PART-II
(3rd & 4th Sem.)

REVISED CURRICULUM OF

ELECTRONICS & COMMUNICATION ENGINEERING DIPLOMA PROGRAMME

IN

MULTI POINT ENTRY & CREDIT SYSTEM

For the State of Nagaland

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

C O N T E N T S

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1.	Structure of the curriculum system	
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Scheme of Studies and Evaluation (MPECS) for Electronics and Communication Engineering

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*	Attendance		Sessional	Viva		
1	G101	Communication Skill-I		2	0	2	75	10	10	5	-	25	-	125	3
2	G102	Communication Skill-II	G101	2	0	2	75	10	10	5	-	25	-	125	3
3	G103	Mathematics-I		3	1	0	75	10	10	5	-	-	-	100	4
4	G104	Mathematics-II	G103	3	1	0	75	10	10	5	-	-	-	100	4
5	G105	Applied Mathematics	G103 G104	3	1	0	75	10	10	5	-	-	-	100	4
6	G106	Physics –I		3	0	2	75	10	10	5	25	25	-	150	4
7	G107	Physics-II	G106	3	0	2	75	10	10	5	25	25	-	150	4
8	G108	Chemistry – I		2	0	2	75	10	10	5	25	25	-	150	3
9	G109	Chemistry – II	G108	2	0	2	75	10	10	5	25	25	-	150	3
TOTAL				**23**	**3**	**12**	**675**	**90**	**90**	**45**	**100**	**150**	**0**	**1150**	**32**

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	Attendance		Sessional	Viva		
10	G201	Engineering Drawing-I		1	0	4	-	-	-	-	25	25	-	50	3
11	G202	Engineering Drawing-II	G201	1	0	4	-	-	-	-	25	25	-	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	4	50	0	0	0	25	50	-	125	4
	G205B	Introduction to Computer Programming													
15	G206A	Engineering Mechanics		3	0	2	75	10	10	5	25	25	-	150	4
	G206B**	C-Programming		2	0	4	50	0	0	0	50	50	-	150	4
16	G207	Fundamentals of Electrical and Electronics Engineering		3	0	2	75	10	10	5	25	25	-	150	4
TOTAL				**10**	**0**	**24**	**200**	**20**	**20**	**10**	**125**	**200**	**50**	**625**	**22**

*G205A and G206B for IT, CSE and CPE only

3. SOFT CORE COURSES: ***(301 and 302 are compulsory and 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	Attend ance		Session al	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	75	10	10	5	-	-	-	100	3
	G304	Entrepreneurship Development		3	0	0	75	10	10	5	-	-	-	100	3
	G305	Principles of Management		3	0	0	75	10	10	5	-	-	-	100	3
	G306	Organizational Behaviour		3	0	0	75	10	10	5	-	-	-	100	3
	G307	Environmental Education		3	0	0	75	10	10	5	-	-	-	100	3
TOTAL				**8**	**0**	**4**	**150**	**50**	**50**	**25**	**-**	**50**	**50**	**300**	**10**

4: Basic Technology Courses

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme								
			Pre-req.	L	T	P	Theory Marks				Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva		
1	ECE401	Circuits & Networks		3	0	2	75	10	10	5	25	25	-	150	4
2	ECE402	Electronics devices and Circuits –I		3	0	2	75	10	10	5	25	25	-	150	4
3	ECE403	Digital Electronics		3	0	2	75	10	10	5	25	25	-	150	4
4	ECE404	Electronic Measurement & Instrumentations		3	0	2	75	10	10	5	25	25	-	150	4
5	ECE405	Communication Engg - I		3	1	2	75	*10*	10	*5*	25	25	-	150	5
6	ECE406	Electronics Devices and Circuits II		3	0	2	75	10	10	5	25	25	-	150	4
7	ECE407	Communication Engg - II		3	1	2	75	10	10	5	25	25	-	150	5
8	ECE408	Electronic Workshop Practice		0	0	4	0	-	-	-	25	25	-	50	2
9	ECE409	Electrical Machines and Measurement		3	1	2	75	*10*	10	*5*	25	25	-	150	5
10	ECE410	Power Electronics		3	1	0	75	10	10	5	25	25	-	100	4
11	ECE411	Control System		3	1	2	75	10	10	5	25	25	-	150	5
				30	**5**	**22**	**750**	**100**	**100**	**50**	**275**	**275**	**-**	**1500**	**46**

