Final Version

REVISED CURRICULUM OF

ELECTRONICS & COMMUNICATION ENGINEERING DIPLOMA PROGRAM

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

SCHEME OF STUDIES AND EVALUATION (MPECS) FOR DIPLOMA IN ECE

1. FOUNDATION COURSES:

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	-	25	-	125	3
2	G102	Communication Skill-II	G101	2	0	2	70	15	15	-	25	-	125	3
3	G103	Mathematics-I		4	1	0	70	15	15	-	-	-	100	5
4	G104	Mathematics-II		4	1	0	70	15	15	-	-	-	100	5
5	G105	Applied Mathematics	G103 G104	3	1	0	70	15	15	-	-	-	100	4
6	G106	Physics -I		2	0	2	70	15	15	25	25	-	150	3
7	G107	Physics-II	G105	2	0	2	70	15	15	25	25	-	150	3
8	G108	Chemistry - I		2	0	2	70	15	15	25	25	-	150	3
9	G109	Chemistry - II	G107	2	0	2	70	15	15	25	25	-	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:

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	-	-	-	-	50	-	50	3
11	G202	Engineering Drawing-II	G201	1	0	4	-	-	-	-	50	-	50	3
12	G203	Workshop Practice-I		0	0	4	-	-	-	-	25	25	50	2
13	G204	Workshop Practice-II	G203	0	0	4	-	-	-	-	25	25	50	2
14	G205A	Introduction to Information Technology		2	0	3	50	0	0	25	50	-	125	4
	G205B	*Introduction to Computer Programming												
15	G206A	Engineering Mechanics		3	0	2	70	15	15	25	25	- -	150	4
	G206B	*C-Programming	G205B	2	1	2								
TOTAL				**7/6**	**0/1**	**21**	**120**	**15**	**15**	**50**	**225**	**50**	**475**	**18**

*G205B & G206B for CSE only

3. SOFT CORE COURSES: ***(Two to be taken, 301 and 302 are compulsory, any two from the rest)***

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	Assign ment		Sessional	Viva		
16	G301	Development of Life Skill-I		1	0	2	-	-	-	-	25	25	50	2
17	G302	Development of Life Skill-II		1	0	2	-	-	-	-	25	25	50	2
18 & 19	G303	Engineering Economics & Accountancy		3	0	0	70	15	15	-	-	-	100	3
	G304	Entrepreneurship Development		3	0	0	70	15	15	-	-	-	100	3
	G305	Principles of Management		3	0	0	70	15	15	-	-	-	100	3
	G306	Organizational Behaviour		3	0	0	70	15	15	-	-	-	100	3
	G307	Environmental Education		3	0	0	70	15	15	-	-	-	100	3
TOTAL				**8**	**0**	**4**	**140**	**30**	**30**	**-**	**50**	**50**	**300**	**10**

4. BASIC TECHNOLOGY COURSES FOR ECE

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		
20	ECE 401	Electrical Engg. Circuits & Materials		3	0	2	70	15	15	25	25	-	150	4
21	ECE 402	Electrical Measurement and Measuring Instrument		3	0	2	70	15	15	25	25	-	150	4
22	ECE 403	Communication Engineering I		3	1	2	70	15	15	25	25	-	150	5
23	ECE 404	Communication Engineering II	ECE403	3	1	2	70	15	15	25	25	-	150	5
24	ECE 405	Motors & Control		3	0	2	70	15	15	-	25	-	125	4
25	ECE 406	Electronic Measurement		3	0	2	70	15	15	25	25	-	150	4
26	ECE 407	Power Electronics		3	0	2	70	15	15	25	25	-	150	4
27	ECE 408	Industrial Instru-mentation & Control		3	0	2	70	15	15	25	25	-	150	4
28	ECE 409	Electronic Devices and Circuit-I		3	0	2	70	15	15	25	25	-	150	4
29	ECE 410	Electronic Devices and Circuit-II	ECE409	3	0	2	70	15	15	25	25	-	150	4
TOTAL				**30**	**2**	**18**	**700**	**150**	**150**	**225**	**250**	**-**	**1475**	**42**

5. **APPLIED TECHNOLOGY COURSES FOR ECE**

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		
30	ECE 501	Fibre Optics		3	0	2	70	15	15	25	25	-	150	4
31	ECE 502	Computer Communication & Networking		3	0	4	70	15	15	25	25	-	150	5
32	ECE 503	Digital Electronics and Microprocessor I		3	0	2	70	15	15	25	25	-	150	4
33	ECE 504	Digital Electronics and Microprocessor II	ECE503	3	0	2	70	15	15	25	25	-	150	4
34	ECE 505	Consumer Electronics		3	0	4	70	15	15	25	25	-	150	5
35	ECE 506	Microwave Techniques		3	0	0	70	15	15	-	-	-	100	3
36	ECE 507	C-Programming with Linux		3	0	2	70	15	15	-	50	-	150	4
37	ECE 508	Professional Practices I		0	0	2	-	-	-	-	50	-	50	1
38	ECE 509	Professional Practices II		0	0	2	-	-	-	-	50	-	50	1
39	ECE 510	Professional Practices III		0	0	3	-	-	-	-	50	-	50	2
40	ECE 511	Professional Practices IV		0	0	3	-	-	-	-	50	-	50	2
41	ECE 512	Professional Practices V		0	0	6	-	-	-	-	50	-	50	3
42	ECE 513	Projects		0	0	8	-	-	-	-	100	50	150	4
TOTAL				**21**	**0**	**40**	**490**	**105**	**105**	**125**	**525**	**50**	**1400**	**42**

6. ELECTIVE COURSES FOR ECE (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	Assignment		Sessional	Viva		
43 & 44	ECE 601	VLSI and Embedded System		3	0	0	70	15	15	0	0	0	100	3
	ECE 602	Cellular Technology		3	0	0	70	15	15	0	0	0	100	3
	ECE 603	Digital Signal Processing		3	0	0	70	15	15	0	0	0	100	3
	ECE 604	Bio Medical Instrumentation		3	0	0	70	15	15	0	0	0	100	3
	ECE 605	Fiber Optic Communication		3	0	0	70	15	15	0	0	0	100	3
	ECE 606	Broad Band Communication		3	0	0	70	15	15	0	0	0	100	3
TOTAL OF TWO COURSES				**6**	**0**	**0**	**140**	**30**	**30**	**0**	**0**	**0**	**200**	**6**

SAMPLE PATH: TERM – I

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	G 101	Communication Skill-I		2	0	2	70	15	10	5	-	25	-	125	3
2	G 103	Mathematics-I		4	1	0	70	15	10	5	-	-	-	100	5
3	G 106	Physics - I		2	0	2	70	15	10	5	25	25	-	150	3
4	G 108	Chemistry - I		2	0	2	70	15	10	5	25	25	-	150	3
5	G 201	Engineering Drawing – I		1	0	4	-	-	-	-	-	50	-	50	3
6	G 203	Workshop Practice - I		0	0	4	-	-	-	-	-	25	25	50	2
7	G 205 A	Introduction to Information Technology		2	0	3	50	0	0	0	25	50	-	125	4
TOTAL				**13**	**1**	**17**	**330**	**60**	**40**	**20**	**75**	**200**	**25**	**750**	**23**

SAMPLE PATH: TERM - II

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours /Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	G 102	Communication Skill-II	G101	2	0	2	70	15	10	5	-	25	-	125	3
2	G 104	Mathematics-II	G103	4	1	0	70	15	10	5	-	-	-	100	5
3	G 107	Physics - II	G106	2	0	2	70	15	10	5	25	25	-	150	3
4	G 109	Chemistry - II	G108	2	0	2	70	15	10	5	25	25	-	150	3
5	G 202	Engineering Drawing – II	G201	1	0	4	-	-	-	-	-	50	-	50	3
6	G 204	Workshop Practice - II	G203	0	0	4	-	-	-	-	-	25	25	50	2
7	G 206 A	Engineering Mechanics		3	0	2	70	15	10	5	25	25	-	150	4
8	G 301	Development of Life Skill-I		1	0	2	-	-	-	-	-	25	25	50	2
9	ECE 508	Professional Practices - I		0	0	2	-	-	-	-	-	50	-	50	1
TOTAL				**15**	**1**	**20**	**350**	**75**	**50**	**25**	**75**	**250**	**50**	**875**	**26**

SAMPLE PATH: TERM - III

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	ECE 401	Electrical Engineering Circuits & Materials		3	0	2	70	15	10	5	25	25	-	150	4
2	ECE 402	Electrical Measurement and Measuring Instrument		3	0	2	70	15	10	5	25	25	-	150	4
3	ECE 409	Electronic Devices and Circuit-I		3	0	2	70	15	10	5	25	25	-	150	4
4	ECE 507	C-programming with Linux		3	0	2	70	15	10	5	-	50	-	150	4
5	G 105	Applied Mathematics	G104 G105	3	1	0	70	15	10	5	-	-	-	100	4
6	G 303	Engineering Economics and Accountancy		3	0	0	70	15	10	5	-	-	-	100	3
7	G 302	Development of Life Skill-II		1	0	2	-	-	-	-	-	25	25	50	2
8	ECE 509	Professional Practices - II		0	0	2	-	-	-	-	-	50	-	50	1
TOTAL				**19**	**1**	**12**	**420**	**90**	**60**	**30**	**75**	**200**	**25**	**900**	**26**

SAMPLE PATH: TERM - IV

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	ECE 403	Communication Engineering I		3	1	2	70	15	10	5	25	25	-	150	5
2	ECE 405	Motors & Control		3	0	2	70	15	10	5	-	25	-	125	4
3	ECE 410	Electronic Devices and Circuit-II	ECE409	3	0	2	70	15	10	5	25	25	-	150	4
4	ECE 501	Fibre Optics		3	0	2	70	15	10	5	25	25	-	150	4
5	CSE 403	Computer Communication & Networking		3	0	4	70	15	10	5	25	25	-	150	5
6	ECE 503	Digital electronics And Microprocessor-I		3	0	2	70	15	10	5	25	25	-	150	4
7	ECE 510	Professional Practices - III		0	0	3	-	-	-	-	-	50	-	50	2
TOTAL				**18**	**1**	**17**	**420**	**90**	**60**	**30**	**125**	**200**	**-**	**925**	**28**

SAMPLE PATH: TERM - V

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	ECE 505	Consumer Electronics		3	0	4	70	15	10	5	25	25	-	150	5
2	ECE 404	Communication Engineering II	ECE403	3	1	2	70	15	10	5	25	25	-	150	5
3	ECE 504	Digital electronics & Microprocessor-II	ECE503	3	0	2	70	15	10	5	25	25	-	150	4
4	ECE 406	Electronic Measurement		3	0	2	70	15	10	5	25	25	-	150	4
5	ECE 506	Microwave Techniques		3	0	0	70	15	10	5	-	-	-	100	3
6	ECE 604	Elective-I Bio Medical Instrumentation		3	0	0	70	15	10	5	-	-	-	100	3
7	ECE 511	Professional Practices – IV*		0	0	3	-	-	-	-	-	50	-	50	2
TOTAL				18	1	13	420	90	60	30	100	150	0	850	26

*This includes industrial visit

SAMPLE PATH: TERM - VI

Sl. No	Code	Course	Study Scheme				Evaluation Scheme							Total Marks	Credit
			Pre-requisite	Contact Hours / Week			Theory				Practical				
				L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	ECE 407	Power Electronics		3	0	2	70	15	10	5	25	25	-	150	4
2	ECE 408	Industrial Instrumentation & Control		3	0	2	70	15	10	5	25	25	-	150	4
3	ECE 607	Elective-II Broadband Communication		3	0	0	70	15	10	5	-	-	-	100	3
4	G 304	Entrepreneurship Development		3	0	0	70	15	10	5	-	-	-	100	3
5	ECE 513	Project		0	0	8	-	-	-	-	-	100	50	150	4
6	ECE 512	Professional Practices – V*		0	0	6	-	-	-	-	-	50	-	50	3
TOTAL				12	0	18	280	60	40	20	50	200	50	700	21

*This includes seminar on project

FOUNDATION COURSES

Applied Mathematics (for Electrical and Electronics Engg)

L	T	P	*Curri. Ref. No.: G 105*
3	1	0	

Total Contact hrs.: 60
Theory: 60
Practical: 0
Pre requisite: G103, G104
Credit: 4

Total marks: 100

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

RATIONALE :

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.

DETAIL COURSE CONTENT

UNIT	TOPIC/SUB-TOPIC	Hrs.	Total Marks.
1.0	1.1 Numerical Solution of Algebraic Equations. (i) Bisection Method. (ii) Regula-falsi Method / Method of false position. (iii)Newton-Raphson Method. (iv)Problems on the above methods.	7	10
	1.2 **Numerical solution of simultaneous linear algebraic equations** **Containing 2 and 3 unknowns.** (i) Gauss elimination method. (ii) Iterative method: Gauss Seidal & Jacobi's method.	7	10

2.0	**PARTIAL DIFFERENTIATION.** (i) Introduction to functions of two or more variables. (ii) Geometrical Interpretation of a Function of two variables. (iii) Partial Derivatives. (iv) Second Order Partial Derivative. (v) Homogeneous function. (v) Euler's Theorem. (v) Problems	8	10
3.0	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 and first degree. (vi) Variables separable. (v) Homogeneous Differential Equations. (vi) Linear Differential Equations. vii) Equations reducible to linear form. (vii) Exact differential Equations. (viii) Equations reducible to the exact form. (ix) Linear Differential Equations of second order with constant coefficients. (x) Complete solution = Complementary Function + Particular Integral. (xi) Method of finding Particular Integral. (xii) Applications of differential equations to electrical circuit problems. (xiii) Problems related to other physical systems.	20	15
4.0	**LAPLACE TRANSFORM (LT):** (i) Piece-wise or Sectional Continuity. (ii) Functions of exponential order. (iii) Definition of Function & the Transform Concept. (iv) Definition and Notation of Laplace Transform. (v) Linearity property. (vi) First shifting Theorem (First Translation). (vii) Second shifting Theorem (Second Translation). (viii) Change of Scale Property. (ix) Laplace Transform of Derivatives. (x) Laplace Transform of Integral (xi) Solution of Problems using LT (xii) Solution of ordinary differential equation up to second order using LT.	7	10
5.0	**CONCEPT OF INVERSE LAPLACE TRANSFORM 7 ITS PROPERTIES** (i) Definition of Inverse Laplace Transform and Null Function.	6	10

	(ii) Linearity Property. (iii) First Shifting Property. (iv) Second Shifting Property. (v) Change of scale property. (vi) Inverse Laplace Transform of derivatives. (vii) Convolution Theorem. (viii) Problems. (ix) Solution of Differential Equations using Laplace Transform.		
6.0	**FOURIER SERIES.** (i) Periodic function. (ii) Trigonometric series. (iii) Fourier series and Fourier coefficients Theorem. (iv) Finite discontinuity, Even functions and Odd functions. (v) Change of Interval and Change of Period. (vi) Complex form of Fourier series, Half range series (vii) Parseval's Identity for Fourier series. (viii) Problems using furrier series.	5	5
		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.

SOFT CORE COURSES

Development of Life Skill -I

L	*T*	*P*	***Curri. Ref. No.: G301***
1	*0*	*2*	

Total Contact hrs : 45 **Total marks: 50** Practical:
Theory: 15 *End Term Exam: 25*
Tutorial: 0 *P.A : 25*
Practical: 30
Credit : 2

RATIONALE :

- Conduct different session to improve students memory Power
- Conduct different session to improve time management skills
- Motivate student to face realistic problem with confidence and positive approach

AIM

- Develop reading skills
- Use techniques of acquisition of information from various sources
- Draw the notes from the text for better learning.
- Apply the techniques of enhancing the memory power.
- Develop assertive skills.
- Prepare report on industrial visit.
- Apply techniques of effective time management.
- Set the goal for personal development.
- Enhance creativity skills.
- Develop good habits to overcome stress.
- Face problems with confidence

DETAILED COURSE CONTENT

UNIT	TOPIC/SUB-TOPIC	TOTAL HRS.
Unit -1	**Importance of DLS** Introduction to subject, importance in present context , application	**01**
Unit -2	**Information Search** Information source –Primary, secondary, tertiary Print and non – print, documentary, Electronic Information center, Library, exhibition, Government Departments. Internet Information search – Process of searching, collection of data –questionnaire, taking Interview, observation method.	**02**
Unit – 3	**Written communication** Method of note taking Report writing – Concept, types and format.	**01**

Unit – 4 **Self Analysis**
Understanding self —
Attitude, aptitude, assertiveness, self esteem,
Confidence buildings. Concept of motivation. **02**

Unit – 5 **Self Development**
Stress Management –Concept, causes, effects and remedies to
Avoid / minimize stress.
Health Management – Importance, dietary guidelines and exercises.
Time management- Importance, Process of time planning, Urgent
Vs importance, Factors leading to time loss and ways to handle it,
Tips for effective time management.
Emotion-concept, Types, Controlling, Emotional intelligence,
Creativity-concept, Factors enhancing creativity
Goal setting-concept, Setting smart goal **06**

Unit – 6 **Study habits**
Ways to enhance memory and concentration.
Developing reading skill.
Organisation of knowledge,
Model and methods of learning. **03**

SUGGESTED LEARNING RESOURCES

Reference Books:

1. Personality Development & Soft Skills - B. K. Mitra, Oxford University Press
2. Basic Managerial Skills for All - E.H. Mc Grath , S.J., Prentice Hall of India Pvt Ltd
3. Body Language - Allen Pease, Sudha Publications Pvt. Ltd.
4. Creativity and problem solving - Lowe and Phil, Kogan Page (I) P Ltd
5. Decision making & Problem Solving - Adair, J, Orient Longman
6. Develop Your Assertiveness - Bishop , Sue, Kogan Page India
7. Time management - Chakravarty, Ajanta, Rupa and Company
8. Life Skills Activities for Secondary Students with Special Needs - Darlene Mannix, Kindle Edition

Internet Assistance:
1) http://www.mindtools.com
2) http://www.stress.org
3) http://www.ethics.com
4) http://www.coopcomm.org/workbook.htm
5) http://www.mapfornonprofits.org/
6) http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7) http://eqi.org/
8) http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9) http://www.mapnp.org/library/ethics/ethxgde.htm
10) http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11) http://members.aol.com/nonverbal2/diction1.htm

12) http://www.thomasarmstron.com/multiple_intelligences.htm
13) http://snow.utoronto.ca/Learn2/modules.html
14) http://www.quickmba.com/strategy/swot/

Practical :

Suggested List of activities:

- Conduct Guest Lectures.
- Conduct Industrial visits.
- Conduct Seminar/Group Discussions.

