Ports 1.0, 2.0, 3.0	
4.2 RS232, Comm ports,	
4.3 Ethernet RJ45	
4.4 Wireless LAN 802.11 a/b/g/n	
4.5 PS-2	
4.6 Fire ware 1394	
4.7 5.1 Audio Interface 3.5mm jack	
4.8 VGA / DVI	
4.9 HDMI	
4.10 Micro SD Card Slots	
5. ROM Bios and Boot Strap Loader	**2**

6. Peripherals   **6**
    6.1 Working and Setup of Peripherals:
        a) Printers
        b) Scanners
        c) Web cameras
        d) Video capture card / Grabber
        e) Sound Capture Card
        f) 5.1 / 7.1 Channel Sound system
        g) USB Wireless Dongle
        h) Bluetooth Dongle

7. Memory Mapping Techniques   **2**
    7.1 Introductory Concepts

8. Maintenance of PC, Laptop, tablet and Server System   **5**
    8.1 Introductory Concepts

Practical
Total Periods : 30
Periods : 2 P/W
1. Identification of Hardware Modules of PC
    a) Processor
    b) Motherboard
    c) SMPS
    d) CD / DVD / Blue Ray Disk Drive
    e) HDD, SCSI Controller, RAID Controller (for Server)
    f) Keyboard
    g) Mouse
    h) CRT / LCD / LED Monitors
    i) Interfaces : USB Ports 1.0, 2.0, 3.0, RS232, Comm ports, Ethernet RJ45, Wireless LAN 802.11 a/b/g/n, PS-2, Fire ware 1394, 5.1 Audio Interface 3.5mm jack, VGA / DVI, HDMI,
2. Identification, Configuration, and Installation of brand dependent devices
3. Installation of O.S. in standalone system, client / server architecture (Windows and Linux)
4. Installation of peripherals: Printers, Scanners, Mobile Setup, Bluetooth deivces
5. Maintenance of PC, Laptop, tablet and Server System: Routine maintenance, Virus and spam attacks, Back-up and restoration
6. Troubleshooting: Identification of trouble with keyboard, mouse, display, RAM, HDD,SMPS
7. Fixing problems related to monitor, key board, mouse, printer, connecting cables etc. Formatting of hard drive and data recovery. Disk cleanup, Disk defragment, system restoring, system configuration. Common start up problems Identify and solve basic problems related to connecting to networks and the Internet.
8. Firewalls, Physical Security, Privileges, Patches, Basic of Cryptography, Encryption, Certificates, Authenticity, Viruses, Trojan Horses, Worms, Denial of Service (DOS), Buffer Overflows.

REFERENCE BOOKS :
1. Hardware and Software of Personal Computers – by S.K. Bose, New Age International
2. Computer Troubleshooting – by K. MacRae, G. Marshal, Haynes Publishing.
3. Handbook of Computer Troubleshooting – by M. Byrd, J. Pearson, R.A. Saigh, The Glen Lake Publishing Company.

MULTIMEDIA ENGINEERING

L   T   P
3   0   2

Curri. Ref. No.: CSE609

Total Contact hrs : 75   **Total marks: 150**   *Theory: 100*
Theory: 45   *End Term Exam: 70*
Practical: 30   *P.A.: 30*
Pre requisite: CSE410   **Practical: 50**
Credit: 4   *End Term Exam: 25*
                                                         P.A : 25

Theory
Total Periods   : 45
Periods : 3 P/W

UNIT TOPIC/SUB-TOPIC	TOTAL HRS.

1. Animation   **10**
1.1   Introduction and Background of Animation
1.2   Uses of Animation
1.3   Types of Animation – cell animation, path animation, 2D & 3D animation
1.4   Role of computers in animation
1.5   Key-frames and Tweening
1.6   Movement creation – coordinate system, transformations
1.7   Principles of Animations – squash and stretch, anticipations, staging, follow-through and overlapping, slow-in slow-out, arcs, timing.
1.8   Animation Techniques – onion skinning, motion cycling, masking, flipbook animation, sound addition.
1.9   3D Animation – modelling, camera and centre of interest (COI), movements of camera, and special effects.

2. Compression   **8**
2.1 Need for Compression
2.2 Types of Compression – lossless and lossy, intra-frame and inter-frame,
2.3 Types of Redundancies – statistical, psycho-visual
2.4 CODEC
2.5 Lossless / Statistical Compression Techniques – entropy, RLE, Huffman, arithmetic coding, LZ, LZW DPCM coding
2.6 Lossy / Perceptual Compression Techniques – Transform, psychoanalysis, inter-frame corrélation,
2.7 JPEG image Coding Standard
2.8 MPEG Standard Overview

3. CD Technology   **4**
3.1   CDROM digital data, CD-interactive, CDROM – extended architecture, Photo CD, Video CD, CD-R, CD-RW.
3.2   DVD – specification, DVDROM, DVD-R, DVD-RW, single sided, single layer, signal sided double layer, double sided single layer, double sided double layer.

4. Multimedia Application Development   **10**

4.1   Multimedia Software Life Cycle – feasibility study, requirement analysis, project planning and management, designing, implementation, integration, delivery and maintenance.