5: Applied Technology Courses

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme								
			Pre-req.	L	T	P	Theory Marks				Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assign ment	Atten Dance		Session al	Viva		
12	ECE501	Microprocessors		3	1	2	75	10	10	5	25	25	-	150	5
13	ECE502	Microcontrollers		3	1	2	75	10	10	5	25	25	-	150	5
14	ECE503	Testing and maintanence of Electronic Equipment		0	2	2	0	-	-	-	25	25	-	50	3
15	ECE504	Fibre optics		3	1	0	75	10	10	5	0	0	-	100	4
16	ECE505	Data communication and computer network		3	1	2	75	10	10	5	25	25	-	150	5
17	ECE506	Consumer Electronics		0	2	4	0	0	0	0	25	50	-	75	4
18	ECE507	CAD for Electronics Circuit		1	0	4	0	0	0	0	25	25	-	50	3
19	ECE508	PCB Design		0	0	4	0	0	0	0	25	25	-	50	2
20	ECE509	Project Work		0	0	10	0	0	0	0	0	50	50	100	5
21	ECE510	Professional Practice –I		0	0	2	0	0	0	0	0	50	-	50	1
22	ECE511	Professsional Practice –II		0	0	2	0	0	0	0	0	50	-	50	1
23	ECE512	Pfrofessional Practice –III		0	0	2	0	0	0	0	0	50	-	50	1
24	ECE513	Professional Practice –IV		0	0	2	0	0	0	0	0	50	-	50	1
25	ECE514	Professional Practice -V		0	0	4	0	0	0	0	0	50	-	50	2
		Total		**13**	**8**	**42**	**300**	**40**	**40**	**20**	**175**	**500**	**50**	**1125**	**42**

Level: 6 – Specialised Courses (any two)

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme								
			Pre-req.	L	T	P	Theory Marks				Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assign ment	Atten dance		Sessional	Viva		
26 & 27	ECE601	Multimedia Technology		3	0	2	75	10	10	5	25	25	-	150	4
	ECE602	Computer hardware and maintenance		3	0	2	75	10	10	5	25	25	-	150	4
	ECE603	Microwave		3	0	2	75	10	10	5	25	25	-	150	4
	ECE604	VLSI & Embedded System		3	0	2	75	10	10	5	25	25	-	150	4
	ECE605	Digital Signal Processing		3	0	2	75	10	10	5	25	25	-	150	4
	ECE606	Cellular Technology		3	0	2	75	10	10	5	25	25	-	150	4
	Total			**6**	**0**	**4**	**150**	**30**	**20**	**10**	**50**	**50**	**-**	**300**	**8**

Sl.no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L	T	P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment		Sessional	Viva		
28	IBT – 01	Industrial Training of three weeks, preferably in two phases (after acquiring 100 credits)				20				200			200	10
	Total									**200**			**200**	**10**

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	G101	Communication Skill-I		2	0	2	75	10	10	5	-	25	-	125	3
2	G103	Mathematics-I		3	1	0	75	10	10	5	-	-	-	100	4
3	G106	Physics – I		3	0	2	75	10	10	5	25	25	-	150	4
4	G108	Chemistry – I		2	0	2	75	10	10	5	25	25	-	150	3
5	G201	Engineering Drawing – I		1	0	4	-	-	-	-	25	25	-	50	3
6	G203	Workshop Practice – I		0	0	4	-	-	-	-	-	25	25	50	2
7	*G205A / G205B	Introduction to Information Technology /Computer Programming		2	0	4	50	0	0	0	25	50	-	125	4
TOTAL				13	1	18	350	40	40	20	100	175	25	750	23