Suggested List of Assignments/Tutorial :

The Term Work Will Consist Of Following Assignments.

1 Library search:-
Visit your Institute's Library and enlist the books available on the topic given by your teacher. Prepare a bibliography consisting name of the author, title of the book, publication and place of publication.

2 Enlist the magazines, periodicals and journals being available in your library. Select any one of them and write down its content. Choose a topic for presentation.

3 Attend a seminar or a guest lecture, listen it carefully and note down the important points and prepare a report of the same.

4 Visit to any one place like historical/office/farms/development sites etc. and gather information through observation, print resources and interviewing the people.

5 Prepare your individual time table for a week –
(a) List down your daily activities.
(b) Decide priorities to be given according to the urgency and importance of the activities.
(c) Find out your time wasters and mention the corrective measures.

6 Keep a diary for your individual indicating- planning of time, daily transactions, collection of good thoughts, important data, etc

7 Find out the causes of your stress that leads tension or frustration .Provide the ways to Avoid them or to reduce them.

8 Undergo the demonstration on yoga and meditation and practice it. Write your own iews, feeling and experiences on it.

NOTE: - THESE ARE THE SUGGESTED ASSIGNMENT FOR GUIDE LINES TO THE SUBJECT TEACHER. HOWEVER THE SUBJECT TEACHERS CAN SELECT, DESIGN ANY ASSIGNMENT RELEVANT TO THE TOPIC, KEEPING IN MIND THE OBJECTIVES OF THIS SUBJECT.

Development of Life Skill -II

L	*T*	*P*	***Curri. Ref. No.: G 302***
1	*0*	*2*	

Total Contact hrs : 45 **Total marks: 50** Practical:
Theory: 15 *End Term Exam: 25*
Tutorial: 0 *P.A : 25*
Practical: 30
Credit : 2

UNITS	Contents	Hours
Units1	**Inter personal Relation** Importance, Interpersonal conflicts, Resolution of conflicts, Developing effective interpersonal skills communication and conversational skills, Human Relation Skills (People Skills)	
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 Storming 3. Thinking outside the Box	
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	
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	5
Unit 5	**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	10
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	6
Unit 7.	**Formal Written Skills:** Memos, Emails, Netiquettes, Business correspondence Letter of enquiry, Letter of Placing Orders, Letter of Complaint	6
	Total	**48**

	Sessional Activities	
Unit I. 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	
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	
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 handout of PPT in the sessional copy	
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.	
Unit V Job Interviews & Group Discussions	Writedown the anticipated possible questions for personal interview (HR) along with their appropriate responses Facemock interviews. The co-operation of HR personnels of industries may be sought if possible Videos of Mock Group Discussions and Interviews may be shown	
Unit 7 Formal Written Skills	Write a memo, Write an effective official e-mail, write a letter of enquiry, letter of placing orders, letter of complaint	

ENGINEERING ECONOMICS AND ACCOUNTANCY

L	T	P	*Curri. Ref. No.: G 303*
3	0	0	

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

Total marks: 100

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

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.

DETAIL COURSE CONTENT

UNITS	TOPICS/SUB-TOPICS	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 5.2 Features of Perfect, Imperfect and Monopoly 5.3 Price Determination under Perfect Competition & monopoly	3
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 & 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	5

	15.2 Revenue and Depreciation Adjustment 15.3 Introduction to Balance Sheet	
16.	**CAPITAL & 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

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.: G 304***
3	0	0	

Total Contact hrs.: 45 **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.

AIM :

- Introduction
- Forms of business organisation
- Small scale and ancillary industries
- System of distribution
- Sales organisation
- Pricing the product
- Introduction to import and export
- Business enquiries
- Project report
- Environment legislation

DETAIL COURSE CONTENT

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 supplier, 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 Prepared by CTSC Manila Publishers by Tata Mc Graw Hill Publishing Co. Ltd.
2. Small Enterprise Management Published by ISTE, Mysore
3. Motivation Published by ISTE, Mysore
4. S.S.M. in Environmental Engineering Published by ISTE, Mysore
5. Entrepreneurship New Venture Creations, Holt, Prentice Hall, India.
6. Essence of TQM by John Bank
7. Rathore, B.S. and J.S. Saini(ed), A Handbook of Entrepreneurship – Panchkula : Aapga, 1997
8. Jose Pauletal, Entrepreneurship Development, Mumbai : Himalaya Publishing House, 1996
9. Khanka, S.S., Entrepreneurship Development, New Delhi : S. Chand and Co., 2001
10. Nagarazan, R.S. and A.A. Arivalagar, TQM New Delhi : New Age International Publishers, 2005
11. Bhatia, R.C., Marketing Communication and Advertising, New Delhi : Galgotia Publishing Co., 2003
12. 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. G 305*
3	0	0	

Total Contact hrs.: 45 **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.

AIM

- Framework of management
- Planning
- Organizing
- Staffing
- Directing
- Total quality management

DETAIL COURSE CONTENT

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1. 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 by Joseph L. Massie, Prentice-Hall of India

ORGANIZATIONAL BEHAVIOUR

L	T	P	*Curri. Ref. No.: G 306*
3	0	0	

Total Contact hrs.: 45
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.

AIM

- Organization
- Motivation
- Developing good work habits
- Organizational culture
- Team building

DETAIL COURSE CONTENT

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.
1.0	**ORGANIZATION:**	**8**
	1.1 Concept and Definition	
	1.2 Structures (line, staff, functional divisional, matrix)	
2.0	**MOTIVATION :**	**10**
	2.1 Principles of Motivation	
	2.2 Aspects of Motivation	
	2.3 Job motivation	
	2.4 Theories of motivation (Maslow, Herzberg, Theory of X&Y of Mc. Gregar)	
3.0	**DEVELOPING GOOD WORK HABITS:**	**10**
	3.1 Principles of habit formation	
	3.2 Attitude and values	
	3.3 Personality-	
	- Concepts	
	- Theories	
	- Personality and Behaviour	

4.0 ORGANIZATIONAL CULTURE: 8

4.1 Concepts and its importance
4.2 Determinants of organizational culture
4.3 Rules & regulations

5.0 TEAM BUILDING: 9

5.1 Concepts Team and Group
5.2 Formation of Team building

SUGGESTED LEARNING RESOURCES:

Reference Books:

1. Organisational Behaviour - An introductory Text by Huezynski A. & Bucheman C., Prentice Hall of India
2. Image of Organisation by Morgan G. (Sage)
3. Understanding Management by Linstoand S. (Sage)
4. Organizational Behaviour bu Robbins (Prentice Hall of India)
5. Understanding and Managing by Organizational Behavior — George & Jones
6. Organisational Behaviour by L.M. PRASAD, New Delhi, Sultan Chand & Sons
7. Essentials of Management by Koontz, Tata McGraw Hill

ENVIRONMENTAL EDUCATION

L	T	P	*Curri. Ref. No. G 307*
3	0	0	

Total Contact hrs.: 45 **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.

AIM :

- Introduction
- Ecological aspects of environment
- Natural resources
- Global environmental issues
- Environmental pollution
- Clean technology
- Environmental legislation
- Environmental impact assessment

DETAILED COURSE CONTENT

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 INTRODUCTION	**2**
1.1 Introduction	
1.2 Environment and its components	
1.3 Environment in India	
1.4 Public Awareness	
2.0 ECOLOGICAL ASPECTS OF ENVIRONMENT	**8**
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

3.0 NATURAL RESOURCES **5**

3.1 Definition of Natural Resources
3.2 Types of Natural Resources
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.

Reference Books:

1. Environmental Engineering by Pandya & Carny, Tata McGraw Hill, New Delhi
2. Introduction to Environmental Engineering and Science by Gilbert M. Masters Tata McGraw Hill, New Delhi
3. Waste Water Engineering – Treatment, Disposal & Reuse by Metcalf & Eddy Tata McGraw Hill, New Delhi
4. Environmental Engineering by Peavy, TMH International New York
5. Environmental Science by Aluwalia & Malhotra, Ane Books Pvt. Ltd, New Delhi
6. Text Book of Environment & Ecology by Sing, Sing & Malaviya, Acme Learning, New Delhi
7. Environmental Science & Ethics by Sing, Malaviya & Sing, Acme Learning, New Delhi
8. Environmental Chemistry by Samir K. Banerji, Prentice Hall of India, New Delhi
9. Study / training materials, references, reports etc. developed by Central Pollution Control Board, New Delhi as well as State Pollution Control Boards

(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 ENGINEERING CIRCUITS & MATERIALS

L	T	P		
3	0	2		

Curri. Ref. No.: ECE 401

Total Contact hrs.: 75 ***Total marks: 150***

Theory: 45
Practical: 30
Pre requisite:
Credit: 4

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONALE:

The concept of Electrical Circuit is very essential for the study of the other subjects. This subject covers the basic electrical principles both on d.c. and a.c. circuits. The fundamental principles of Magnetic Circuits have also been covered. The knowledge of Electrical Engineering Material in Electrical Engineering plays an important role. The technicians who will be completing the course under Diploma Engineering Scheme will be entrusted to select the proper materials for the use as conductor, semiconductor and insulator. Resistance materials are used for different purposes as potential divider, heating and controlling element. This subject provides the necessary information regarding all above materials so that the student can select the suitable materials for the definite purposes.

AIM:

a) To develop the concept on basic electrical circuit principles.
b) To develop problem solving ability on electrical circuit principles.
c) To describe the properties of different electrical Engineering Materials.
d) To develop the skill for selection of right material for right job.
e) To develop the skill for suggesting the substitute of the replacement material when it is not available in ready stock.

DETAILED COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**Materials for Conductors, Resistors and Insulator** 1.1 Classify electrical material based on 1.1.1 Their properties and applications 1.1.2 Their atomic structure 1.2 To describe the properties of 1.2.1 Conductors, Semiconductors 1.2.2 Superconductors 1.2.3 Instalators 1.3 To state the important Electrical & Mechanical characteristics of 1.3.1 Good conducting materials 1.4 Describe the application and properties of important resistance materials like Tungsten, Carbon, Nichrome manganin, Eureka, Platinum 1.5 To classify the Insulating Materials in terms of temperature	**4**

	ranges (e.g. Class O, Class Y)	
2.	**Dielectric Material** 2.1 To define Dielectric strength, Dielectric loss, Dissipation factor, the factors affecting dielectric loss 2.2 To state the relation between Relative permittivity and Dielectric strength. 2.3 To describe conduction through 2.3.1 Gaseous Dielectric 2.3.2 Liquid Dielectric 2.3.3 Solid Dielectric 2.4 To state the application of Dielectrics	**6**
3.	**Insulating Waxes, Varnishes and coolants** 4.1 To describe properties and application of 4.1.1 Insulating varnishes 4.1.2 Coolants in Electrical machines 4.2 To list the name and important properties of some common type of coolants (e.g. Transformer oil, Nitrogen, Silicon Varnish) 4.3 Describe the effect of Contamination	**2**
4.	**Magnetic Material** 4.1 To define 4.1.1 Ferromagnetic material 4.1.2 Paramagnetic material 4.1.3 Diamagnetic material 4.1.4 Curie point 4.2 To draw and explain the hysteresis loop for different materials like hard sheet, wrought iron and alloy steel 4.3 To state the effect of adding impurities in Ferromagnetic materials 4.4 State the properties of 4.4.1 electromagnetic steel and alloys 4.4.2 CRGO 4.4.3 Dynamo Grade steel 4.4.4 Ferrites 4.4.5 ALNICO 4.4.6 Hard Ferrites	**4**
5.	**Magnetic Circuits** 5.1 To understand the relation between Magnetic flux and magnetic intensity. 5.2 To define permeability, retuctance, permeance. 5.3 Describe magnetic circuit and comparison with electrical circuit. 5.4 To define series, parallel and composite magnetic circuit. 5.5 To enumerate the energy stored in magnetic field. 5.6 To determine the pulling force by an electromagnets.	**5**
6.	**Passive Circuit Elements** 6.1 Resistance, capacitance, Inductance 6.2 To define resistance, capacitance & Inductance (Self & Mutual) 6.3 To write the expression relating resistance & resistivity.	**6**

	6.4 To write the expression of capacitance in terms of areas and distance between plates. 6.5 To write the expression for inductance relating to its physical dimensions. 6.6 To write the equation relating voltage, current & resistance. 6.7 To write the expression relating to charge, capacitance & voltage. 6.8 To write the expression relating to voltage current & inductance. 6.9 To write expression for energy dissipated in resistance & energy store in capacitance and Inductance. 6.10 To solve simple problems resistance, capacitance & Inductance.	
7.	**D.C. Circuits** 7.1 To define voltage and current source 7.2 To represent graphically the ideal current and voltage source 7.3 To represent graphically the practical voltage and current source 7.4 To describe series parallel combination and determine the equivalent resistance 7.5 To deduce the conversion formulae for Delta to Star and vice-versa 7.6 To state 7.6.1 Kirchhofff's current law 7.6.2 Kirchhofff's voltage law 7.6.3 Superposition theorem 7.6.4 Norton's theorem and Thevenin's Theory 7.6.5 Maximum power transfer theorem 7.6.6 To solve the D.C network problems using above theorems and laws	**8**
9.	**Series and parallel Resonance** 9.1 To state the condition for series resonance 9.2 To determine the expression of frequency at resonance condition 9.3 To define quality factor & band width 9.4 To state the condition for parallel resonance 9.5 To determine the resonance frequency for parallel L-C Circuit 9.6 To solve problems on series and parallel resonance	**8**
	Class Test	**2**

LIST OF EXPERIMENTS

1. Identification of Passive Components
2. Performing the good bad test of Passive Components
3. To verify Kirchhoff's Current Law and Voltage Law
4. To verify Superposition Theorem
5. To verify Thevenin's Theorem

6. To develop the charging and discharging curve of voltage across the capacitor connected in series with a resister
7. To measure the voltages across R, L, C in a series RLC circuit.
8. To develop phaser diagram.
9. To verify maximum power transfer theorem
10. To determine the resonance frequency and Q-factor in a series LC circuit
11. To determine the resonance frequency and Q-factor in a parallel LC circuit

REFERENCE:

1. Electronics and Electrical Engineering by Lionel Warnes, Macmillan
2. Electrical Engineering Material by N. Alagappan and NT Kumar, TATA McGraw Hill Publishing Company Limited
3. Electrical Egg. Materials by NITTTR, Madras.
4. A course in Electrical Engineering Materials by S.P. Seth, P.V. Gupta, Dhanpat Rai & Sons.
5. Electrical Engineering Materials by A.J. Dekker, PHI.
6. Materials Science for Electrical & Electronics Engineers by Ian P. Jones, Oxford
7. Electrical Properties of Materials by L. Solymar & D. Walsh, Oxford
8. Introduction to material science for engineers by J.K. Shackelford & M.K. Muralidhara, Pearson Education.

ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENT

L	T	P		
3	0	2		***Curri. Ref. No.: ECE 402***
Total Contact hrs.: 75			***Total marks: 150***	**Theory:**
Theory: 45				End Term Exam: 70
Practical: 30				P.A.: 30
Pre requisite:				**Practical:**
Credit: 4				End Term Exam: 25
				P.A : 25

RATIONALE:

The subject Electrical Measurement and Measuring Instrument is an important subject in the field of Electronics Engineering. This subject deals with the technique of measuring voltage, current and wattage by the indicating type of instruments. The technique of measurement of Electrical power in single phase and three phase circuits will be studied here. Measurement of energy and calibration and adjustment of energy meters will be studied under this subject. Prior to above the working principle construction of all type of measuring instruments like indicating, integrating and recording type will also be studied here. The modern industries are implementing digital instruments for measuring electrical quantities but till date the conventional instruments are being used. For this reason the importance of studying the subject "Electrical Measurement and Measuring Instruments" still exists.

AIM:

1. To acquire the skill for selecting similar instruments for the measurement of voltage, current and wattage.
2. To learn the technique connecting different type of Electrical measuring instruments.
3. To learn the technique of calibrations and adjustment of different type of electrical measuring instruments.
4. To explain the working principle and construction of different type of Electrical Measuring Instruments.

DETAILED COURSE CONTENTS

Unit	Topic/Sub Topic	Hour
1.	**Introduction**	**3**
	1.1 Systems of Units	
	1.1.1 To describe base units with examples	
	1.1.2 To describe derived units with examples	
	1.1.3 To indicate the units and dimensions of the following: frequency, speed, acceleration, force, work, energy, power, charge, potential reactance, Conductance, capacitance, inductance, magnetic field, flux density, magnetic flux.	
	1.1.4 To discuss on drawbacks of : Electrostatic System, Electromagnetic System.	