4.2   Conceptualization - subject matter/theme, target audience, objectives

4.3   Content Collection and Processing

4.4   Storyboard – guidelines for: text, visual element, motion video, animation, audio

4.5   Hardware and software for implementation.

4.6   Authoring Metaphors – slide show, book, windowing, timeline, network, icon metaphor.

5. Computer Games   **10**

5.1   Video Game Console – Sony Play Station, Nintendo Game Cube, Xbox

5.2   Genres

5.3   Game Design

5.4   Game Controller / Game Engine

5.5   Game Programming

5.6   Interactive Gaming

6. Virtual Reality   **3**

6.1   Forms of Virtual Reality

6.2   Virtual Reality Application – perambulation, synthetic experience, realization.

6.3   Software Requirement - device drivers, development tools, navigation engine

6.4   Peripherals Devices – audio/visual, tracking, navigation devices

6.5   Virtual Reality Modelling Language (VRML)

Total = 45

Practical
Total Periods : 30
Periods   : 2 P/W

1.   Desktop Publishing
      Photoshop basics
      Corel draw
      Page Maker

2.   Audio
      Nature of sound
      Techniques of recording and editing sound using popular audio software

3.   Video Editing Basics
      Picture transitions
      Video and audio special effects
      Current popular editing software

4.   Animation
      Principles of Animation
      Various stages of production like script, story boarding etc
      Working with flash – basic and advanced
      Basics of 3D Max – modeling, texturing, advanced lighting, animation

5.   Advanced 3D Graphics and Animation
Maya –polygon modeling, NURBS modeling, Advanced texturing, lighting
Creating 3D Characters and Animation
Generating Special effects using features of Maya

Reference Books:

1.   Principles of Multimedia – Ranjan Parekh – Mc-Graw-Hill –2008
2.   Multimedia Communications – Fred Halsell–Pearson Education Ltd – 2009
3.   Multimedia Communication System: Techniques, Standards and Networks – by K.R. Rao, Z.S. Bojkovic, A. Milovanovic, Prentice Hall
4.   Multimedia: From Wagner to Virtual Reality- by Randall Packer, Nortan
5.   Virtual Reality –by H. Rheingold

Detail Configuration of Equipment

The hardware specification is indicative only. At the time of procurement the Institute may opt for higher configuration. The following configuration is as per DGS&D specifications.

Student Strength – 30

1.   Standard PC/Multimedia PC   -   15 nos.

1		Processor	:	Inter Pentium D 820 dual core or higher, 2.8 GHz, 2x1MB L2 Cache and 800MHz FSB with EM64T
2		Mother Board	:	Intel 945G Chipset or better on OEM Mother Board
3		Bus Architecture	:	Integrated Graphics 2PCI, 1 PCI Express x1 and 1PCI Express x16
4	a)	Memory	:	256 MB, 400MHz, DDR2 RAM
	b)	Add on Memory	:	512 MB 400MHz DDR2 RAM
	c)	Add on Memory		256 MB 400MHz DDR2 RAM
5		Hard Disk Drive	:	160 GB Serial ATA HDD (7200rpm)
6		Floppy Disk Drive	:	3.5" 1.44MB internal FDD.
7		Optical Drive	:	16x10x40 X CD R/W and 12 X DVD.
8		Ethernet Port	:	10/100/1000 Mbps Ethernet Card on board.
9		Keyboard	:	104 keys Standard keyboard from OEM connected through PS/2
10		Mouse	:	Optical Mouse from OEM connected through PS/2
11		Ports	:	6-USB, 1-Serial, 1-Parallel, 1-PS/2 for Keyboard and 1-PS/2 for Mouse.
12		DMI	:	DMI 2.0 Compliance and Support
13		Cabinet	:	Mini Tower.
14		Monitor	:	17" TFT Monitor or 17" CRT
15		Preloaded Software	:	a) Preloaded Operating System – Windows XP (Professional) with Recovery CD
				b) E-trust Antivirus

2.   Server   -   1 no.

1	Processor	:	Inter XEON 5050 3.0 GHz Dual Core Processor EM-64 T or better capable of dual processing (supplied with single processor as standard) with 2X 2 MB L2 cache Memory or better
2	Mother Board	:	Intel 5000 series on Intel or equivalent OEM Motherboard. Motherboard should be capable of 667 MHZ FSB with support for Dual Core CPU
3	Slots	:	3 PCI Express (x8), 2 PCI-x64 bit/133 MHz and 1 PCI 32-bit/33 MHz
4	Memory	:	2 x 512 MB 667 MHz DDR2 RAM upgradeable up to 32 GB on DIMM (8 DIMM slots)
5	Hard Disk Drive	:	3x72 GB 10000rpm SAS Hot Plug
6	RAID Controller	:	3 GB SAS Controller with 256 MB cache and battery backup

7	Back up	:	Digital Auto Tape Drive 20/40 GB DAT with back up software for schedule managed backup and disaster recovery till last back up
8	Monitor	:	43 cm (17") SVGA Digital colour Monitor (Support 1024 x 768 NI Resolution) MPR II complaint or TCO 03 Certified
9	Video Controller	:	Onboard 16 MB Dynamic Video Memory
10	Key Board	:	101 Keys Keyboard
11	Mouse	:	Optical Mouse
12	Bays	:	Minimum 4 internal Hot Plug Bays
13	Ports	:	4 USB Ports, 2 Serial Port, I Parallel Port
14	Cabinet	:	Tower
15	Certifications	:	Windows, Red Hat and Novell certified Compliance and Support
16	CD ROM/DVD	:	24 x or better CD ROM Drive or DVD drive
17	Power Supply	:	Redundant Power supply
18	Fan	:	Redundant Fan
19	Networking Features	:	Dual LAN (10/100/1000) Network Card with asset tracking and security management, remote wake up
20	Power Management	:	Screen blanking, hard disk and system idle mode in power on, set up password, power supply surge protected.
21	Preloaded Software	:	Norton, McAfee, E Trust or equivalent Antivirus (latest version)
22	Operating System	:	MS Windows 2003 Server : Standard/Linux

3. **Networking Components :**
   Hub, Switch, Cabling etc., for about 20 nodes

Software :   Latest version of software should be procured for all the software items mentioned in connection with different lab-based courses. Emphasis should be given to check for the mutual compatibility of the software package with the operating system on which it will run.