*G205A is for CSE, IT and CPE

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	G102	Communication Skill-II	G101	2	0	2	75	10	10	5	-	25	-	125	3
2	G104	Mathematics-II	G103	3	1	0	75	10	10	5	-	-	-	100	4
3	G107	Physics – II	G106	3	0	2	75	10	10	5	25	25	-	150	4
4	G109	Chemistry – II	G108	2	0	2	75	10	10	5	25	25	-	150	3
5	G202	Engineering Drawing – I I	G201	1	0	4	-	-	-	-	25	25	-	50	3
6	G204	Workshop Practice – II	G203	0	0	4	-	-	-	-	-	25	25	50	2
7	G206A	Engineering Mechanics	G106 & G107	3	0	2	75	10	10	5	0	50	-	150	4
	*G206B	C-Programming	G205B	2	0	4	50	0	0	0	50	50	-	150	4
8	G301	Development of Life Skill-I		1	0	2	-	-	-	-	-	25	25	50	2
9		Professional Practices – I#		0	0	2	-	-	-	-	-	50	-	50	1
TOTAL				15/14	1	20/22	375/350	50	50	25/20	75/125	250	50	875	26

*For CSE, IT and CPE
#Applied Technology course

SAMPLE PATH : TERM – III

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L	T	P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
1.	ECE401	Circuits & Networks		3	0	2	75	10	15	25	25	-	150	4
2.	ECE402	Electronics devices and Circuits –I		3	0	2	75	10	15	25	25	-	150	4
3	ECE404	Digital Electronics		3	0	2	75	10	15	25	25	-	150	4
4	ECE405	Electronic Measurement & Instrumentations		3	0	2	75	10	15	25	25	-	150	4
5	ECE406	Communication Engg - I		3	1	2	75	10	15	25	25	-	150	5
6	ECE511	Professional Practice -II				2					50	-	50	1
7	G207	Fundamental of Electrical and Electronics Engg		3	0	2	75	10	15	25	25	-	150	4
8	G302	Development of life skills –II		1	0	2	-	-	-	-	25	25	50	2
	Total			**19**	**1**	**16**	**450**	**60**	**90**	**150**	**225**	**25**	**1000**	**28**

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

SAMPLE PATH : TERM-IV

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

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L	T	P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
1.	ECE403	Electronics Devices and Circuits II		3	0	2	75	10	15	25	25	-	150	4
2.	ECE407	Communication Engg - II		3	1	2	75	10	15	25	25	-	150	5
3	ECE501	Microprocessors		3	1	2	75	10	15	25	25	-	150	5
4	ECE408	Electronic Workshop Practice		0	0	4	0	0	0	25	25	-	50	2
5	ECE409	Electrical Machines and Measurement		3	1	2	75	10	15	25	25	-	150	5
6	ECE508	PCB Design		0	0	4	0	0	0	25	25	-	50	2
7	ECE512	Professional Practice -III		0	0	2	0	0	0	0	50	-	50	1
8.	G105	Applied Mathematics		3	1	0	75	10	15			-	100	4
9.	G303-G307	Soft Core –I		3	0	0	75	10	15	0	0	-	100	3
	Total			**18**	**4**	**18**	**450**	**60**	**90**	**150**	**200**	**-**	**950**	**31**