1.1.5 To define the following: SI units and analyse the dimension of Newton, Joule, Newton meter, watt, Ampere, Coulomb, Ohm, Volt, Farad, Weber, Henry Self inductance, mutual inductance unit magnetic pole, Ampere turn, Ampere turn per meter, Tesla

2. Types of Instruments: **3**

2.1 To classify different type of instruments e.g. indicating integrating, and recording.

2.2 To describe type of (a) deflection system (b) Controlling System and (c) damping systems.

2.3 To describe the advantage and disadvantages of above mentioned systems.

2.4 To describe the constructional detail of pointer, control spring and Instrument bearings.

3. Construction and Working principles **8**

3.1 To describe the constructions and working principles for the following instruments

- 3.1.1 moving coil instruments
- 3.1.2 moving iron instruments
- 3.1.3 Electrodynamic instruments (air cored and iron cored)
- 3.1.4 Induction instruments
- 3.1.5 Electrostatic Instruments
- 3.1.6 Thermal instruments

3.2 To describe the above principles in case of Ammeter, Voltmeter Wattmeter and PF meter

4. Extension of Range of instruments and conversion **3**

4.1 To describe the method of extension of range of ammeters and Voltmeters (D.C Meters)

4.2 To describe the concept of Swamping resistor

4.3 To describe the method of extension of range of ammeter and voltmeter (A.C meters). Uses of C.T and P.T and their working principles

4.4 To describe the working principles of rectifier type instruments

4.5 To Solve of Problems on above concepts

5. Measurement of Resistance **6**

5.1 To classify the resistance according to the range values

5.2 To define the accuracy of measurements

5.3 To describe method of measurement of resistances

- 5.3.1 To state ammeter voltmeter method of measurement (Connection for ammeter for different ranges of resistance state the sources of error in different measurement techniques)
- 5.3.2 To state method of substitution for the measurement of resistance. Discuss the sources of error
- 5.3.3 To state Wheatstone bridge principle of measurement of resistances with precautionary measures

5.3.4 To describe the concept of meter bridge and P.O box principles, discuss about the sources of error

5.3.5 To describe the Kelvin-Double bridge principle. Deduce the expression for calculation for the value of unknown resistance. Discuss the methods for eliminating the errors for measurements.

5.3.6 To describe the basic principles of series and shunt ohmmeter

5.3.7 To describe the principles of crossed coil or Ratio ohmmeter. Describe for low resistance and high resistance measurement

5.3.8 To describe the constructions working principles of Megger. State the type of Megger tester and their field of application (Insulation Tester & Earth Tester). State the recommendation of Bureau of Indian Standard Specification for selection of voltage for testing. State the effect of capacitance of cable regarding the selection of Megger. State the effect of use of guard ring in Megger.

5.3.9 To state the method of measuring the insulation resistance while the power is on.

5.3.10 To solve problems on above topic/subtopic

6 Measurement of Power 6

6.1 To describe the method of connecting a wattmeter for measurement of single-phase power

6.2 To describe the method of measuring single phase power by (a) three ammeter and (b) three voltmeter method

6.3 To describe the method of measurement of p.f by using wattmeter, voltmeter and Ammeter in single-phase circuit.

6.4 To describe the method of three phase power by two wattmeter method, Deduce the expression for measurement of total power and the p.f of the circuit for the balanced load conditions. State the precaution to be taken for the measurement of Power in low p.f load condition

6.5 To solve problems on power measurement

7. Energy Meter 6

7.1 To describe the construction and working principle of D.C Energy meters

7.2 To describe the construction and working principles of Induction Type Energy Meter.

7.2.1 To describe the method of testing of Energy meter

7.2.2 To describe the method of construction of three phase Energy meters

7. 3 Solve problems on Energy meter Testing

8. Bridges and Potentiometers 8

To describe the principles of A.C Bridges on the following

8.1 Capacitance comparison Bridge

8.2 Inductance comparison Bridge

8.3 Precautionary measure to be taken for high frequency measurement

8.4 Method of Wagner's Earth Connection

8.5 Solution of problems on above concepts

9. Class Test 2

LIST OF EXPERIMENT

1. Dismantling and Assembly of indicating type instrument PMMC type, identification and drawing the following
   (a) Deflecting system
   (b) Controlling System
   (c) Damping System
2. Dismantling and assembly of indicating type instrument eg. Electro-dynamic Wattmeter, identification and drawing of (a) deflecting System(b) Controlling System (c) Damping System (d) current coil (e) potential coil (f) voltage multiplier
3. Dismantling and assembly of indicating type instrument e.g. Moving Iron Voltmeter and Ammeter, identification and drawing of (a) deflecting system (b) Controlling System and damping system.
4. Dismantling and assembly of rectifier type voltmeter
   4.1 Dismantling and assembly of Single phase energy meter, identification and drawing of (a) deflecting system (b) braking system (c) current coil (d) potential coil (e) creep adjustment (f) Pf adjustment (g) speed adjustment
   4.2 Calibration of single phase Energy Meter and Phantom loading and power factor
5. Measurement of power by three Voltmeter methods
6. Measurement of power and power factor by three-ammeter method
7. Measurement of three phase power & power factor by 2 wattmeter method
8. Extension of Range of a PMMC voltmeter
9. Connection of CT and PT for measurement of high current and high voltage and determination of trans ratio of current and potential transformer
10. Measurement of resistance by Wheatstone Bridge (and Kelvin's Double Bridge)
11. Measurement of Medium Value resistance by Ammeter Voltmeter method
12. Study of HV oil Testing set
13. Measurement of dielectric strength of transformer oil by oil testing set
14. Localization of cable fault by Murray loop test

REFERENCE:

1. Electrical Measurement and Measuring Instruments by Golding.
2. Electronic Instrumentation by H.S. Kalsi, T.M.H.
3. Electrical Measurements and Measuring Instruments by E. Handscombe, The Wykeham Technologies Service.
4. Electrical Measurement and Measuring Instruments by S. R. Paul, Rukamari Book House Calcutta.
5. Electrical Measuring Instruments by S. R. Paul, Concept Publications.

COMMUNICATION ENGINEERING - I

L	T	P		*Curri. Ref. No.: ECE 403*
3	1	2		
Total Contact hrs.: 90			**Total Marks: 150**	**Theory:**
Theory: 45				End Term Exam: 70
Tutorials : 15				P.A.: 30
Practical: 30				**Practical :**
Pre Requisite:				End Term Exam: 25
Credit: 5				P.A : 25

RATIONALE:

This course concentrates on the field of analog communication and pulse code modulation. It also includes the advantages and disadvantages of digital and analog communications. After passing through the course the students will be acquainted with the basic telephony systems. Upon successful completion of this course the students will be able to

1. know the basic requirements of an analog communication system;
2. understand analog modulation including PAM, PWM and PPM;
3. know the functioning of transmitter and receiver;
4. explain the difference between digital and analog communication;
5. discuss the basic ideas of information theory;
6. discuss the ideas dealing with the operation of the systems like telephony.

AIM:

To acquire knowledge in

a) Analogue communication system
b) Analogue modulation
c) Transmitting systems
d) Demodulation
e) Receiving system
f) Pulse code and delta modulation
g) Multiplexing
h) Basic telephony

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**Introduction to Electronic Communication** Importance of communication – Elements of a communication system – Types of electronic communication - Electromagnetic spectrum – Bandwidth – Basic idea of Fourier series and Fourier transform	**4**
2.	**Analog Modulation** 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	**8**

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

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:

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
8. Warne Tomasi
9. Modern Digital and Analog Communications Systems by B. P. Lathi
10. Electronic Communication Systems, Kennedy, TMH

COMMUNICATION ENGINEERING-II

L	T	P	*Curri. Ref. No.: ECE 404*
3	1	2	

Total Contact hrs.: 90 **Total Marks: 150** **Theory:**
Theory: 45 End Term Exam: 70
Tutorials : 15 P.A.: 30
Practical: 30 **Practical:**
Pre Requisite: ECE 403 End Term Exam: 25
Credit: 5 P.A : 25

RATIONALE:

This course is continuation of the paper titled 'Communication Engineering – I'. After completion of this course, the students will be able to get some idea about modern digital communication techniques like delta modulation, multiplexing, ASK, FSK, PSK etc. They will also know the basics of radar system, microwave amplifiers and antenna wave guide.

AIM:
To acquire knowledge in
(a) RF modulation for base band signal
(b) Performance & testing of digital communication link
(c) Propagation of waves
(d) Radar systems
(e) Satellite communication
(f) Antenna & waveguide
(g) Modern telephony

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**RF Modulation for Base Band Signal**	**6**
	1.1 Concepts of binary modulation techniques.	
	1.2 Principles of amplitude shift keying, frequency shift keying and phase shift keying.	
	1.3 Comparison between ASK, FSK and PSK.	
	1.4 Basic idea of Quadrature Amplitude Modulation.	
2.	**Performance of Digital Communication Link**	**8**
	2.1 Information Theory: Relationship between data speed and channel bandwidth – Shannon-Hartley theorem – Theory of line coding, RZ, NRZ, AMI, HD B3, Manchester check, Hamming Distance, FEC, ARQ.	
	2.2 Error Correction Techniques: Parity checking & cyclic redundancy check.	
	2.3 Bit error rate performance with pseudo noise sequence generation, jitter.	
	2.4 Block schematic idea of digital transmission analyzer.	

2.5 Brief description of inter-symbolic interference and interpretation of eye pattern.

3. Propagation of Waves 4

3.1 Elementary concepts about propagation of waves.
3.2 Propagation of ground wave, space wave and sky wave.
3.3 Iono-spheric layers – Skip distance – Plasma frequency – Critical frequency – MUF – Virtual height.
3.4 Duct propagation – Single hop & multi hop – Fading.

4. Radar Systems 4

4.1 Block schematic description of simple radar system – Plan position indicator, frequency and power range of radar system – Operation of duplexer.
4.2 Operation of instrument landing system.

5. Satellite Communication 6

5.1 Kepler's Law – Artificial Satellite – Orbits – Geostationary Orbit – Satellite Speed – Power Systems – Satellite Angles – Station Keeping – Satellite Launching – Attitude Control.
5.2 Transponder and satellite frequency allocations – Frequencies reuse.
5.3 Block schematic description of communication satellite – Elementary idea of FDMA and TDMA.

6. Antenna & Waveguide 7

6.1 Basic principles of antenna — Different types of antenna: Dipole antenna – Half wave and folded, microwave antenna – Horn antenna, parabolic antenna and helical antenna, Antenna arrays
6.2 Properties of antenna: Gain – Bandwidth – Beam Width – Impedance – Radiation Pattern.

7. Modern Telephony 10

7.1 Working of facsimile or fax – Idea of image processing by Charged Coupled Device.
7.2 Cellular Telephone System: Concept – Mobile Telephone Switching Office – Cellular telephone unit – Frequency synthesizer – Number Assignment Module – Mobile Identification Number – Digital cellular telephone system – Global System for Mobile communication – Concept of CDMA, 2G, 3G.
7.3 Blue tooth.
7.4 Concept of Video Phone.

LIST OF EXPERIMENMTS:

1. Study of PCM transmission and reconstruction
   (a) To study the TDM and sampling of analog signal and its PCM form in the transmitter & the demultiplexing and reconstruction at the receiver section; and,
   (b) to study the AD and DA conversion.
2. To study the radiation patterns and to obtain polar plots of

(a) ½ λ, λ, 3/2 λ and folded ½ λ dipole antenna;
(c) 3-element, 5-element, 7-element and 3-element folded yagi-uda antenna;
(d) loop and log periodic antenna;
(e) horn antenna.

3. Study of the microwave components :
   (a) to study the following parameters of multi-hole directional coupler-mainline and auxiliary line VSWR, coupling factor and the directivity of the coupler;
   (b) to study: magic tee, isolator and attenuator.
4. To study the working of Reflex / Multi-Cavity Klystron.
6. To study the working of Travelling Wave Tube.
7. To generate and detect ASK, FSK and PSK.
8. To be familiar with rectangular and circular wave guide.
9. To be familiar with installation of modem.
10. To be familiar with fax, cordless telephone, mobile telephone and pager system

REFERENCES:

1. Communication Electronics by Frenzel, Tata McGraw-Hill
2. Electronic Communication System by Dungan, Vikash Publishing House
3. Electronic Communication System by Kennedy, Tata McGraw-Hill
4. Principles of Communication System by Taub & Schilling, Tata McGraw-Hill
5. Electronic Communication by Roddy & Coolen, Prentice Hall of India
6. Communication System by Simon Haykin, W.I. Ltd.
7. Telemetry Principles by D. Patranabis, Tata McGraw-Hill
8. Analog and Digital Communication System by M.S. Roden, Shroff Pub. & Distrib. Pvt. Ltd.

MOTORS AND CONTROL

L	T	P	*Curri. Ref. No.: ECE 405*
3	0	2	

Total Contact hrs.: 75 **Total Marks: 125** **Theory:**
Theory: 45 End Term Exam: 70
Practical: 30 P.A.: 30
Pre Requisite: **Practical:**
Credit: 4 End Term Exam: Nil
P.A : 25

Rationale

The close linkage between Electronics and Electrical Technology is the purpose of this course. Through investigative experiments the student will gain insight into the practice of supply, control and primary usage of electrical power as relevant to Electronics Technology." Particular emphasis is given to electrical and electronic controls and interfaces as used for DC & AC motors. An electrical safety and shock hazard awareness session in the laboratory will precede the students' laboratory experiments.

Aim:

The student will be able to identify types of electrical services, and then analyse and evaluate electrical circuits and diagrams related to the following topics:

- Magnetic Fields and Forces
- Magnetic force Field interaction
- Transformers
- DC Machine
- AC Machine
- Protection and control of Electrical Line & equipments.
- Power factor Improvement

Detail Course Content :

Unit	Topic/Sub Topic	Total Hours

1. Magnetic Fields and Forces

1.1 Definition of magnetic poles
1.2 Definition of magnetic flux, flux density
1.3 Properties of magnetic flux lines.
1.4 Characteristics of magnetic field
1.5 Definition of electromagnetism.
1.6 Definition of magnetic saturation.
1.7 Definition of m.m.f and reluctance
1.8 Definition of permeability
1.9 Basic magnetic circuit (Including Toroid)
1.10 Analogy between electrical & Magnetic circuit
1.11 To solve simple problem of Ampera Tums, Flux current requirement.

2. Magnetic Force Field Interaction

2.1 Time varying Magnetic Field
2.2 Faradays Laws of Electromagnetic Induction
2.3 Fleming's Right hand rule
2.4 Fleming's Left hand rule
2.5 Force acting on current carrying conductor place in a uniform magnetic field.
2.6 Definition of Induced emf.
  2.6.1 Statically Induced emf
  2.6.2 Dynamically Induced emf

3. Transformers

3.1 Definition of a transformer
3.2 Working principle of a transformer
3.3 Construction of Transformers
  3.4.1 Classification of Transformers
  3.4.2 Based on input & output voltage
  3.4.3 Based on construction of core
3.5 To list assumptions for an ideal transformers
3.6 To derive the emf equation of an ideal transformers
3.7 To explain an ideal transformers on load
3.8 To explain the effect of leakage flux of a transformers
3.9 To develop equivalent circuit of a Transformers.
3.10 To describe the concept of referring quantities from one side to another side.
3.11 To describe losses in a transformer efficiency
3.12 To find the condition for maximum efficiency.
3.13 To describe open circuit test and short circuit test.
3.14 To determine efficiency from S/c. test & O/c. test at a particular load and power factor.
3.15 To describe construction & working principle of an auto transformers

4. DC Machine

1.2 Construction of a DC Machine
1.3 Types of DC Machine on the basis of the manner in which the filed wdg is connected to armature.
1.4 Various parts of DC Machines
1.5 Working principles of a DC Generator.
1.6 Emf equation of a DC Generator.
1.7 No-load and on load characteristics
1.8 Working principle of a DC motor
1.9 Concept of back emf.
1.10 Starting of a DC Motor
1.11 Construction and working of a 3 point starter.

1.12 Speed control of a DC motor
   a) Field flux control method
   b) Armature voltage control method.

5. AC Machine

5.1 Construction of 3 ϕ Induction Motor.
5.2 Types of 3 ϕ Induction Motor by rotor construction.
5.3 Rotation magnetic field
5.4 Principle of rotor rotation.
5.5 Speed of rotor rotation.
5.6 Slip, frequency of rotor induced emf.
5.7 Development of torque equation.
5.8 Torque slip characteristics.
5.9 Speed control
5.10 Method to increase starting torque of 3 ϕ Induction Motor.
5.11 Working principle of altemetor.
5.12 Generation of three phase voltage
5.13 E. M. F. equation of an alternator.
5.14 3 phase 4 wire system
5.15 3 phase 3-wire system

6. Single phase Induction Motors

6.1 Types of Single phase Induction Motor
6.2 Construction and working principle of
   6.1.1 Resistance split phase induction motor.
   6.1.2 Capacitor start induction motor
   6.1.3 Capacitor rub induction motor
   6.1.4 Shaded pole motor
   6.1.5 Reluctance motor

7. Protection and control of Electrical Line & equipments.

7.1 List protection and control devices of line & equipments.
7.2 Define of fuse
7.3 Different electrical terms related to fuse (Rated current).
7.4 H.R.C. Fuse
7.5 Circuit Breaker (Definition)
7.6 Difference between fuse and CB
7.7 Simple scheme of protection of a line using circuit breaker and relay.

8. Power factor Improvement

8.1 Effect of low p.f.
8.2 Causes of p.f.
8.3 Method adopted for improvement of pf.

List of Experiments

1. Study of a 3-point starter and starting of a DC Shunt Motor.
2. Speed control of a DC Shunt motor
3. Open circuit characteristics of a DC Generator.
4. Details study of a single phase transformer.
5. Open circuit test on a single phase transformer.
6. Short circuit test on a single
7. To find efficiency of a 1 ϕ Induction Motor.
8. To study and start a three phase induction motor
9. To calculate slip of a 3 ϕ Induction Motor at various load.
10. To study and start a capacitor short single phase induction motor.
11. To draw open circuit characteristic of 3 ϕ alter meter.

REFERENCE :

1. A Text Book on Electrical Technology by B. L. Theraja, Chand and Co. Ltd
2. Basic Electrical Engineering by A Chakrabarti, S Nath and C K Chanda, Tata Mc Graw Hill Publications.
3. Electrical Machinery by P.S. Bhimra, Khanna Publishers.
4. Electric machines by D.P. Kothari & I.J Nagrath, Tata Mc Graw-Hill Publishing, Company Limited.
5. Electrical Machines by P.K. Mukherjee & S. Chakrabarty, Dhanpat Rai Publication.

ELECTRONIC MEASUREMENT

L	T	P	*Curri. Ref. No.: ECE 406*
3	0	2	

Total Contact hrs : 75
Theory: 45
Practical: 30
Pre requisite: NA
Credit: 4

Total Marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam:25
P.A : 25

Rationale

This subject deals with the technique of measuring voltage, current and wattage by the indicating & display type of instruments and CRO. The working principle, construction of all types of measuring instruments (indicating, integrating and recording) digital instruments are also covered. The general principles of build and handling of electronic instrumentation are also discussed.