SAMPLE PATH: TERM-V

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

Sl.no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L	T	P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment *		Sessional	Viva		
1.	ECE502	Microcontrollers		3	1	2	75	10	15	25	25	-	150	5
2.	ECE410	Power Electronics		3	1	0	75	10	15	0	0	-	100	4
3	ECE411	Control System		3	1	2	75	10	15	25	25	-	150	5
4	ECE503	Testing and Maintanence of Electronic Equipment		0	2	2	0	0	0	25	25	-	50	3
5	ECE513	Professsional Practice - IV		0	0	2	0	0	0	0	50	-	50	1
6	ECE505	Data communication and Computer Network		3	1	2	75	10	15	25	25	-	150	5
7	ECE504	Fibre optics		3	1	0	75	10	15	0	0	-	100	4
8.	ECE507	CAD for Electronics Circuit		1	0	4	0	0	0	25	25	-	50	3
	Total			**16**	**7**	**14**	**375**	**50**	**75**	**125**	**275**	**-**	**800**	**30**

SAMPLE PATH: TERM-VI

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

Sl. no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L		P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment*		Sessional	Viva		
1.	ECE506	Consumer Electronics (Specialized course)		0	2	4	0	0	0	25	50	-	75	4
2.	ECE601	Multimedia Technology (Specialized course)		3	0	2	75	10	15	25	25	-	150	4
3.	ECE602	Computer hardware and maintenance		3	0	2	75	10	15	25	25	-	150	4
4.	ECE509	Project Work		0	0	10	0	0	0	0	50	50	100	5
5	ECE514	Professional Practice -V		0	0	4	0	0	0	0	50	-	50	2
6.	G303-G307	Soft Core –II		3	0	0	75	10	15	0	0	-	100	3
	Total			**9**	**2**	**22**	**225**	**30**	**45**	**75**	**200**	**50**	**625**	**22**

Sl.no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							
			Pre-req.	L	T	P	Theory Marks			Pract. Marks			Total Marks	Credits
							End Exam	Progressive Assessment		End Exam	Progressive Assessment			
								Class Test	Assignment		Sessional	Viva		
28	IBT – 01	Industrial Training of three weeks, preferably in two phases (after acquiring 100 credits)				20				200			200	10
	Total									**200**			**200**	**10**

CIRCUITS & NETWORKS

L	T	P		Curri. Ref. No.: ECE401	
3	0	2			
Total Contact Hours		**: 75 Hrs**		**Theory**	
Theory		: 45 Hrs	**Total Marks: 150**	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		**:**		**Practical**	
				End Term Exam	: 25
Credit		**: 4**		Progressive Assessment	: 25

RATIONALE:

The concept of electrical Circuit is very essential for the study of the other subjects in Electrical Engineering. This subject covers the basic electrical principles both on d.c. and a.c. circuits. Analysis of series and parallel circuits have also been covered.

DETAILED COURSE CONTENT:

Unit/ Module	Topic/Subtopic	Hours
1	**Over view of circuits and networks** 1.1 Electric Circuit Elements R,L,C 1.2 Energy Sources 1.3 Relation of R,L,C in series parallel in DC supply	**4**
2.	**Alternating Current Supply** 2.1 Sinusoidal A.C voltage generation 2.2 Definitions of various terms used in circuits and networks: amplitude, frequency, time period, RMS value, Average value, form factor and peak factor	**5**
3.	**Network Theorems** 3.1 Superposition theorem 3.2 Thevenin's theorem 3.3 Norton's theorem 3.4 Maximum power transfer theorem	**6**
4.	**Single phase AC circuit** 4.1 Response of basic R, L and C elements to a sinusoidal voltage and current 4.2 Average power. Apparent power, reactive power and power facto 4.3 Complex numbers – Rectangular and polar form and conversion between forms 4.4 Phasor Diagram	**8**

5.	**3-ϕ A.C. circuit** 5.1 3-ϕ generation 5.2 Phase sequences 5.3 Y and Δ connected generator 5.4 Star-Delta transformation 5.5 Balanced three phase supply with Y connected loads 5.6 Balanced three phase supply with Δ connected loads **5.7** Unbalanced three phase supply with Y connected loads	**8**
6.	**Analysis of Series and Parallel Circuits in AC supply** 6.1 Series – parallel circuits (voltage, current, power & P.F.) 6.2 Equivalent circuits 6.3 Effective resistance 6.4 Series a.c. circuits – Impedance and phasor diagram, series resonance, quality factor 6.5 Parallel a.c. circuits- admittance and susceptance, phasor diagram, parallel resonance, quality factor	**8**
7.	**Analysis of A.C. Networks** 7.1 Source conversion 7.2 Mesh analysis 7.3 Nodal analysis	**6**

List of Experiments

1. To observe A.C. waveform on C.R.O and to calculate average and R.M.S. Values, frequency, Time Periods.
2. To verify Kirchhoff's law in DC circuit
3. To verify Thevenin's theorem in DC and AC circuit
4. To verify superposition theoremin DC and AC circuit
5. To verify Norton's Theoremin DC and AC circuit
6. To verify Maximum Power Transfer theorem in DC and AC circuit
7. To measure Resistor, Inductor and Capacitor using voltmeter and ammeter and plot the V-I Characteristics.
8. To measure the voltage and current in RLC series circuit and plot the phasor diagram
9. To determine the resonance frequency and Q-factor in a series LC circuit
10. To determine the resonance frequency and Q-factor in a parallel LC circuit

REFERENCES

Sl. No.	Title	Author/ Publisher/Edition/Year
1	Circuit theory Analysis and Synthesis	Chakrabarti: Dhanpat Rai Publishing
2	Schaum's Solved Problems in Electric Circuits – Book 1	Nasar, Syed ; McGraw-Hill, New York, latest
3	Schaum's Solved Problems in Electric Circuits - Book 2	Nasar, Syed ; McGraw-Hill, New York, latest
4	Introduction to electric circuits & machines	Pai, M.A., Affiliated East-West Press, New Delhi
5	Circuit & Networks: analysis & synthesis	Sudhakar, Tata McGraw Hill, New Delhi,

Electronic Devices and Circuits-I

L	T	P		Curri. Ref. No.: ECE402	
3	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		:		Practical	
				End Term Exam	: 25
Credit		: 4		Progressive Assessment	: 25

RATIONALE:

Electronics Engineering cannot stand alone without the study of Electronic Devices & Circuits. The modern Electrical Equipment 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.

DETAILED COURSE CONTENTS

Unit/ Module	Topic/Subtopic	Hours
1.	**Semiconductor Diodes** 1.1 Semiconductor Physics 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 Volt amps, characteristics of diode 1.2.2 Property of ideal diode 1.2.3 Resistance of diode & the method of measurements 1.2.4 Practical diode 1.2.5. Important specifications of semiconductor diode 1.2.6. Half wave and full wave rectifier circuits 1.2.7. Efficiency of rectifier circuit 1.3 Special purpose diodes 1.3.1 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.	10
2	**Transistor** 2.1 Construction of transistor 2.2 Working principle of transistor 2.3 Types of transistor	15

	2.4 Characteristics of transistor and method of drawing characteristics curves 2.5 Amplifying characteristics in (a) common base (b) common emitter (c) common collector configuration 2.7 Definition of (a) current amplification factor (b) collector current (c) emitter current (d) leakage current (e) input resistance (f) output resistance (g) base current amplification factor 2.8 Relation between α and β 2.9 Method of drawing the (a) input characteristics curve (b) output characteristics curve 2.10 Comparison of characteristics of three different configurations e.g. CB, CE, CC 2.11 Load line of a transistor (both for dc & ac) 2.14 Transistor biasing and essential requirement of a transistor Biasing circuit. 2.15 Function of a small single stage amplifier, and calculation of voltage and power gain. 2.16 Classification of Amplifiers. 2.17 Multistage amplifiers and different type of coupling. 2.18 Feedback amplifier (concept of feedback, gain in feedback, advantage & disadvantage in feedback amplifiers).	
3	**Pulse Waveforms and RC networks.** 3.1 RC charging, discharging and calculations and RC frequency response. 3.2 Ideal and actual rectangular waveforms with respect to rise time, fall time, duty cycle, tilt & average value.	**8**
4	**Sinusoidal Oscillators:** 4.1 Type of Electronic Oscillators 4.2 Damped and un-damped oscillations 4.3 Conditions of oscillation 4.4 Different types of oscillators like Hartley, Colpitt, Phase-shift, Wein Bridge and Crystal oscillators and their application.	**10**
5	**Wave Shaping Circuits:** 5.1 Working of Diode clipping and Diode Clamping Circuits.	**2**

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.