AIM

To acquire knowledge in

- Measurement with CRO
- Pattern measurement
- Electronic multimeters
- Basic principles of Frequency measurement
- Phase shift measurement
- Measurement of circuit parameter
- Measurement in distributed parameter circuit
- Power measurement
- Measurement of modulated signal
- Antenna radiation instrumentation
- Sensors
- Advanced electronic instrumentation

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**OSCHILOSCOPES** 1.1 To describe the construction and working principle of cathode ray tube 1.2 To describe the (a) block diagram of linear CRO (b) applications of CRO 1.3 To describe the block diagram of a dual trace oscilloscope, its working principle, and applications 1.4 To describe the block diagram of digital storage oscilloscope, working principle and applications.	**5**

2.	**SIGNAL GENERATORS** 2.1 Definition of signal generation and write the specifications of a signal generators. 2.2 Description of the working principle of a signal generator. Types of signal generator. 2.3 Principle of operation of a pulse generator, pulse characteristics and their specifications 2.4 Function generator: Generation of functions and control functions.	**7**
3.	**SIGNAL ANALYZERS** 3.1 Wave analyzers: block diagram description and working principle of (a) frequency selective wave analyzer, (b) heterodyne wave analyzers. 3.2 Applications distortion analyzers: working principles, type of distortion 3.3 Spectrum analyzer, working principle and characteristics.	**5**
4.	**DIGITAL INSTRUMENTS** 4.1 Digital multimeter: its advantages over the moving coil meter w.r.t sensitivity and input impedance 4.2 Important specifications of a digital multimeter 4.3 Digital frequency meter: pulse counting method for frequency measurement 4.4 Digital voltmeter: Characteristics and types of DVM (only principle of operation) 4.5 To explain the significance of the 3½ digit display system in DVM.	**7**
5.	**ELELCTRONIC VOLTMETER** 5.1 Advantages of electronic voltmeter 5.2 VTVM: Principle of diode peak reading VTVM, types 5.3 TVM: operating principle, advantages and disadvantages 5.4 Rectifier amplifier voltmeter and Amplifier rectifier voltmeter	**5**
6.	**POWER MEASUREMENT** 6.1 Principles of basic power measurement 6.2 Measurement of power using the output power meter. 6.3 Measurement of AF & PF power 6.4 Measurement of microwave power using bolometer 6.5 Calormetric method for measurement of large R power.	**6**
7.	**ANTENNA PARAMETER MEASUREMENT** 7.1 Measurement of field strength 7.2 Measurement of radiation pattern 7.3 Antenna gain measurement s 7.4 Measurement of Q and phase shift	**5**
8.	**RECORDING INSTRUMENTS AND DISPLAY DEVICES** 8.1 Recorders 8.2 Analog recorder (a) Graphic recorders, (i) Null type recorder, (ii) XY recorder, (b) Oscillogrpahic recorder, (i) ultraviolet	**5**

	recorders. 8.3 Magnetic storage device : magnetic tape recorders 8.4 Display device : LED, LCD, Seven segment.	

LIST OF EXPERIMENTS:

1. Use of single and dual trace oscilloscope for the Measurement of (a) voltage, (b) current (c) Frequency (d) Phase difference
2. Use of digital storage oscilloscope for the Measurement of (a) voltage, (b) current (c) Frequency (d) Phase difference
3. Compare two waves with respect to magnitude, phase and frequency using dual trace / digital storage oscilloscope
4. Measure the frequency by using reed type frequency meter
5. Determine the radiation pattern of an antenna
6. Study of spectrum analyser.
7. Use a spectrum analyser for the analysis of distortion of a wave form coming out of transmission media
8. Use a 3 and ½ digit digital Multimeter for the measurement of the following
   a. Voltage b. Current
   c. Resistance d. Inductance
   e. Capacitance f. Frequency
   g. Diode check
9. Frequency and Phase shift measurement using various analog and digital techniques.

REFERENCES:

1. P.H. Sydenham (Ed.), Handbook of measurement Science. Volume I. Theoretical
2. Fundamentals, John Wiley and Sons, 1982. .
3. P.H. Sydenh.am (Ed.), Handbook of measurement Science. Volume II. Practical.
4. Fundamentals, John Wiley and Sons, 1983.
5. P. H. Sydenham (Ed.), Handbook of measurement Science. Volume III. Elements of Change.
6. John Wiley and Sons, 1992.
7. R. Morrison, Grounding and Shielding Techniques, John Wiley and Sons, 1998
8. E. O. Doebelin, Measurement Systems, Application and Design, McGraw-Hill, 1990.
9. H. N. Norton, Handbook of transducers, Prentice Hall, 1989.
10. W. Gardner, Microsensors Principles and Applications, John Wiley, 1994.
11. S.M. Sze (Ed.), Semiconductor Sensors, John Wiley and Sons, 1994.
12. A. Caristi, IEEE-488 General Purpose Instrumentation Bus Manual, Academic Press, 1989
13. Intelligent Instrumentation – George c. Barney (PHI)
14. Electronic Instrumentation by H.S. Kalsi (TMH)
15. Principles of Industrial Instrumentation by D. Paranobis (TMH)

POWER ELECTRONICS

L	T	P		
3	0	2		

Curri. Ref. No.: ECE 407

Total Contact hrs.: 75
Theory: 45
Practical: 30
Pre requisite:
Credit: 4

Total marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONALE:

Power Electronics is an interdisciplinary area using the members of Thyristor family & control electronics to control the switch ON and switch OFF processes of the devices and principles of control theory. The field of control electronics also had a great change to the digital integrated and microprocessor control. The area power electronics had a two sided development (a) the semiconductor devices of improved performance (b) control circuit of these devices. Thus the care has been taken to include the study of the characteristics of the power devices which are being used and also their control circuit's starting from their rudimentary level to the block diagram study of the sophisticated computer control system.

AIM:

To acquire knowledge in

- The characteristics of power devices like thyristor and power diodes
- Field of application of the power diode and thyristor
- The construction and working principles of speed control circuits of d.c. and a.c. machines
- The construction and working principles of a.c. power conditioners.
- The construction and working principles of inverters, switch mode power supplies and uninterrupted power supplies.

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Hours
1.	**Power Devices:** Power diode, Power Transistor, Monolithic Darlington, SCR, 5 MOSFET, GTO, IGBT, Construction, Working Principle and Characteristics	5
2.	**Triggering Devices:** Characteristics of SCR, Gate pulse triggering of SCR by R, RC and UJT Circuit, Isolation requirement for triggering. Isolation by pulse transformer and opt isolator. Specification and rating of thyristor, Commutation of SCR – Natural commutation and forced commutation.	5

3.	**Power Regulation by SCR and Triac:** Half wave phase shift control of D.C. load, full wave phase shift control of D.C. load, full wave A.C. and D.C. (by phase shift); Pulsed control of D.C. shunt motor by SCR and Diac combination	7
4.	**Application of Power Electronics** AC voltage regulator, single Phase & three Phase (analysis of resistive loads only), Choppers – step down, step up, Buck-boost, Inverter Types, single phase and three phase bridge (line communication and forced commutation, speed control of motors, speed regulation by armature voltage control. Speed control of AC induction motor (variable voltage control))	5
5.	**D.C. Regulated Power Supply:** Linear mode of operation; series, shunt, combination of two, op-amp controlled, chip version using 78XX, 79XX, LM317, LM337. Switching mode of operation; boost, buck, and combination of boost buck, forward converter and fly-back converter	6
6.	**Inverter :** Inverter circuit (single phase) using SCR & using MOSFET, PWM Control of the MOSFET of Inverter.	

LIST OF EXPERIMENTS

1. To draw the characteristics curve of S.C.R.
2. To assemble the turn ON and turn OFF circuit of SCR and check the performance
3. To assemble and run push pull inverter circuit (Transistorized)
4. To assemble and run push pull inverter circuit (SCR version)
5. To assemble & control the current through DC load (360° control) by Phase Shift Method.
6. To develop the circuit for current regulation through heater by phase shift Control of triac
7. To control the speed of a D.C. motor through full wave rectifier bridge and SCR (phase shift control)
8. To regulate the speed of a D.C. motor by using of zero crossing detector and UJT Oscillator
9. To regulate the speed a D.C. motor by pulsed triggering through optocoupler
10. To regulate the speed of a D.C. motor by gated pulsed triggering and Through pulsed transformer
11. To regulate the speed of an A.C. load by PWM Circuit
12. To develop the back and boost converter circuit for D.C. to D.C. conversion and check its performance
13. To run and study of a closed loop D.C. Motor control system
14. To assemble & run the soft start method of starting of induction Motor (Wring triacs).
15. To assemble, run and check the performance of a SCR controlled Automatic Battery Charger.
16. To develop forced commutation circuits for (a) resistive load and Inductive loads.

REFERENCE:

1. Power Electronics by S. K. Mandal, Mc Graw Hill Education
2. Power Electronics by Md. H. Rashid, PHI
3. Power Electronics by Vdedam Subrahmanium, New Age International Publisher
4. Power Electronics by P.C. Sen, T.M.C.

INDUSTRIAL INSTRUMENTATION AND CONTROL

L	T	P		
3	0	2		

Curri. Ref. No.: ECE 408

Total Contact hrs.: 75
Theory: 45
Practical: 30
Pre requisite:
Credit: 4

Total marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONALE:

Due to widespread automation in Industry, the study of instrumentation and control has become very essential. The aim of this course is to develop some level of specialization in students of electrical and electronics engineering as maintenance personnel in the maintenance of sophisticated instruments. Instrumentation in all fields of engineering is becoming increasingly sophisticated with the advancement in electronic techniques together with computers entering the field of data processing, where the inputs have to be much more accurate and the controllers much faster in response. This course of instrumentation and control develops an understanding of sensors, transducers, signal conditioner and suitable display; recording devices.

AIM:

To acquire knowledge on

a) The construction characteristics and method of usage of sensors and transducer
b) The interfacing technique of sensors with both analog and digital system
c) The first hand knowledge of control system with a brief study of controllers and their usage
d) The Single Conditioning and Programmable Logic Controller (PLC)

Detailed Course Contents

Unit	Topic/Sub Topic	Hour
1.	**OVERVIEW OF INSTRUMENTATION**	**3**
	1.1 To list the basic elements of Instrumentation system. To define (a) Measurement, (b) Methods of measurement, (c) function of Instrument and measurement system.	
	1.2 Applications of measurement system.	
2.	**TRANSDUCERS**	**3**
	2.1 Classification of transducers	
	2.2 Types of errors in transducer	
	2.3 Selection of transducer for specific application	
3.	**TEMPERATURE MEASUREMENT**	**6**
	3.1 To define temperature and state the practical scales of temperature.	
	3.2 To states the relation between the three scales of temperature. (C,F,K)	

3.3 To explain the operating principle of the different methods of temperature measurement such as (a) ntc thermistors, (b) plantium RTD, (c) type K thermocouple (d) IC temperature sensor, (e) ultrasonic temperature transducer, (f) semiconductor thermometer, (g) quartaz crystal thermometer, (h) radiation pyrometer (total radiation, infrared, optical)

4. PRESSURE MEASUREMENT 5

4.1 To describe the concepts of pressure measurement and pressure measurement device.

4.2 To explain the different methods of pressure measurement such as (a) direct pressure measurement (eg. Force summing devices, electrical pressure transducers, photoelectric transducer, piezoelectric transducer, LVDT), b) indirect pressure measurement such as load cell.

4.3 To describe the construction and explain the principle of operation of the above.

5. FORCE AND WEIGHT MEASUREMENTS 4

5.1 To define (a) force (b) weight (mass)

5.2 To describe the construction, principle and uses of strain gauge.

5.3 To define (a) gauge factor (b) Poisson ratio, (c) torque.

5.4 To describe the dynamometer method of torque measurement.

5.5 To describe the construction of (a) linear, (b) wire wound potentiometer.

5.6 To explain the principle of operation of a pontentiometer.

6. MEASUREMENT OF OTHER PHYSICAL QUANTITIES 5

6.1 Principle for the measurement of
Humidity, Sound, PH value, Liquid level, Thickness, Fluid Flow, Velocity, Acceleration

6.2 Principle of Industrial Opto-electronic Devices:
Industrial Light Sources, Photoconductive Cells, Photodiodes, Phototransistors, Opto-isolators, Opto-couplers

7. **SIGNAL CONDITIONING 4**

7.1 To describe the basic principle (a) D.C. (b) A.C. signal conditioning (c) Data Acquisition and conversion system

7.2 To describe the basic instrumentation Amplifier

7.3 To describe the block diagram of an instrumentation system

7.4 To explain the instrumentation Amplifier circuit used on Transducers Bridge

8. **CONTROL SYSTEM ENGINEERING** 7

8.1 To define Control System Engineering (emphasis on open loop and close loop system).

8.2 To define Transfer Function

8.3 To define Block diagrams and to develop block diagram from the transfer function

8.4 To define controller and types of controller

8.5 To study D.C. and A.C. position control system (Tacho-generator)

9.0	**Display and Recording Devices** 9.1 Characteristics of digital display: specification, resolution, sensitivity, accuracy 9.2 Digital display elements: alphanumeric displays, LEDs, LCDs, Display system, dot matrix system, seven segment system 9.3 Recording: chart recorders, printer, laser printers, ink jet printer	**4**
10.	Introduction Programable logic Controller (PLC).	2
11.	Class Test	2

LIST OF EXPERIMENTS: **30**

1. To study the characteristics for the displacement measurement using LVDT.
2. To study the function of opto electric transducer.
3. To study the characteristics of K type thermocouple.
4. To use linear potentiometer for displacement measurement.
5. To study the characteristics of a platinum RTD transducer.
6. To study the characteristics of ntc thermistor
7. To study the characteristics of humidity transducer.
8. To study the characteristics of PMDC tachogenerator.
9. To study the characteristics of dynamic microphone

REFERENCE:

1. Intelligent Instrumentation by George c. Barney, PHI
2. Electronic Instrumentation by H.S. Kalsi, TMH
3. Principles of Industrial Instrumentation by D. Patranabish, TMH
4. Johnson, Curtis D., *Process Control Instrumentation Technology*, John Wiley & Sons, New York.
5. Singh, S. K., *Industrial Instrumentation and Control*, 2nd ed., Tata McGraw-Hill, New Delhi.

ELECTRONIC DEVICES AND CIRCUITS - I

L	T	P	*Curri. Ref. No.: ECE 409*
3	0	2	

Total Contact hrs : 75 ***Total marks: 150***

Theory: 45
Practical: 30
Pre requisite:
Credit: 4

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam:: 25
P.A : 25

RATIONALE:

Electronics Engineering cannot stand alone without the study of Electronic Devices & Circuits. The modern Electrical Equipments are mostly controlled by electronic circuits where the circuits are mostly designed on the basis of linear and binary operation of the solid state devices. This subject provides the facility for the study of basic knowledge of the solid state devices and their application. Care has been taken so that the study of the practical circuits are included in this subject rather than theoretical approach. Some problems on designing of simple electronic circuits have also been included here.

AIM:

1. To develop knowledge on the characteristics of
   a) different type of diodes b) transistor
2. To describe the working principles of transistor amplifiers
3. To describe the effect of feedback on amplifier
4. To develop different application circuit on diode and transistors

DETAILED COURSE CONTENTS

Unit	Topic/Sub Topic	Hours
1.	**Semiconductor Diodes** 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 & describe the method of measurements 1.2.4 To describe practical diode 1.2.5. To state the important specifications of semiconductor diode 1.2.6. To describe the half wave and full wave rectifier circuits 1.2.7. To calculate the efficiency of rectifier circuit	**12**

	1.2.8 To write the formulae of calculating the parameters of filter 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** 3.1 To describe the construction of transistor 3.2 To describe the working principle of transistor 3.3 To state the types of transistor 3.4 To describe the characteristics of transistor and method of drawing characteristics curves 3.5 To describe the amplifying characteristics 3.6 To describe the amplifying characteristics in (a) common base (b) common emitter (c) common collector configuration 3.7 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 3.8 To establish the relation between α and β 3.9 To describe the method of drawing the (a) input characteristics curve (b) output characteristics curve 3.10 To compare the characteristics of three different configurations e.g. CB, CE, CC 3.11 To analyze the load line of a transistor (both for dc & ac) 3.12 To describe the function of the heat sink of a transistor. 3.13 To write the Specification of a transistor. 3.14 To state the conditions for faithful amplification. 3.15 To define transistor biasing and essential requirement of a transistor Biasing circuit. 3.16 To define the function of a small single stage amplifier, and calculate its voltage and power gain. 3.17 Classification of Amplifiers. 3.18 To define the Multistage amplifiers and different type of coupling. 3.19 To describe the different types of power amplifiers 3.20 To describe and draw the different stages of an amplifier used in PA system. 3.21 To study the feedback amplifier(concept of feedback, gain in feedback, advantage & disadvantage in feedback amplifiers).	**22**
4	**Pulse Waveforms and RC networks.** 4.1 To study RC charging, discharging and calculations and RC frequency response. 4.2 to describe the ideal and actual rectangular waveforms with respect to rise time, fall time, duty cycle, tilt & average value.	**3**

5.	**Sinusoidal Oscillators:** 5.1 To state the type of Electronic Oscillators 5.2 To describe damped and un-damped oscillations 5.3 To state the conditions of oscillation 5.4 To study different types of oscillators like Hartley, Colpitt, Phase-shift, Wein Bridge and Crystal oscillators and their application.	**5**
6.	**Wave Shaping Circuits:** 6.1 To study the working of Diode clipping and Diode Clamping Circuits.	**3**

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 curve 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) L-C 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 R-C network.

REFERENCE:

1. Basic Electronics by S. K. Mandal, Mc Graw Hill Education
2. Electronic Principles by Sahdev, Dhanpat Rai & Sons
3. Electronic Devices and circuits by Mothershead, TMH
4. Electronic Devices by Floyd
5. Electronic Principles by Malvino, TMH
6. Electronics Fundamentals and Applications by D. Chottopadhyay and Rakshit.
7. Electronics Devices by G.K.Mithal.
8. Electronics Devices & Circuit theory by Robert Boyelstad.