REFERENCES:

Sl. No.	Title	Author/ Publisher/Edition/Year
1.	Basic Electronics	S. K. Mandal, Mc Graw Hill Education
2.	Electronic Principles	Sahdev, Dhanpat Rai & Sons
3.	Electronic Devices and circuits	Mothershead, TMH
4.	Electronic Devices	Floyd
5.	Electronic Principles	Malvino, TMH
6	Electronics Fundamentals and Applications	D. Chottopadhyay and Rakshit.
7	Electronics Devices	G. K. Mithal.
8	Electronics Devices & Circuit theory	Robert Boyelstad.

Digital Electronics

L	T	P		Curri. Ref. No.: ECE404	
3	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		:		Practical	
				End Term Exam	: 25
Credit		: 4		Progressive Assessment	: 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 their 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.

DETAILED COURSE CONTENT

Unit/ Module	Topic/Subtopic	Hours
1.	Number system, Radix conversion and Binary Codes 1.1 Definition (a) binary (b) bit (c) base or radix (d) Numeric coding 1.2 Generalised equation for the conversion of a number from other systems to the decimal systems 1.3 Conversion of a number from other systems to the decimal system by using the generalized equation 1.4 Conversion (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 Classification of the numeric codes 1.6 Definition of (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 correctingcode (m)learning code (n) alphanumeric code (o) display code (p) seven segment display (q) dot matrix display 1.7 Performing i) Binary addition ii) Binary subtraction	**6**

	iii) Binary multiplication iv) Binary division 1.8 Performing 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** 2.1 Description of (a) switching circuits (b) Logic gates (c) Symbols for logic gates (d) truth table for different type of gates 2.2 Realization of exclusive-OR in terms of basic building blocks 2.3 Universal building blocks and realization of basic logic gates in terms of universal logic gates 2.7 Boolean Algebra for the verification of De-Morgan's theorem and other Boolean Functions 2.8 Description of (a) sum of product (b) NAND gate realization (c) Product of Sum (d) NOR gate realization 2.9 Definition of (a) Minterm (b) Maxterm 2.10 Use of Karnaugh Map for simplification of Boolean equation (Karnaugh map utilizing Minterms and Maxterms)	**8**
3.	**Combinational and arithmetic Logic Circuits** 3.1 Development of (a) Half Adder (b) Full Adder (c) Binary parallel Adder (d) Subtractor (e) Full & half subtractor (f) Adder / Subtractor in 1'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 Development of (a) comparators (b) Encoder (c) decoder, (d) multiplexing (e) demultiplexing (f) priority encoder (g) BCD to seven segment display decoder 3.3 Application of above circuit	**8**
4.	**Sequential Circuits** 4.1 Development of (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 Application of the above circuits 4.3 Development of 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	**8**
5.	**Shift Register** 5.1 Development of (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 Connection diagram and application of IC Shift	**5**

	Registers.	
6.	**Digital Memories** 6.1 Functions and applications of Digital memories like (a) RAM (b) ROM (c) PROM (d) PLA (e) FIFO	**3**
7.	**DA and AD converter** 7.1 Explanation of working principles of a) D/A Converter with binary weighted register b) D/A converter with R and 2 R resistors 7.2 Description of a practical circuit for using D/A converter in instrumentation and control circuit 7.3 Working principle of a) Successive approximation A/D converters c) Single and dual slope integration ADC e) Parallel type ADC 7.4 Practical circuit for using ADC in instrumentation and control circuit	**7**