ELECTRONIC DEVICES AND CIRCUITS - II

L	T	P	*Curri. Ref. No.: ECE 410*
3	0	2	

Total Contact hrs.: 75 ***Total marks: 150***

Theory: 45
Practical: 30
Pre requisite: ECE 409
Credit: 4

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam:: 25
P.A : 25

RATIONALE:

The application of Electronic Devices is increasing, not only in the field of electronics communication and instrumentation but it is also used in the field of electrical Engineering. In fact the field electronics is being amalgamated with the field of Electrical Engineering. So the study of Electronic Devices and circuits are very essential for the students of the Diploma course in Electrical Engineering. The part of this subject deals with the characteristics of basic devices like diode transistors and their circuits. The second part is dealing with the special devices e.g. UJT, FET, MOSFET, OPAMP, 555 timers and three terminal regulator chips. The study of CRO, Digital Multimeter and signal generators have also been included in this subject.

AIM:

1. To acquire the knowledge of application and working principles of (a) UJT, FET, MOSFET, OPAMP, three timing regulators.
2. To acquire the knowledge for specifying and indenting of the components as stated in Sl No 1
3. To acquire knowledge on the working principles and applications of (a) CRO (both analog and Digital (b) Digital Multimeter (c) Signal generator

DETAILED COURSE CONTENT

Unit	Topic/ Sub-Topic	Hours
1.	**Uni-junction Transistor**	**6**
	1.1 To describe the construction, working principle and characteristics of Uni-junction Transistor	
	1.2 To define (a) emitter current (b) negative resistance region (c) saturation region	
	1.3. To describe the UJT relaxation Oscillator circuit and write expression for the time period of the oscillator	
	1.4 To state some application of UJT relaxation oscillator	
2.	**Field Effect transistor**	**4**
	2.1 To describe the construction, operation and characteristics of Junction Field Effect Transistor	
	2.2 To define (a) channel Ohmic region (b) Pinch off region (c) Drain resistance (d) Trans conductance	

	2.3 To describe the effect of temperature on FET parameters	
3	**MOSFET (Metal Oxide Semiconductor Field Effect Transistor)**	**5**
	3.1. To describe (a) Depletion MOSFET (b) Enhancement MOSFET	
	3.2. To differentiate the characteristics of JFET and MOSFET	
	3.3. To describe (a) the handling precautions of MOSFET, CMOS	
4	**Opto Electronic Devices**	**8**
	4.1 To describe the Electromagnetic spectrum of Light	
	4.2 To list the application of photo Electronic Devices	
	4.3 To describe the photoconductive sensors e.g. Bulk-type photoconductive cells PN photodiode PIN photodiode Avalanche Photodiode NPN Photodiode NPN Phototransistor Photo Darlington Transistor	
	4.4 To describe the applications of Photodiodes and phototransistors	
	4.5 To describe the function of light Emitters e.g. (a) LED's (b) Infrared Emitters (c) Laser diode	
	4.6 To describe the functions of (a) Photo-couplers (b) Application of the photo coupler circuit	
5	**Differential amplifier**	**6**
	5.1. To define a differential amplifier and explain its significance	
	5.2. To describe four different configuration of the differential amplifier	
	5.3. To deference the voltage gain, differential input resistance and output resistance	
6	**Operational Amplifier**	16
	6.1 To define operational amplifier	
	6.2 To describe the manufacturers designation for integrated circuits	
	6.3 To define SSI, MSI, LSI and VLSI packages	
	6.4 To draw the circuit symbol for a 741 Op-amp and show the in number for each terminal	
	6.5 To furnish the ordering information of Op-Amp	
	6.6 To describe the power supplies required for Op-amp circuits	
	6.7 To define (a) input off set voltage (b) input off set current (c) common mode rejection ratio (d) large signal voltage gain (e) slew rate (f) output resistance (g) output short circuit current of operational amplifier	
	6.8 To state the seven important properties of the ideal Op-Amp	
	6.9 To define (a) open loop Op-Amp configuration (b) differential amplifier (c) inverting amplifier (d) non-inverting amplifier	
	6.10 To define (a) ground terminal (b) virtual ground	
	6.11 To draw the (a) inverting and non-inverting amplifier circuit	

6.12 To calculate the close gain of (a) inverting and non-inverting amplifiers

6.13 To develop mathematical expression and state the applications of (a) adder (b) subtractor (c) integrator (d) differentiator circuit (e) voltage follower

6.14 To define comparator and show the output waveform for sinusoidal input and the reference voltage of (a) zero voltage (b) Positive voltage (c) negative voltage

6.15 Describe (a) zero crossing detector with hysterisis (b) voltage to current converter (c) currents to voltage converter

6.16 To state some application of Op-Amp (a) high resistance voltmeter (b) zener diode tester (c) diode tester (d) LED tester (f) 420ma current loop (g) Tone control circuit

6.17 To explain the operation of a multi vibrator circuit and sketch its output voltage waveform and calculate the frequency of Oscillation

6.18 To develop a square/ triangular wave generation using Op-Amp, resistors and capacitor and determine frequency of oscillation

6.19 To develop basic differential amplifier using op-amp

6.20 To describe the (a) low pass (b) high pass and (c) Band pass filter

LIST OF EXPERIMENTS

1. To draw the Emitter characteristics curve of the junction Transistor and identify cutoff, negative resistance region and saturation region of the device
2. Construct a UJT Relaxation Oscillator circuit and (a) measure the peak value of (a) Curiffer voltage (b) output voltage (c) frequency of oscillation at different value of R.C.
3. To draw the (a) Drain currents for different values of V_{os} (b) Transconductance curve of JEFT
4. Construct the (a) common source (b) common drain (c) common gate amplifier of JFET and compare their gains
5. To construct the inverting amplifier and verify the gain of amplifier with various ratio of R_i and R_f. Also check the gain of input , output signals (use IC 741)
6. To construct the non – inverting amplifier and verify the gain of amplifier with various ratio of R_i and R_f . Also check the polarity of input output signals (use IC741)
7. Construct the adder and subtractor circuit using IC 741 and verify the output voltage with various input voltages
8. Construct an integrator circuit and note the output waveform for a square wave input
9. Construct a differentiation circuit and note the output wave form for a triangular input voltage.
10. To develop a comparator circuit and note the output waveform with sinusoidal input and (a)zero volt (b) positive voltage and (c) negative voltage inputs as the reference input at the non-inverting input terminals.

11. To Develop a square wave / triangular wave generator circuit by using IC 741 as square wave generator and integrator
12. To develop (a) voltage to current and (b) current to voltage converter circuit and check and adjust its linearity
13. To use a IC 741 in differential mode and check its common mode rejection capability
14. To develop an instrumentation amplifier by using three IC 741
15. To establish an astable multi vibrator circuit by using IC 555
16. To establish a Monostable multi-vibrator circuit by using IC 555
17. To develop a pulse width modulator circuit by using a 555 timer
18. To develop a regulated power supply unit using (a) step down transformer (b) Four arm bridge rectifier (c)Filter and (d) three terminal 7800 group IC regulator
19. Perform the test for different load current and input voltage and determine percent regulation
20. Develop an adjustable d.c. Voltage regulator using LM 317
21. Use a 3 ½ digit digital Multi meter for measurement of (a) D.C. voltages (B) A.C. voltages (c) frequency of a signal (d) Value of resistor (e) value of inductors (f) value of capacitor
22. Use a 3 ½ digit digital Multimeter to perform the good bad test of (a) diode (b) transistor (c) SCR.
23. Use a 3 ¾ digit digital Multimeter to measure (a) true RMS (B) Average and (c) peak value
24. of a rectified sine wave and find its form factor and peak factor
25. Use a dual trace CRO along with a signal generator to note (a) different type of wave forms of the output of signal generator (b) The amplitude and frequency of wave form (c) phase relation between two phase shifted wave forms

REFERENCES:

1. Basic Electronics by S. K. Mandal, Mc Graw Hill Education
2. Electronic Devices and Circuits by Allen Mother Shed, PHI
3. Operational Amplifier and Linear Integrated Circuit by Robert Conghlin, Frederick F. Drescolt, PHI
4. Op-Amp and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI
5. Electronics Fundamentals and Applications by D. Chottopadhyay and Rakshit.
6. Electronic Principles; Sahdev (Dhanpat Rai & Sons)
7. Electronic Devices; Floyd
8. Electronic Principles; Malvino; (TMH)
9. Electronics Devices by G.K.Mithal.
10. Electronics Devices & Circuit theory by Robert Boyelstad.

APPLIED TECHNOLOGY COURSES

FIBRE OPTICS

L	T	P		
3	0	2		

Curri. Ref. No.: ECE 501

Total Contact hrs : 75
Theory: 45
Practical:30
Pre requisite: NA
Credit: 4

Total Marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical: 50
End Term Exam: 25
P.A : 25

RATIONALE:

Optical Fiber Communication Systems have moved very rapidly from research laboratory into commercial application. When the attenuation inherent in the optical fiber was reduced, that made optical fiber economically attractive for long – haul communications, sources and detectors are ready and available for commercial applications. The optical fiber, lasers and photo detector were made possible for communication at very high data rates over increasing long distances. As optical fiber communication system technologies have improved, an increasing variety of applications has become technically feasible and economically attractive. This course is designed to prepare students to entire these fascinating, dynamic and very important emerging new field of communication.

AIM :

After completion of this course students will be able to explain

- The generation of fiber optics
- Physics of light
- Light transmission in Fibers
- Optical sources and transmitters
- Optical detectors and receivers
- Optical components
- Propagation Modes in Optical Fibers
- Losses in Optical Fibers
- Optical Communication System
- Advantages and limitations of Optical Fiber Communications.

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**INTRODUCTION**	**3**
	1.1 To explain the generation of fibre optics.	
	1.2 To list the components that are used in a fibre optic communication channel.	

1.3 To draw the electromagnetic spectrum and show the optical region and state its wavelength.

2. PHYSICS OF LIGHT 5

2.1 To state the laws of reflection and refraction. To define diffraction, polarization.
2.2 To define refractive index, total internal reflection, critical angle.
2.3 To use Snell's law for calculating wavelength and frequency.
2.4 To define photons, energy of photon, energy gap, energy level diagram.

3. LIGHT TRANSMISSION IN FIBRES 5

3.1 Nature of glass for light transmission.
3.2 Principles of light radiation through (a) semiconductor (b) PB junction.
3.3 Construction of optical fibres [SI, GI, (SM and MM)].
3.4 Launching of light in fibres.
3.5 Numerical aperture, Acceptance cone (basic formula and their related problems).
3.6 Evanescent wave.

4. OPTICAL SOURCES/TRANSMITTERS 6

4.1 LED:- construction, operating principle, operating characteristics, types, applications.
4.2 LASER:- properties, processes, principles, types, applications, safety considerations.
4.3 Transmitter circuits (Block diagram & brief description of each block).

5. OPTICAL DETECTORS/RECEIVERS 6

5.1 Principles of light detection, types of light detectors, Characteristics.
5.2 PN photo detector:- principle of operation.
5.3 PIN diode :- operating principle, characteristics, types.
5.4 APD :- operating principle, advantages, applications.
5.5 Receiver circuits (Block diagram & brief description of each block)

6. OPTICAL COMPONENTS 7

6.1 Connectors : - elements of fibre connector, construction, means of attaching, types, properties.
6.2 Splices :- definition, procedure, types.
6.3 Couplers :- construction, FBT, advantages of FBT, types.
6.4 Switches: - principle, types, applications.
6.5 Principle of Attenuators, isolators.

7. PROPAGATION MODES IN FIBRES 3

7.1 Propagation modes, leaky modes
7.2 Modal dispersion :- Intramodal, Intermodal dispersion.

8. LOSSES IN FIBRES 4

8.1 Chromatic dispersion, absorption losses, scatter losses, bending loss, radiation loss, loss due to connectors.
8.2 Optical noise, Interference.

9. OPTICAL SYSTEM **4**

9.1 Typical fibre optic communication system using TDM & WDM
9.2 Power budget of an optical communication system.
9.3 Define bandwidth, bit rate.

10. OPTICAL COMMUNICATION **2**

10.1 Block schematic description of optical fibre communication.
10.2 Concept of fibre optic communication system – Advantage & limitation of optical fibre communication.

LIST OF EXPERIMENTS

1. Setting up analog link and measurement of bandwidth
2. Study of losses in optical fibre
3. Setting up of optical voice link
4. Setting up of optical digital link and measurement of band width
5. Measurement of numerical aperture
6. Study of TDM (digital)
7. Study of PC to PC communications
8. To study interference of light using biprism and laser
9. To study diffraction of light using laser
10. To determine the wave length of given laser source using diffraction grating
11. To study polarisation of light using He-Ne laser

BOOKS & REFERENCES:

1. Fibre Optics and Optoelectronics by K. Hare, Oxford
2. Optical Fiber communication System by William D., Jones Jr.
3. Optical fiber Communication, Principles and Practice by John M. Senior
4. Fiber Optic Systems for Telecommunications by Roger L. Freeman, Willey

COMPUTER COMMUNICATION & NETWORKING

L	T	P		
3	0	4		

Curri. Ref. No.: ECE 502

Total Contact hrs.: 105 ***Total marks: 150***

Theory: 45
Practical: 60
Credit: 5

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONALE:

Computer Communication and Networking is an essential infrastructure component of any modern society. The course emphasizes the theory behind data networks. The students will learn about mathematical models used in data communication networks, that will enable them to develop their own models and to implement these networks in hardware and software.

AIM :

After completion of this course students will be able to explained.

- The uses of Computer Network
- Network layer
- Concepts of Internet

DETAIL COURSE CONTENT:

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

Practical

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

DIGITAL ELECTRONICS & MICROPROCESSOR - I

L	T	P	*Curri. Ref. No.: ECE 503*
3	0	2	

Total Contact hrs.: 75 ***Total marks: 150***

Theory: 45
Practical: 30
Pre requisite:
Credit: 4

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONALE:

A lot of MSI, LSI, VLSI and Microprocessors have been developed and are being widely used in the Industrial Applications. To understand the functions of the above-mentioned chips it is required to learn the basic principles. So different topics of digital electronics have been included in this subject. As The field of Digital Electronics and Microprocessor is very vast the subject is divided into two parts. In the first part the study of fundamental principles, the study of combinational and sequential logic application of different IC chips have been included. The knowledge of digital to Analog and Analog to Digital converters are very essential for interfacing the analog to Digital System. So these topic have also been included.

AIM:

- To acquire knowledge on the operation of basic building blocks e.g. AND, OR, NOT
- To develop the (a) combinational logic circuits (b) Sequential logic circuits
- To acquire knowledge on the operation of DAC and ADC modules
- To develop application circuits by using available standard IC Chips

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Hours
1	**Number system, Radix conversion and Binary Codes**	**8**
	1.1 To define (a) binary (b) bit (c) base or radix (d) Numeric coding	
	1.2 To write the generalised equation for the conversion of a number from other systems to the decimal systems	
	1.3 To convert a number from other systems to the decimal system by using the generalised equation	
	1.4 To convert(a) decimal number to binary number(b)octal to binary (c) Binary to Octal (d) Hexadecimal to Binary (e) Binary to Hexadecimal (f) Octal to Hexadecimal (g) hexadecimal to octal number	
	1.5 To classify the numeric codes	
	1.6 To define (a) Weighted code (b) BCD Code (c) Non weighted code (d) Non-error detecting code (e) Ring counter code (f) excess three code (g) gray code (h) self checking code (i) parity checking code (j) error	

checking code (k) simple error correcting code (l) self correcting code (m)learning code (n) alphanumeric code (o) display code (p) seven segment display (q) dot matrix display

1.7 To perform

i) Binary addition ii) Binary subtraction

iii) Binary multiplication iv) Binary division

1.8 To perform the (a) 1's complement operation of binary number (b) binary subtraction by using 1's complement operation (c) 2's complement operation (d) binary subtraction using 2's complement

2. Digital Logic Circuit and Boolean algebra 10

2.1 To describe (a) switching circuits (b) Logic gates (c) Symbols for logic gates (d) truth table for different type of gates

2.2 To realise exclusive-OR in terms of basic building blocks

2.3 To define universal building blocks and realisation of basic logic gates in terms of universal logic gates

2.4 To use diode, transistor, FET, MOSFET as logic gates (or switches)

2.5 To be familiarised with RTL, DTL, TTL, ECL. IIL, MOS Circuits

2.6 To define SSI, LSI, MSI, Microprocessor, Fan in, Fan out, Noise level in TTL circuits, totempol configuration

2.7 To use Boolean Algebra for the verification De-Morgan's theorem and other Boolean Functions

2.8 To describe (a) sum of product (b) NAND gate realisation (c) Product of Sum (d) NOR gate realisation

2.9 To define (a) Minterm (b) Maxterm (c) canonical

2.10 To use Karnaugh Map for simplification of Boolean equation (Karnaugh map utilising Minterms and Maxterms)

Combinational and arithmetic Logic Circuits 3

3.1 To develop and explain (a) Half Adder (b) Full Adder (c) Binary parallel Adder (d) Subtractor (e) Full & half subtractor (f) Adder / Subtractor in I's complement and 2's complement system (g) BCD addition and subtraction in 9's complement system (h) excess 3 adder and subtractor

3.2 To develop and explain following circuits (a) comparators (b) Encoder (c) decoder, (d) multiplexing (e) demultiplexing (f) priority encoder (g) BCD to seven segment display decoder

3.3 State the application of above circuit

4. Sequential Circuits 3

4.1 To develop and explain the following circuits

(a) Flip Flop using NAND or NOR gate (b) RS-Flip Flop (c) clocked RS Flip Flop (d) D Flip-Flop (e) Triggering of Flip- Flop (f) J-K Flip-Flop (g) T Flip-Flop (h) Master slave Flip-Flop

4.2 To state the application of the above circuits

4.3 To develop and explain following circuits

a) Asynchronous or ripple counter (b) Modulo counter(c) synchronous counter (d) Divide by N counter (e)Decade counter (f) up-down counter (g) ring counter (h) Jhonson Counter

4.4 To state the application of above counters

5. Shift Register **3**

5.1 To develop and explain following circuits
(a)Shift Register (b) Buffer Register (c) Serial in serial out register (SISO) (d) Parallel in serial out shift Register (PISO) (e) Parallel in Parallel out shift Register (PIPO) (f) Bi-directional shift Registers (h) Universal Shift Register

5.2 To describe the connection diagram and application of IC Shift Registers.

6. Digital Memories **5**

6.1 To describe the functions and applications of Digital memories like
(a) RAM (b) ROM (c) PROM (d) PLA (e) FIFO (f) Magnetic core memories (g) Magnetic Surface storage devices (h) Magnetictape (i) Magnetic Disc Storage device

6.2 To describe the following operation with the help of digital circuits
a) Serial adding
b) Parallel adding
c) Parallel subtracting
d) Combined adder subtractor
e) Multiplication circuit
f) Division circuit

7. DA and AD converter **8**

7.1 To explain the working principles of
a) D/A Converter with binary weighted register
b) D/A converter with R and 2 R resistors
c) Monolithic / hybrid D/A Converter e.g. (1) MC 1408 (2) NE/SE 5018

7.2 To describe a practical circuit for using D/A converter in instrumentation and control circuit

7.3 To explain the working principle of
a) Successive approximation A/D converters
b) Monolithic/hybrid A/D converter
c) Single and dual slope integration ADC
d) Counter and servo type ADC
e) Parallel type ADC

7.4 To describe a practical circuit for using ADC in instrumentation and control circuit

8. Popular IC Chips used in practical circuits **5**

8.1 To develop a parallel Full adder circuit using TTL chip 7483
8.2 To develop a 3 to 8 decoder circuit using 7420 chips
8.3 To set up a BCD to 7 segment display decoder circuit
8.4 To develop a 4 digit counter system using 7490 (Decade counters)
8.5 To develop a 4 bit serial in parallel out shift register using IC 7476
8.6 To develop dive by 'N' counter using IC 7473
8.7 To develop a multiplexed display decoder cum counter by using MM 925
8.8 To design a digital system for controlling the elevator by using sequential logic.

LIST OF EXPERIMENTS

A. Experiments by using Digital Trainer Kit

1. Verification of Truth Tables for AND, OR,NOT, Exclusive-OR gates
2. To develop exclusive-OR gate using basic building block
3. To develop the half adder and full adder circuit and verify the truth table
4. To connect a 4-bit parallel full adder circuit and verify the Truth Table
5. To connect four Flip Flop circuit to develop a four bit ripple counter
6. To connect a J.K. Flip Flop circuit and verify the truth table for various input of J and K
7. To connect 4 Flip Flop with "Pre" and “CLR” input terminal for developing different type of shift registers
8. To connect the 7492 counter chip to develop different module counter
9. To connect the 7490 decade counter with display decoder system for showing the counting operation
10. Connect the XOR circuit to develop parity bit checker

B. Experiments by using bread board and IC chips

1. To develop a 3 to 8 decoder circuit
2. To develop a set-reset Flip Flop by using 7400 (NAND Gate) chip
3. To develop a divide by 'N' counter by using 7473 chip
4. To develop a two digit counter by using 7490, 7448 and seven segment Display
5. Develop a 4 to 1 multiplexer circuit by using discrete chips
6. To develop a 4 digit multiplexed display counter by using MM 925 and other relevant components
7. To develop a up down counter circuit by using Flip Flops and AOI (And OR Invert) circuits
8. To connect the DAC chip MC1408 L or 0800 in the circuit to check the conversion process
9. To connect the ADC 7109 on the circuit to check the conversion process

REFERENCES :

1. Digital Electronics Principles and Applications by S. K. Mandal, Mc Graw Hill Education.
2. Digital Electronics and Microcomputers by R.K.Gaur, Dhanpur Rai
3. Fundamental Engineering by Lionard S. Bobrow, Oxford
4. Digital Principles and application by Malvino & Leach, TMH
5. Digital Electronics and Microprocessor Problems and Solution by R.P.Jain, TMH
6. Elements of Computer Science by S. Srinivasan, New Central Book Agency Pvt Ltd

DIGITAL ELECTRONICS & MICROPROCESSOR -II

L	T	P		
3	0	2		

Curri. Ref. No.: ECE 504

Total Contact hrs.: 75
Theory: 45
Practical: 30
Pre requisite: ECE 503
Credit: 4

Total marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A : 25

RATIONAL:

Digital Electronics & Microprocessor is not a new subject. Though the progress and advancement in this area is very fast, the study of the basic principles e.g. the study of digital building blocks and 8085A system is still continuing. As the field is very vast, The whole subject is divided into two parts. The study of Microprocessor its peripheral devices, advance level microprocessor and microcontrollers are included in the second part. A lot of emphasis has been given to do some exercise on design aspects for the better understanding. A lot of lab exercises have been included for better understand of the subject.

AIM:

1) To appreciate the importance of microprocessors in flexible system design
2) To acquire thorough knowledge about the architecture, memory organization, instruction set, interrupt control and programming methodology of 8085A system
3) To acquire thorough knowledge of using the peripheral and interfacing devices e.g. 8251, 8255, 8253, 8257, 8279
4) To acquire the first hand knowledge of system design
5) To acquire knowledge on fault diagnosis and maintenance of Microprocessors Based system
6) To acquire knowledge on 16 Bit Microprocessor
7) To acquire knowledge on 8251 Microcontroller

DETAIL COURSE CONTENT

Unit	Topic Sub-Topic	**Hours**
1.	Micro Computer System and hardware	**4**
	1.1 To describe the structure of a micro computer	
	1.2 Define (i) Programmable (ii) Memory (iii) Input/ output (iv) CPU	
	1.3 To describe the micro computer organization and the function of a micro processor	
	1.4 To describe the principle of operation of a micro-processor	
	1.5 To describe the generic architecture of a microprocessor with its functional components (e.g. registers ALU, timing & control unit and control signals)	
	1.5.1 To describe (a) various registers (general purpose register and special purpose register) (b) general capability of ALU (c) various control signals (d) functions of internal and external buses.	

1.6 To explain with sketch various functional components of 8085A Microprocessor

2. **Memory and Memory Organization** **3**

2.1 To describe memory organization with reference to microprocessor

2.2. To define static and dynamic RAM

2.3. To compare advantages and disadvantages of static and dynamic RAMs

2.4. To describe (a) ROM, PROM, EPROM (b) important memory timing parameters (c) memory address decoding (d) various forms of storage in microprocessor

3. **Elements of Programming** **3**

3.1 To use Binary and Hexadecimal number systems

3.2 To explain (a) instruction code (b) the need for assembly language (c) role of assembler

3.3 To state the merit and demerit of instruction length

3.4 To identify the field of instruction

3.5 To differentiate execution efficiency of various types of instructions

3.6 To describe the role of flags

3.7 To explain op-code fetching modes

3.8 To describe time requirements of instructions

3.9 To identify the blocks of a flow chart

4 Instruction Set **4**

4.1 Data Transfer & Arithmetic group of Instruction of 8085 A

4.1.1 To identify and use the data transfer and arithmetic group of instructions

4.1.2 a) to recognize the number of T states, machine cycles, addressing modes associated with each instruction (b) to describe the effect of the instruction on flags if any

4.1.3 To write small programs using these instructions.

4.2 Logical group & Branch group of Introduction for 8085 A

4.2.1 To identify and explain the logic and branch group of restriction

4.2.2. a) To recognize the number of T states, machine cycles, addressing modes associated with each instruction b)To recognize the effect of execution of instructions, on the various flags

4.2.3 To write sets of instruction to illustrate logic and branch operations

4.2.4 To explain the use of logic instruction making or resetting of individual bus

5 Interfacing of INPUT/OUTPUT Devices **5**

5.1 To decode the address assigned to an Input / Output part.

5.2 To explain the process of interfacing and I/O device with microprocessor for a specified device address

	5.3 To explain the process of interfacing non-multiplexed and multiplexed display output port with microprocessor	
	5.4 To compare the software/hardware overheads of interfacing multiple ports using decoders	
	5.5 To compare I/O mapped I/O and memory mapped I/O interfacing with microprocessor	
6	**Analog Signal Interfacing**	**5**
	6.1 To explain the need of Analog Interfacing	
	6.2 To explain interfacing techniques of 8 bit or higher word length Digital to Analog converters (DAC) with microprocessor	
	6.3 To explain interfacing techniques of 8 bits or higher word length Analog to Digital Converters (ADC) with microprocessors	
	6.4 To explain the need and use of Opto-isolator	
	6.5 To explain with examples of interfacing of 8 bit ADC/DAC with microprocessor	
7	**Interrupts**	**3**
	7.1 To describe basic techniques of data transfer	
8	**Programmable Peripheral Interface 8255 and applications**	**2**
	11.1 To explain the internal structure of 8255A. To describe (a) the programming methodology ofthe8255A (b) method of interfacing 8255A I/O devices in simple mode (c) method of interfacing 8255A devices in hand shake technique	
9	**Programmable interval Timer/Counter 8253**	**2**
	12.1 To describe (a) the internal architecture of 8253 (b) programming technique of 8253 Timer/Counter (c)the application of 8253 timer	
10	**Direct Memory Access and DMA Controller 8257**	**2**
	13.1 To describe (a) Direct Memory Access operation (b) the internal structure of 8251(c) method of use of DMA Controller 8257	
11	**Programmable Keyboard and Display Interface - 8279**	**2**
	14.1 To describe (a) the internal structure of 8279 (b) the programming methodology of 8279 (c) the use of 8279 for keyboard and display interface	
12	**Microcontroller**	**5**
	16.1 To define Microcontroller	
	16.2 To compare the Microcontroller 8051 with 8bit microprocessor	
	16.3 To describe the 8051 Microcontroller hardware	
	16.4 To describe (a) the Input/Output Pins, Ports and Circuits (b) external memory (c) counters and Timers (d) Serial Data Input/Output (e) Interrupts	
13	**16 -bit Microprocessor and Current Trends**	**5**
	17.1 To describe basic features of 16 bit microprocessor	
	17.2 To describe architecture and main feature of 8086	

List of Experiments:

1) To examine the 8085A training Kit, identify the microprocessor, Keyboard interface chip, Input Output Interface Chip, Programmable timer/counter chip, serial communication chip, interrupt controller chip, RAM and ROM area.
2) To move a data (a) by immediate addressing (b)from register to register (c) register to memory(d)memory to registers
3) To add two hexadecimal numbers
4) To subtract one hexadecimal number from other
5) To add five hexadecimal numbers which are stored in 5 successive memory location
6) To arrange five random hexadecimal numbers in memory locations in a sequential order (Starting from highest to lowest)
7) To divide two hexadecimal numbers and convert the result from hexadecimal to decimal value
8) (a) To develop a time delay subroutine (b) To convert 5 hexadecimal (number into its corresponding Analog Value and display it on CRO screen using the time delay subroutine as per Sl No. 8(a)
9) To convert the analog values into its corresponding digital value and display it in the address and data field
10) To develop a Programme for driving a stepper motor
11) To develop a Programme for a Running display of HELP US in Address and Data field
12) To develop a Programme for Traffic Control System
13) To develop a Programme to display the second and Minute of a clock
14) To develop a Programme to control a Coffee Vending Machine
15) To develop a Programme for the operation of a counter

REFERENCE:

1. Microprocessors and Microcontrollers Architecture, Programming and Interfacing using 8085, 8086 and 8051 by S. K. Mandal, Mc Graw Hill Education
2. Microprocessor, Architecture, Programming and Application with the 8085/8080A by Rames S.Gaonkar, PHI
3. Introduction to Microprocessor by A.P. Mathur, TMH
4. Microprocessor by Rafiquazzaman
5. Microprocessor & Microcomputer by Malvino

Consumer Electronics

L	T	P		
3	0	4		

Curri. Ref. No.: ECE 505

Total Contact hrs.: 105
Theory: 45
Practical: 60
Pre requisite: Nil
Credit: 5

Total marks: 150

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 25
P.A: 25

RATIONALE:

This course is designed to provide required knowledge and skills in the communication systems such as microphone and loudspeakers. The students will also be acquainted with the systems like tape recorder, audio CD player, B/W TV, colour TV, VCR, VCP etc. Also covered in this are some of the home appliances like washing machine, electronic cooker etc. Upon successful completion of this course the students will be able to

1. Discuss the basic concept dealing with the operations of microphone, loudspeakers and tape recorder;
2. Discuss the basic concepts dealing with the operation of B/W TV circuits, Colour TV circuits, VCR circuits and audio CD player;
3. Understand the function of cable TV system, washing machine, microwave oven etc.

AIM:

To acquire knowledge in

1. Microphones
2. Loudspeakers
3. Black and white TV system
4. Colour TV
5. CD player
6. Cable TV system
7. Home appliances
8. Mobile Repairing
9. LCD, LED

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours

1. Microphones **2**

Construction, working principle and frequency response of**:** Carbon Microphone – Variable Reactance Microphone – Capacitance Microphone – Piezo-Electric Microphone – Moving Coil Microphone

2. Loudspeakers **2**

Frequency ranges of musical instruments – Intensity and Dynamic Range – Constructions and working principles of Moving Coil Loudspeaker – Impedance and Power Level of loudspeaker – Frequency characteristics of Practical Loudspeakers**:** Woofer, Tweeter, Squawker – Loudspeaker Enclosure

3. Tape Recorders **1**

Principle of magnetic recording and playback – Requirement of bias – Working principle with block schematic diagram of a tape recorder system

4. Stereos **1**

Details of stereo components**:** Tone, Bass, Treble, Balance & Control – Crossover Networks – Graphic Equalizer – Noise Reduction Techniques

5. Black and White TV System **3**

5.1 Working principle with block diagram of TV transmitter and receiver

5.2 Brief description with circuit diagram: TV Tuner – Video IF stage – Sound stage – Picture tube & its associated circuit – Synchronizing circuits – Automatic Gain Control (AGC) – Horizontal & vertical deflection circuits – EHT section – Remote control of a TV receiver

6. Colour TV System **10**

Colour technology – Working principle with block diagram of a colour camera arrangement – Block schematic description of a colour encoder and decoder – RGB drivers of a colour picture tube – Colour picture tube & its associated circuits. Basics of PLASMA and LCD Television system, LED.

7. CD Player **2**

Working principle of CD recording and CD playing

8. Cable TV System **5**

Channel and cable type of cable TV system – Head end processor – Trunk & cable distribution system with block diagram – Scrambling

9. Home Appliances **10**

Basics of maintenance aspect of PHOTO-COPYING machines; Basics of maintenance aspect of Mobile telephone handset; Ideas of commonly used appliances like washing machine, electronic oven, electronic heater and watches with block diagram

11. Mobile Repairing **9**

LIST OF EXPERIMENTS:

1. To study the internal layout of black and white TV receiver.
2. To study the Internal adjustment, control and fault finding procedure of Black & White TV.
3. To study the internal layout of colour television.
4. To study the internal adjustments control and simple troubleshooting techniques of Colour TV.
5. To study the electronic parts, internal switching and control of Videocassette recorder.
6. To study simple trouble shooting techniques of VCR.

7. To study of internal switching and controls of CD player and its simple troubleshooting techniques.
8. To study simple trouble shooting techniques of Mobile telephone Handset
9. To study simple trouble-shooting techniques of PHOTO COPYING machine.

REFERENCE BOOKS:

1. Audio and Video Systems by R. G. Gupta, Tata McGraw-Hill
2. Monochrome and Colour TV by Gulati, New Age International
3. Book Video by Newness, BPB
4. VCR-Principle Maintenance and Repair by S. P. Sharma, Tata McGraw-Hill
5. Cable TV Technology and Operation by Bartlett, Tata McGraw-Hill
6. Electronic Instruments and Systems by R.G. Gupta, Tata McGraw-Hill
7. Electronic Communication by Ruddy and Coolen, Prentice Hall of India, N. Delhi.

MICROWAVE TECHNIQUES

L	T	P	*Curri. Ref. No.: ECE 506*
3	0	0	

Total Contact hrs : 45 **Total Marks: 150**

Theory: 45
Practical: 0
Pre requisite:
Credit: 3

Theory:
End Term Exam: 70
P.A.: 30
Practical:
End Term Exam: 0
P.A : 0

RATIONALE:

The application of Microwave is increasing rapidly. This is not only used in communication system, are also it is applied in Industry and household appliances. So the study of this subject both in the Electronics and Electrical Engineering has become inevitable. Starting from the definition of Microwave, the topics on its working principles and field of applications have been included in this subject.

AIM:

To acquire knowledge on

a) Microwave transmitter structure and resonator
b) Generation technique of Microwave
c) Measurement of Microwave
d) Microwave characteristics
e) different applications of microwave in communication & industry.