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 :

Sl. No.	Title	Author/ Publisher/Edition/Year
1.	Digital Electronics Principles and Applications	S. K. Mandal, Mc Graw Hill Education
2.	Digital Electronics and Microcomputers	R.K.Gaur, DhanpatRai
3.	Fundamental Engineering	Lionard S. Bobrow, Oxford
4.	Digital Principles and application	Malvino& Leach, TMH
5.	Elements of Computer Science	S. Srinivasan, New Central Book Agency Pvt Ltd

L	T	P		Curri. Ref. No.: ECE405	
3	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		:		Practical	
				End Term Exam	: 25
Credit		: 4		Progressive Assessment	: 25

Electronics Measurement and Instrumentations

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.

Detailed Course Contents

Unit/ Module	Topic/Subtopic	Hours
1.	**Measurement Fundamentals** 1.1 Explanation of accuracy, precision, sensitivity, resolution, dynamic range, response and repeatability of measuring instruments. 1.2 Role of Units in measurements and different types of units, Type of errors, Definition of Primary and Secondary Standards, Concept of Calibration	**10**
2.	**Electronic Voltmeter & Multi Meter** 2.1 Advantages of electronic voltmeter over ordinary voltmeter. 2.2 Working principle of Digital Multi Meter – Different types of DMM: Integration and successive approximation type. 2.3 Advantages of DMM over Conventional Multi Meter	**10**
3.	**Measurement with CRO:** 3.1 Dual Trace Oscilloscope : Working Principle; Uses of Oscilloscope for frequency response measurement; 3.2 Digital Storage Oscilloscope : Working Principle; uses in the field of Transient responses. 3.3 X-Y Display Unit: Working Principle; Uses as phase measurement	**15**
4.	**Frequency Measurement:**	**10**

	1.1 Comparison method; Capacitor charge discharge method; 1.2 Pulse counting Method by Digital frequency meter; 1.3 Detail study of digital frequency meter.	
5.	**Phase Shift Measurement:** 5.1 Oscilloscopic Method 5.2 Null balance method 5.3 Phase shift to pulse conversion method 5.4 Phase shift measurement by pulse counting 5.5 Phase shift measurement by Intermediate Frequency (IF) method 5.6 Study of phase shifters	**15**
6.	**Power Measurement:** 6.1 Basic power measurement method 6.2 Power measurement method by terminating (absorption) method 6.3 Feed-through power measurement 6.4 Low-level power measurement	**8**
7.	**Signal Conditioning and Data Acquisition System (DAS)** 7.1 Need of signal acquisition circuit with measuring sensor. 7.2 Use of Op amp as inverting, non inverting, summing, integrator, differentiator as signal conditioning circuit after measuring sensor. 7.3 Instrumentation amplifier design, characteristics and application. 7.4 Introduction to DAS 7.5 Block diagram of multichannel DAS. 7.6 Application of DAS.	**7**

List of Experiments **25**

(1) Use (a) 3½ Digit (b) 3¾ Digit (c) 4 4/5 Digit Digital Multimeter for the measurement of (1) Current (2) Voltage [AC (RMS); DC (Average)] (3) Resistance (4) Inductance (5) Capacitance (6) frequency (7) Diode check

(2) Use of Single/ Dual trace Oscilloscope for the measurement of (a) Voltage (b) Current (c) time period (d) phase difference (e) Comparing of the two waves in respect of magnitude, phase and frequency.

(3) Use digital storage Oscilloscope for the measurement of (a) Voltage current (b) time period (c) Phase difference (d) Comparing of two waves in respect of magnitude, phase and frequency.

(4) Use X-Y display unit for (a) comparing two frequencies (b) demonstration of lysleristicsloop

(5) Measurement of low resistance by Kelvin's Double Bridge

(6) Measurement of inductance by Maxwell's Bridge and Comparing of the value by measuring it with Commercial Digital R-L-C bridge and 3¾ Digital Multimeter.