DETAILED COURSE CONTENT:

Unit	Topic / Sub Topic	Hours
1.	**Introduction :** EM Theory, Wave Equation, Energy Power**,** Transmission Line Theory, Fields in Media & Boundary Condition.	9
2.	**Transmission Structure and Resonators** 2.1 To describe (a) Smith Chart (b) Waveguides (c) Resonators (d) Electromagnetic spectrum, TEM Waves, Isolator, attenuator, Directional coupler, circulator.	4
3.	**Microwave Generation** 3.1 To describe the method of Generation of Microwave in different method (Klystron, Magnetrons, Travelling Wave Tubes) Bipolar transistor, Gunn oscillator, Avalanche diode oscillator. Trapped Avalanche Transmit Time mode)	4
4.	**Microwave Measurement** 4.1 To describe the principle of Microwave detection 4.2 To describe the method of Microwave Power Measurement 4.3 To describe the method of Microwave Impedance Measurement 4.4 To describe the method of Microwave Frequency Measurement	4
5.	**Microwave Radio Link** 5.1 To define (a) microwave link (b) receiver power	5

	5.2 To enumerate receiver power in terms of (a) Waveguide and antenna losses. (b) Transmitter antenna gain (c) Path loss (d) Receiver antenna gain (e) Receiver waveguide and antenna losses 5.3 To describe the mobile communication system.	
6.	**RADAR** 6.1 To define RADAR 6.2 To write the RADAR equation 6.3 To describe (a) Pulse RADAR (b) FMCWRADAR (c) Doppler RADAR 6.4 To describe the block diagram of RADAR system 6.5 To state different application of RADAR in (a) Ship and Ship Position Control (b) Air Traffic Control (c) Alometry (d) Position fixing (e) Mapping (f) Tracking (g) Guidance and horning for weapon (h) Obstacle avoidance (i) Distance Measurement (j) Speed detector (k) Burglar detection	8
7.	**Application of Microwave** To write notes on application of Microwave in following areas a) Radio Astronomy b) Infrared heat detection c) Imaging (Laud and human) d) Military sensing (arms control verification) e) Monitoring agriculture f) Security Surveillance g) Microwave hearing and cooking h) Medical hyperthermia	9
8.	Class Test	2

REFERENCE :

1. Microwave by K.C. Gupta, New Age International Publishers
2. Microwaves Techniques by A Kumar, New Age International Publishers
3. Microwaves and Optional Transmission by A. David Olver, John Willey and sons
4. Microwave Engineering by David M. Pozar Wiley

C PROGRAMMING WITH LINUX

L	T	P
3	0	2

Curri. Ref. No.: ECE 507

Total Contact hrs.: 75
Theory: 45
Practical: 30
Pre requisite: Nil
Credit: 4

Total marks: 150

Theory:
End Term Exam: 70
I.A.: 30
Practical:
End Term Exam: 25
I.A: 25

RATIONALE:

This course is an introduction to the C programming language. The student will learn to write programs containing the following C language features: simple data types, one-dimensional arrays, conditional and control statements, and functions. The student will also develop programs to handle sequential files. The programs will be run on a LINUX machine, and the student will learn the necessary LINUX commands to create, edit, save, compile, link, debug and run these programs in a LINUX environment. The use of structured programming techniques, program readability, program documentation and testing will be emphasized.

AIM:

Upon completion of" this course, the successful student will be able to :

- State the basic operations of a modern digital computer and its peripherals.
- Use LINUX operating system commands to handle files, and perform programming tasks as a user.
- Use integer and real number arithmetic operations in a C program.
- Apply the concepts of variables, constants, and built-in functions in a program.
- Concept of data structure — string, array (linear, nonlinear), graph, queue, stack, tree etc.
- Write user-defined functions.
- Develop pseudo-code solutions for a stated problem. Implement the solution program using the C language.
- Utilize branching and looping techniques in a program.
- Implement simple applications using the array data type in a program.
- Pass parameters to a function
- Differentiate local variables from global variables, and state the scope of a variable.
- Write programs with clear documentation.
- Test programs for proper operation.

DETAILS COURSE CONTENT

Unit	Topic/Sub Topic	Hours

1. Digital Computer Operations **2**

- Sketch a block diagram of a computer and describe the functions of each of the blocks.

- Use the following terms to describe the operation of a computer - main memory, bit, byte, word, machine code, high-level, operating system.

2. Introduction to the LINUX Operating System 5

- Describe the functions of an operating system.
- Use the following LINUX commands (plus any additional commands specified by your instructor) - passwd, vi, chmod, cat, more, Ipr, rm, tnv, cp, Is, cd, pwd, mkdir, and mail.
- Use the vi/other editor to create a C source program.
- Use the C compiler and the linker to compile and link the source program to produce an executable code.
- Describe what is meant by the following terms: file, file-name, file extension (or file type), directory, text file, machine langualge file.
- Describe the differences between a file produced by the editor, the compiler, and the linker.

3. Basic Components of a C Program 5

- Understand the basic structure of a C program and identify its 3 basic components - the program heading, the declaration section, and ihe executable section.
- Define and give examples of the following terms: reserved words, standard identifiers, identifiers, statements, and syntax diagrams.
- Write simple programs using the predefined functions scanfQ and printfQ.
- Use the following aridimetic operations: +, -, *, %, / on integer variables.
- Use the following arithmetic operations: +, -, *, %, / on real variables.
- Use mixed-mode arithmetic expressions containing both real and integer operations.

4. Variables, Constants, and Standard Functions 4

- Understand the difference between the allocation of memory locations (in the declaration section) and the assignment of values to variables and constants.
- Use the following data types: mt, float, and char in simple programs.
- Use constants in simple programs.
- Use the scanfQ and getcharQ functions to enter data values interactively for a program.
- Use standard functions in simple programs.

Functions without Parameters' 3

- Understand the concept of a user defined function.
- Write simple programs using functions that do not use parameters.

Programming Techniques 8

- Define and give examples of pscudo-codc and algorithms.
- List the steps in the program development process.
- Write programs that have adequate documentation.
- Differentiate between compile-time errors, run-time errors and design errors.
- Given a program containing compile-time errors, (syntax errors), identify and correct the errors.
- Given a program printout containing a run-time error message, correct the error.
- Given a printout containing a design error, correct the error.
- Use the echo-checking technique to debug a program.

Decisions **3**

- Understand and use "boolean1 data types (Mcro and non-zero) as implemented m
- C.
- Construct Boolean expressions using the six relational operators and the three logical operators
- Understand operators and use the IF statement.
- Understand and use the IF ... ELSE statement.

Repetitions **4**

- Understand and correctly use the FOR.... statement in programs requiring single fixed repetition loops.
- Use nested FOR.... statements in programs requiring multiple repetitions of single repetition loops.

Testing Loops **4**

- Understand and correctly use the WHILE.... pre-test loop.
- Understand and correctly use the DO...WHILE post test loop.
- Understand and correctly use die 'coin' built-in function and correctly use it in both die WHILE and DO ... WHILE loops.

One dimensional Arrays **2**

- Understand the concept one and two dimensional arrays.
- Correctly declare an array with a variable definition.
- Write a simple input/output routine using arrays.

Functions **3**

- Understand how parameters arc passed between functions.
- Describe graphically the difference between passing parameters by value and by reference.
- Describe die difference between formal and actual parameters.
- Use functions requiring value parameters.

Scope of Variables **2**

- Describe the difference between a local and a global variable.
- Indicate the scope of each identifier for a given program.

LIST OF EXPERIMENTS:

1. Write a program to output the following multiplication table:

   7 x 1 = 7
   7 x 2 = 14
   7 x 3 = 21
   …
   …
   …
   7 x 25 = 175
2. Write a programme to calculate the average of a set of N numbers.
3. Write a program to determine and print the sum of the following harmonic series for a given value of n:

$$1+\frac{1}{2}+\frac{1}{3}+\ldots\ldots\ldots+\frac{1}{n}$$

The value of n should be given interactively through the terminal.

4. The total distance traveled by a vehicle in t seconds is given by distance = ut + $(at^2)/2$
   Where u is the initial velocity, (meters per second), a is the acceleration (meters per second^2). Write a program to evaluate the distance traveled at regular intervals of time, given the values of u and a. The programme should provide the flexibility ot the user to select his own time intervals and repeat the calculations for different values of u and a.
5. Write a programme to read the following numbers, round them off to the nearest integers and print out the results in integer form:
   29.72 301.21 -76.73 -46.46
6. Admission to a professional course is subject to the following conditions:
   a. Marks in Mathematics >=60
   b. Marks in Physics >=50
   c. Marks in Chemistry >=40
   d. Total in all three subjects >>200
   Total in mathematics and physics >=150
   Given the marks in the three subjects, write a programme to process the applications to list the eligible candidates.

7. Floyd's triangle is given as follows:

```
1
2   3
4   5   6
7   8   9   10
11  12  13  14  15
…
…
…
79                  91
```

   Write a programme to print the triangle and modify it to produce the following triangle

```
1
0   1
1   0   1
0   1   0   1
1   0   1   0   1
```

8 Write a programme that will read a positive integer and determine and print its binary, octal, hexadecimal equivalents. The programme should obtain the option from the user interactively.

9. Write a programme to calculate the standard deviation of a number of data stored in an array.
10. Consider two arrays A and B containing a sorted list of data items in ascending order. Write a programme to merge them into a single sorted array C that

contains every item from arrays A and B, in ascending order.

11. Write a programme which will read a string and rewrite it in the alphabetical order. For example, the word “INDIA” should be written as “ADIIN”.

12. Write a programme, using recursive functions, to evaluate

$$f(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$$

PROFESSIONAL PRACTICE I

L	T	P	*Curri. Ref. No.: ECE 508*
0	0	2	

Total Contact hrs : 30
Theory: 0
Practical: 30
Credit: 1

Total Marks: 50

Theory: 0
End Exam: 0
P.A.: 0
Practical:
End Exam: Nil
P.A : 50

COURSE CONTENT

1. Guest Lecture
   Lectures by professional / Industrial expert to be organized.

2. Seminar/ short presentation.
   Students are to be assigned a topic from any subject being taught in the current term to do a self study and prepare a report of 10 pages and deliver a presentation of 10 mins in ppt.

3. Group discussion
   Presentation to be followed by group discussion (Interactive session)

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

PROFESSIONAL PRACTICE II

L	T	P	*Curri. Ref. No.: ECE 509*
0	0	2	

Total Contact hrs : 30
Theory: 0
Practical: 30
Credit: 1

Total Marks: 50

Theory: 0
End Exam: 0
P.A.: 0
Practical:
End Exam: Nil
P.A : 50

COURSE CONTENT

1. Guest Lecture
   Lectures by professional / Industrial expert to be organized.

2. Seminar/ short presentation.
   Students are to be assigned a topic from any subject being taught in the current term to do a self study and prepare a report of 10 pages and deliver a presentation of 10 mins in ppt.

3. Group discussion
   Presentation to be followed by group discussion (Interactive session)

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

PROFESSIONAL PRACTICE III

L	T	P	*Curri. Ref. No.: ECE 510*
0	0	3	

Total Contact hrs : **Total Marks: 50** **Theory: 0**
Theory: End Exam: 0
Practical:15 P.A.: 0
Credit: 2 **Practical:50**
End Exam: Nil
P.A : 50

COURSE CONTENT

1. Guest Lecture
   Lectures by professional /Industrial expert to be organized.

2. Seminar/ short presentation.
   Seminar topic should be related to subjects of fourth term. Each student shall submit a report of 10 pages and deliver a presentation of 10mins in ppt.

3. Mini projects/ Activities
   - Manufacture of PCB
   - Fabrication of circuits

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

PROFESSIONAL PRACTICE IV

L	T	P	*Curri. Ref. No.: ECE 511*
0	0	3	

Total Contact hrs : **Total Marks: 50** **Theory: 0**
Theory: End Exam: 0
Practical:15 P.A.: 0
Credit: 2 **Practical: 50**
End Exam: Nil
P.A : 50

COURSE CONTENT

1 Guest Lecture
Lectures by professional /Industrial expert to be organized. Students should submit a brief report on the lecture as part of term work.

2 Industrial visits.
Structured industrial visits to local industries and factories and report for the same should be submitted by individual students as part of term work.

3. **Group discussions**
Students in groups of 4/5 should discuss a specified topic and write a brief report on the same as part of term work. Topic of discussions may be selected by faculty members.

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

PROFESSIONAL PRACTICE V

L	T	P	*Curri. Ref. No.: ECE 512*
0	0	6	

Total Contact hrs : 90
Theory:
Practical:15
Credit: 3

Total Marks: 50

Theory: 0
End Exam: 0
P.A.: 0
Practical: 50
End Exam: Nil
P.A : 50

COURSE CONTENT

1. Industrial visits.
   Structured industrial visits to local industries and factories and report for the same should be submitted by individual students as part of term work.

2. Information search, data collection and report writing on the topic .
   A topic relating to upcoming technology in the respective field is chosen by the students/faculty. Students are required to form groups of 4/5 gather information and write a report on the same

3. Seminar/Presentation
   The above report is converted into a ppt presentation and a seminar is delivered by the group for about 30-40 mins.

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

Project

L	T	P	*Curri. Ref. No.: ECE 513*
0	0	8	

Total Contact hrs : 120 **Total Marks: 150** **Theory: 0**
Theory: End Exam: 0
Practical:120 P.A.: 0
Credit: 4 **Practical: 150**
End Exam: 0
P.A : 150

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

VLSI & EMBEDDED SYSTEM

L	T	P	*Curri. Ref. No.: ECE 601*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100** **Theory:**
Theory: 45 End Exam: 70
Practical: P.A.: 30
Credit: 3 **Practical:**
End Exam: Nil
P.A : Nil

RATIONALE :

The increasing number of available transistors on a diode has enabled the emergence of a new class of computing systems that can be included on a single chip multiple computing elements. The functionality of those computing elements can be configured or tailored to specific functions, in some cases even at run-time. Contemporary Field-Programmable Gate-Arrays (FPGAs) devices and modern Multi-Core Processors are extreme examples of this trend in the industry. Reconfiguration techniques are also seen as a way to mitigate, or even eliminate potential issues with reliability and intermittent faults in large VLSI systems. Learning this subject the students will get introduction on modern embedded systems.

AIM :

Upon completion of this course, the successful student will be able to explain

- VLSI Design Methodologies.
- Fabrication of MOSFETs.
- MOS Transistor
- MOS Inverters : Static Characteristics
- MOS Inverters : Switching Characteristics and Interconnect Effects
- Combinational MOS Logic Circuits
- Sequential MOS Logic Circuits
- Semiconductor Memories
- Concept of Embedded System
- Design for Testability

Detail Course Content:

Unit	Topic/Sub Topic	Hours
1.	**Introduction:**	3
	1.1 Historical Perspective	
	1.2 A Circuit Design Example	
	1.3 Overview of VLSI Design Methodologies	
	1.4 VLSI Design Flow	
	1.5 Design Hierarchy	
	1.6 Concepts of Regularity, Modularity and Locality	
	1.7 VLSI Design Styles	
	1.8 Design Quality	
	1.9 Packaging Technology	

2.	**Fabrication of MOSFETs** :	5
	2.1 Fabrication Process Flow : Basic Steps	
	2.2 Layout Design Rules	
3.	**MOS Transistor:**	5
	3.1 Structure and Operation of MOS Transistor (MOSFET)	
	3.2 MOSFET Current Voltage Characteristics (Formula only)	
	3.3 MOSFET Scaling and Small Geometry Effects	
	3.4 MOSFET Capacitances (Concept only)	
4.	**MOS Inverters : Static Characteristics :**	4
	4.1 Resistive – Load Inverter	
	4.2 Inverters with n-Type MOSFET Load	
	4.3 CMOS Inverter	
5.	**MOS Inverters : Switching Characteristics and Interconnect Effects**	4
	5.1 Delay - Time Definitions	
	5.2 Calculation of Delay Times	
	5.3 Estimation of Interconnect Parasitics	
	5.4 Calculation of Interconnect Delay (Elmore Delay only)	
6.	**Combinational MOS Logic Circuits** :	5
	6.1 MOS Logic Circuits with Depletion nMOS Loads (Circuit diagram only)	
	6.2 CMOS Logic Circuits (Circuit diagram only)	
	6.3 Complex Logic Circuits (Circuit diagram only)	
	6.4 CMOS Transmission Gates (Concept only)	
7.	**Sequential MOS Logic Circuits** :	4
	7.1 SR Latch circuit (Circuit diagram only)	
	7.2 Clocked Latch and Flip-Flop Circuit (Circuit diagram only)	
8.	**Semiconductor Memories** :	4
	8.1 Dynamic Random Access Memory (DRAM)	
	8.2 Static Random Access Memory (SRAM)	
	8.3 Flash Memory	
9.	**Concept of Embedded System** :	6
	9.1 Define Embedded System	
	9.2 Application of Embedded System	
	9.3 Concept of Y Chart in Embedded System Desing	
	9.4 Concept of Partitioning	
	9.5 Concept of Scheduling	
	9.6 Concept of Allocation	
	9.7 System on Clip (Concept only)	
10.	**Design for Testability** :	3
	9.1 Introduction	
	9.2 Fault Types and Models	
	9.3 Built-In Self Test (BIST) Techniques	

Class Test **2**

REFERENCE BOOKS:

1. CMOS Digital Integrated Circuits by Sung-Mo Kang and Yusuf Leblebici, TMH
2. Basic VLSI Design by D A Puckneli and K Eshraghian, Prentice Hall of India, New Delhi.
3. VLSI Technology by S M Sze, McGraw Hill International, NY, 1998. Principles of CMOS
4. VLSI Design: Analytical Perspective by Niel H E Weste and E Kamraw, Peason Asia.
5. An Embedded Software Primer by David E. Simon, Pearson Education Asia.
6. Basic VLSI Design Systems and Circuits by Douglas A. Pucknell, Prentice Hall of India.

CELLULAR TECHNOLOGY

L	T	P	*Curri. Ref. No.: ECE 602*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100**

Theory: 45
Practical:
Credit: 3

Theory:
End Exam: 70
P.A.: 30
Practical:
End Exam: Nil
P.A : Nil

RATIONALE :

The student is introduced to the basic concepts behind the frequency re-use technology used in cellular radio, Personal Communications Systems and Trunked private systems. This leads to a study of the details of the two most common cellular standards in use, AMPS and TDMA (or NADC). This course provides die background for the course in Personal Communications Systems, WLS709.

AIM :

Upon completion of this course, the successful student will be able to explain :

- The Cellular Concept – System Design Fundamentals
- Modern Wireless Communication Systems
- Mobile Radio Propagation : Small-Scale Fading and Multipath
- Wireless Systems and Standards
- Equalization, Diversity and Channel Coding
- Speech Coding
- Multiple Access Techniques for Wireless Communications

Detailed Course Contents

Unit	Topic / Sub Topic	Hours
1.	**The Cellular Concept – System Design Fundamentals**	**7**
	1.1 Introduction	
	1.2 Frequency Reuse	
	1.3 Channel Assignment Strategies	
	1.4 Handoff Strategies	
	1.5 Prioritizing Handoffs	
	1.6 Practical Handoff Considerations	
	1.7 Interference and System Capacity	
	1.8 Co-channel Interference and System Capacity	
	1.9 Channel Planning for Wireless Systems	
	1.10 Adjacent Channel Interference	
	1.11 Power Control for Reducing Interference	
	1.12 Improving coverage & Capacity in Cellular Systems	
	1.13 Cell Splitting	
	1.14 Sectoring	

1.15 Repeaters for Range Extension
1.16 A Microcell Zone Concept

2. Modern Wireless Communication Systems 5

2.1 Second Generation (2G) Cellular Networks
2.2 Evolution to 2.5G Wireless Networks
2.3 HSCSD for 2.5G GSM
2.4 GPRS for 2.5G GSM and IS-136
2.5 EDGE for 2.5G GSM and IS-136
2.6 IS- 95B for 2.5G CDMA
2.7 Third Generation (3G) Wireless Networks
2.8 3G W-CDMA (UMTS)
2.9 Bluetooth and Personal Area Networks (PANs), LAN, MAN, (Concept)

3. Mobile Radio Propagation : Small-Scale Fading and Multipath 7

3.1 Small-Scale Multipath Propagation
  3.1.1 Factors Influencing Small Scale Fading
  3.1.2 Doppler Shift
3.2 Impulse response model of a Multipath Channel
  3.2.1 Relationship Between Bandwidth and Received Power
3.3 Parameters of Mobile Multipath Channels
  3.3.1 Time Dispersion Parameters
  3.3.2 Coherence Bandwidth
  3.3.3 Doppler Spread and Coherence Time
3.4 Small-Scale Fading
  3.4.1 Fading Effects Due to Multipath Time Delay Spread
  3.4.2 Flat Fading
  3.4.3 Frequency Selective Fading
  3.4.4 Fading Effects Due to Doppler Spread
  3.4.5 Fast Fading
  3.4.6 Slow Fading

4. Wireless Systems and Standards 6

4.1 AMPS and Small-Scale Multipath Propagation
4.2 Global System for Mobile (GSM)
  4.2.1 GSM Services and Features
  4.2.2 GSM system Architecture
  4.2.3 GSM Radio Sub-system
  4.2.4 GSM Channel Types
  4.2.5 GSM Traffic channels (TCHs)
  4.2.6 GSM Control Channels (CCH)
4.3 CDMA Digital Cellular Standard (IS-95)
  4.4.1 Frequency and Channel Specification
  4.4.2 Forward CDMA Channel
  4.4.3 Reverse CDMA Channel

5. Equalization, Diversity and Channel Coding 6

5.1 Fundamentals of Equlization

5.2 Training a Generic Adaptive Equalizer
5.3 RAKE Receiver
5.4 Interleaving
5.5 Fundamentals of Channel coding
5.6 Block Codes and Finite Fields
5.7 Examples of Block Codes
5.8 Convolutional Codes
5.9 Decoding of Convolutional Codes
5.10 Viterbi Algorithm
5.11 Coding gain
5.12 Trellis Coded Modulation
5.13 Turbo Codes (Concept only)

6. Speech Coding **5**

6.1 Quantization Techniques
6.2 Uniform Quantization
6.3 Nonuniform Quantization
6.4 Adaptive Quantization
6.5 Adaptive Differential Pulse code Modulation (ADPCM)
6.6 Frequency domain Coding of Speech
6.7 Vocoders
6.8 Linear Predictive Coders

7. Multiple Access Techniques for Wireless Communications **7**

7.1 Introduction to Multiple Access
7.2 Frequency Division Multiple Access (FDMA)
7.3 Time Division Multiple Access (TDMA)
7.4 Spread Spectrum Multiple Access
7.5 Frequency Hopped Multiple Access (FHMA)
7.6 Code Division Multiple Access (CDMA)
7.7 Hybrid Spread Spectrum Techniques
7.8 Space Division Multiple Access (SDMA)
7.9 Packet Radio Protocols
7.10 Carrier Sense Multiple Access (CSMA) Protocols
7.11 Reservation Protocols
7.12 Capture effect in Packet Radio
7.13 Capacity of Cellular System
7.14 Capacity of Cellular CDMA
7.15 Capacity of CDMA with Multiple Cells
7.16 Capacity of Space Division Multiple Access

Class Test **2**

REFERENCE BOOKS :

1. Wireless Communications: Principles and Practice by Theodore S. Rappaport, Pearson
2. Wireless Communications and Networkings by Mak & Zhuang, TMH
3. Wireless Communications by Stallings, TMH

DIGITAL SIGNAL PROCESSING

L	T	P	*Curri. Ref. No.: ECE 603*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100**

Theory: 45
Practical:
Credit: 3

Theory:
End Exam: 70
P.A.: 30
Practical:
End Exam: Nil
P.A : Nil

RATIONALE:

Digital signal processing is a technology driven field which dates its growth when Computers and Digital Circuitry became fast enough to process large amount of data efficiently. This subject deals with processing discrete – time signal or data sequences and covers the background and fundamental materials on discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.

AIM :

Upon completion of this course, the successful student will be able to explain :

- Concept of Signal processing
- Signal
- Discrete-time Systems
- Frequency Analysis of Discrete time Signals
- Z – Transform
- Discrete Fourier Transform
- Fast Fourier Transform (FFT)
- Design of Digital Filters
- FIR Filter design
- Applications of Digital signal processing

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours

1. **Introduction** **4**
   - 1.1 Concept of Signal & Systems
   - 1.2 Concept of Signal processing
   - 1.3 Concept of Frequency domain Analysis of time Domain Signal : for continuous time & Discrete-time signal.

2. **Signal** **8**
   - 2.1 Definition and classification : Continuous, Discrete & Digital
   - 2.2 Elementary signals : Unit Step Signal, Impulse, Ramp & Sinusoidal Signal
   - 2.3 Representation of Discrete - time signals.
     - 2.3.1 Graphical representation

2.3.2. Tabular representation
2.3.3 Sequence representation
2.4 Classification of Discrete-time-signals
2.4.1 Energy & Power Signal
2.4.2 Causal & Non Causal Signal
2.5 Operations on signals.
2.5.1 Shifting
2.5.2 Time reversal
2.5.3 Time Scaling
2.5.4 Addition operation

3. **System** **5**
3.1 Definition, Classification of Discrete-time Systems
3.1.1 Static & Dynamic System
3.1.2 Causal & Non-Linear System
3.1.3 Time-variant & Time invariant system
3.2 Representation of Arbitrary Sequence : Convolution technique.

4. **Frequency Analysis of Discrete time Signals** **3**
4.1 Discrete – time Fourier Series
4.2 Discrete – time Fourier Transform.

5. **Z – Transform** **3**
5.1 Definition of Z-Transform and ROC (Region of Convergence)
5.2 Z-Transform Finite – Impulse Sequence & Infinite – Impulse Sequence.
5.3 Properties of Z-transform
5.4.1 Long division Method.
5.4.2 Partial fraction expansion method.
5.4.3 Convolution method.

6. **Discrete Fourier Transform** : (Concept & Formula only) **3**

7. **Fast Fourier Transform (FFT) :** Decimation-in-time algorithm
Decimation in Frequency algorithm **3**

8. **Design of Digital Filters.** **5**
8.1 IIR filter design techniques.
8.1.1 Butterworth Filter design
8.1.2 Chebysheve Filter design
8.2 Realization of Digital filters.
8.2.1 Direct form – I realization
8.2.2 Direct form – II realization

9. **FIR Filter design** 5
9.1 Rectangular window
9.2 Hanning window
9.3 Hamming window
9.4 Bartlett window

10 **Applications of Digital signal processing** **4**

11	**Class Test**	**2**

REFERENCE BOOKS :

1. A Practical Approach to Digital Signal Processing by K. Padmanabhan, S. Ananthi, R. Vijayarajeswaran, New Age International Publications.
2. Signals and Systems by M. J. Roberts, Tata McGraw-Hill.
3. Digital Signal Processing by Sanjit K Mitra, Tata McGraw-Hill.
4. Signal processing and Linear Systems by Lathi, B., Carmichael, CA, Berkley-Cambridge.
5. Linear Systems and Digital signal Processing by Young, T., Englewood Cliffs, NJ, Prentice Hall.

BIO MEDICAL INSTRUMENTATION

L	T	P	*Curri. Ref. No.: ECE 604*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100**

Theory: 45
Practical:
Credit: 3

Theory:
End Exam: 70
P.A.: 30
Practical:
End Exam: Nil
P.A : Nil

RATIONALE :

In order to work in the area of Bio Medical Instrumentation, students need to have basic knowledge about various systems of human body. Hence anatomy and physiology of some important systems are covered in brief in this subject along with electronic processing units of medical instruments. Most of the medical instruments incorporate transducers to convert biophysical parameters into electrical signals for electronic processing unit. The electronic processing unit mainly consists of signal conditional circuits, steady power supply and microprocessor-based control and measurement circuits. Therefore, this course is intended to develop understanding of various systems of human body and skills to use and troubleshoot basic electronic instruments used in the medical field.

AIM :

Upon completion of this course, the successful student will be able to explain :

- Radiology & Microscopy Instruments
- Ultrasound
- Microscopy
- Analytical & Laboratory Instruments
- I.C.U. / C.C.U. Systems
- Blood Pressure Measurement

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1.	**Radiology & Microscopy Instruments**	**10**
	1.1 Properties of X-ray – Production of X-ray – Types of X-ray machine photoelectric effect – Crompton effect.	
	1.2 Bremostrate lung X-ray tubes – High voltage power sources – Typical X-ray machine, care, maintenance and troubleshooting designs variations.	
	1.3 Scatter reductions – Image intensifiers – C.T. scan.	
	1.4 Endoscopy – Principal of operation and application.	
	1.5 MRI	
2.	**Ultrasound**	**6**
	Ultrasonic Pulse Echo techniques – Time Motion Ultrasonography.	
3.	**Microscopy**	**3**

Electron microscopy – Light microscope – Their comparison

4. Analytical & Laboratory Instruments **10**

4.1 Introduction & basic principles of PH meter.
4.2 Blood gas analysis – Densitometers – Electrophoresis.
4.3 Filter and flame photometers – Spectrometers.

5. I.C.U. / C.C.U. Systems **10**

5.1 Introduction – System configuration – System connection – Recording instrument – Alarm modules – Displaying.
5.2 Information and servicing considerations in control systems.
5.3 Strip chart recorder – Introduction recording technique.
5.4 PMMC Galvanometer – Electronic Recorder – Adjustment & typical faults – Servo recorders.
5.5 D.C. defibrillator – External pacemaker – ECG recording – Block diagram – Troubleshooting – Respiration measurement.
5.6 EEG recording.

6. Blood Pressure Measurement **6**

Principle of Blood Pressure meter – Direct and indirect measurement.

LIST OF EXPERIMENTS:

1. To study inverting and non-inverting amplifiers, and, to measure the gain.
2. To measure the CMRR, input impedance, output impedance, open loop gain, offset input current and bias current with op-amp.
3. To study the op-amp as — (i) waveform generator, and, (ii) instrumentation amplifier.
4. To measure and to study the characteristics of SMPS and UPS.
5. Blood pressure measurement by Direct and Indirect method.
6. To study D/A & A/D conversion, multiplexing A & D, memory mapped ADC multiplex.
7. To study the following features of an X-ray machine**:** Production, Characteristics, Exposure, Timing, X-ray plates and its developing.
8. To study the operations & control of an E.C.G. machine & to practice its troubleshooting.
9. To study the following features of an USG machine**:** Operation, Control, Troubleshooting and function of Camera.
10. To study the following features of a PH meter**:** Electrodes, Meter, Buffer Solution, Application; and, also to study the ways & means of its maintenance.
11. Blood SUGAR measurement by Colorometer.

REFERENCE BOOKS:

1. Handbook of Biomedical Instrumentation by R.S. Khandpur, Tata McGraw Hill
2. Handbook of Biomedical Instrumentation and Measurement by H.E. Thomas, Prentice Hall of India
3. Biomedical instrumentation and Measurement by L. Cromwell, F.J. Weibell & E.A. Peiffer, Prentice Hall of India
4. Electronics for Biomedical Personnel by E.J.B. Buckstein, Taraporewala
5. Biomedical Instrumentation / Can & Brown
6. X-ray techniques for students / M.O. Chasney
7. Recent Advances in Biomedical Engineering / Reddy

FIBRE OPTIC COMMUNICATION

L	T	P	*Curri. Ref. No.: ECE 605*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100**

Theory: 45
Practical:
Credit: 3

Theory:
End Exam: 70
P.A.: 30
Practical:
End Exam: Nil
P.A : Nil

RATIONALE :

Optical Fiber Communication Systems have moved very rapidly from research laboratory into commercial application. The optical fiber, lasers and photo detector were made possible communication at very high data rate over increasing long distances. In this course physics of light, light transmission in fibers, optical sources / detectors and optical communication is discussed in details.

AIM :

Upon completion of this course, the successful student will be able to explain :

- Physics
- Quantities
- Optical Transmitters
- Optical Detectors/Receivers
- Optical Components
- Optical Links
- Optical System
- Spectrum and Safety

Detailed Course Contents

Unit	Topic / Sub Topic	Hours
1.	**Physics**	**4**
	1.1 Linear and non-linear optics.	
	1.2 Reflection, Refraction, Refraction Index, Diffraction.	
	1.3 Snell's Law	
	1.4 Dispersion, Surface Fields, Evanescent Wave, Total Internal Reflection and Polarization.	
	1.5 Simple calculation involving Snell's Law Calculating wavelength & Frequency	
2.	**Quantities**	**4**
	2.1 Representation of photons as wave and particle, photon size, photon energy.	
	2.2 Characteristic Impedance in free space and photon speed.	
	2.3 Photon energy-carrier, Radiant flux, Radiant Intensity, Solid Angle, Numerical	
	2.4 Aperture.	
3.	**Optical Transmitters**	**5**

3.1 Principles of Light Radiation
3.2 Population Inversion
3.3 Stimulated Radiation
3.4 Light Sources radiation Characteristics
3.5 LEDS
3.6 LASER fundamentals
3.7 LASER diodes
3.8 Transmitter Circuits

4. Optical Detectors/Receivers **5**

4.1 Principles of light Detection
4.2 light Detectors
4.3 PIN Detectors
4.4 APD Detectors
4.5 Receiver Circuits.

5. Optical Components **7**

5.1 Optical Waveguides
5.2 Characteristics and Construction of SM, MMSI and MMGI Fibers
5.3 Propagation Modes
5.4 Numerical Aperture, Acceptance cone, Launching of light attenuation and Dispersion Characteristics VS Wavelength
5.5 Connectors and Surface inspection
5.6 Optical Couplers, Grin Lenses, Optical Stitches

6. Optical Links **6**

6.1 Principles of Wave Division Multiplexing and DWDM
6.2 Examples of WDM System using Grin Lens
6.3 WDM Demultiplexing
6.4 Fibre optic links
6.5 Fibre BW, Bit Rate, Fibre Loss, BW-Length Product, Power Ratings,
6.6 Optical Noise, Interference.

7. Optical System **5**

7.1 Typical fibre Optic Communication System Using TDM and WDM

8. Spectrum and Safety **7**

8.1 Spectrum of optical and quasi-optical electromagnetic waves.
8.2 The common wave lengths used in fibre opucs-850rim, 133 Onrn and 155 Onm.
8.3 Optical LED and LASER safety.
8.4 Maximum exposure limits.

Class Test **2**

REFERENCE BOOKS :

1. Fiber optics and optoelectronics by K. Hare, Oxford
2. Introduction to Optical Fiber Communications Systems by William B. Jones, Jr., OUP USA
3. Optical Fiber Communications Principles and Practice by John M. Senior, PHI
4. Fibre Optic Systems for Telecommunications by Roger L. Freeman, Willey

BROAD BAND COMMUNICATION

L	T	P	*Curri. Ref. No.: ECE 606*
3	0	0	

Total Contact hrs : 45 **Total Marks: 100** **Theory:**
Theory: 45 End Exam: 70
Practical: P.A.: 30
Credit: 3 **Practical:**
End Exam: Nil
P.A : Nil

RATIONALE:

Learners in this course are provided with a working knowledge of the architectures, protocols & frame transport mechanisms of Broadband ISDN, SONET, FRAME RELAY and ATM technologies employed in LAN, WAN, and Wireless internetworking System.

AIM:

Upon completion of this course, the successful student will be able to explain:

- ISDN basic and primary rate service, ISDN layers.
- Frame Relay Technology.
- SONET Topology and SONET Layers, Various SONET Equipment
- ATM TECHNOLOGY
- Mapping of ATM cells over a SONET envelope

Detailed Course Contents

Unit	Topic / Sub Topic	Hours
1.	**Integrated Services Digital Network (ISDN)**	**12**
	1.1 ISDN Basic Rate And Primary Rate service	
	1.2 ISDN Functional groupings and interface points	
	1.3 ISDN ; ISDN Layers	
	1.4 ISDN FRAMES	
	1.5 ISDN Encoding over S/T Interface	
	1.6 ISDN Protocols	
2.	**Frame Relay**	**10**
	2.1 FR Technology Comparison with X-25 and T-Caxrier System	
	2.2 FR Services, FR Layers, PVC and SVC, FR Frames, FR Protocols	
	2.3 FR Network Capacity Management, FR Equipment,	
	2.4 Encapsulating LAN Data in a FR Frame, Cost Comparison with T-Carrier	
3.	**Synchronous Optical Network (SONET)**	**11**
	3.1 SONET Rates, SONET Topology, SONET Layers, SONET Architecture	
	3.1 SONET Equipment, SONET Protocol, SONET Transmission System	
	3.2 SONET STS-1 FRAME, STS-3, STS-3c, SONET Signal Hierarchy	
	3.3 SONET OH, VIRTUAL TRIBUTARIES, Payload pointers	
	3.4 Mapping sub STS payloads into SONET Envelope, Mapping ATM Cells	

4. Asynchronous Transfer Mode (ATM) 10

4.1 ATM Standards and application, ATM Architecture, ATM Layers

4.2 ATM Sub Layers, ATM interface, ATM Services, ATM connections, (VPL, VCL)

4.3 ATM Protocols, AALI, AAL2, AAL3, AAL4, AAL5

4.4 ATM CELL, ATM internetworking, ATM Vendors and ATM equipment.

Class Test **2**

Reference :

1. Broad Band Communication by Balaji Kumar, McGraw Hill
2. Fixed BroadBand Wireless Communicating Principles and Practical Applications by Douglas Morai.
3. Providing Broad band Network by Marlyn Mempher Litma
4. Broad Planar Antennas Design & Applications by Zhi Hing chen, Michael Yan Wah Chaia.