(7) Measurement of capacitance by Wien Bridge and Comparing of the value from those of commercial Digital R-L-C bridge and 3¾ Digit Digital Multimeter.

(8) Measurement of frequency by Reed type frequency meter and Comparing of the value from the value measured by Digital Frequency meter.

(9) Study electronic Power measurement circuit by power integration method.

(10) Measurement of (High frequency /RF range) Power by Bolometer.

REFERENCES:

Sl. No.	Title	Author/ Publisher/Edition/Year
1.	Handbook of measurement Science. Volume I. Theoretical Fundamentals,	P.H. Sydenham (Ed.), John Wiley and Sons.
2.	Handbook of measurement Science. Volume II. Practical. Fundamentals,	P.H. Sydenh.am (Ed.), John Wiley and Sons, 1983.
3.	Grounding and Shielding Techniques,	R. Morrison, John Wiley and Sons
4.	Measurement Systems, Application and Design,	E. O. Doebelin, McGraw-Hill.
5.	Handbook of transducers,	H. N. Norton, Prentice Hall.
6.	Intelligent Instrumentation	George c. Barney (PHI)
7.	Electronic Instrumentation	H.S. Kalsi (TMH)
8.	Principles of Industrial Instrumentation	D. Patranabis (TMH)

COMMUNICATION ENGINEERING-I

L	T	P		Curri. Ref. No.: ECE406	
3	1	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		:		Practical	
				End Term Exam	: 25
Credit		: 5		Progressive Assessment	: 25

Rationale:

A human being cannot live without any mode of communication. Whatever may be the media used for communication the principle is same; it transfers one form of information from one point to other point or many points. Previously, it was a wired communication where telegraphy and telephony information was recorded whether in written form or orally. Now emphasis is given to the wireless communication with multipoint communications and speed of operation, channel sharing, long distance communication features are important. Electronics communication system deals with various modes of communication.
Concepts such as modulation, side band transmission, radiation and propagation, reception and demodulation, which are widely used in the field of analog & digital communication, is dealt in this course.

Detailed Course Contents

Unit/ Module	Topic/Subtopic	Hours
1.	**Communication Fundamentals** 1.1 Transmitter, Receiver, Channel 1.2 Line of sight distance 1.3 Noise distortions 1.4 Gain – frequency plot and its importance	**4**
2.	**Modulation Techniques** 2.1 Need & nature of modulation 2.2 Modulation types: AM, FM, PM 2.3 Modulation index 2.4 Sidebands 2.5 Power contents 2.6 Bandwidth and noise consideration	**5**
3.	**Amplitude Modulation** 3.1 Concept & Need of Modulation 3.2 Types of RF signal Modulation techniques 3.3 Definition, Representation, Modulation Index, Frequency Spectrum and	**7**

	mathematical expression of Amplitude Modulated wave 3.4 Power relation in Amplitude Modulation 3.5 Generation of Amplitude Modulation 3.6 High level and Low level Modulation 3.7 Transistorised Amplitude Modulation circuit (Collector Modulated class C amplifier only) 3.8 Block diagram of Amplitude Modulation transmitter 3.9 Methods of SSB generation	
4.	**Frequency Modulation** 4.1 Definition, waveform, mathematical representation of frequency modulation 4.2 Frequency spectrum of Frequency Modulation wave 4.3 Effect of noise on carrier 4.4 Pre-emphasis De-emphasis – concept, need, circuit 4.5 Methods of FM generation: Direct Method - Basic Reactance Modulator 4.6 Varactor diode modulator; Indirect Method - Block diagram of Frequency Modulation Transmitter 4.7 Definition and mathematical Expression of Phase modulation 4.8 Comparison between AM, FM & PM	**7**
5.	**Demodulation Techniques** 5.1 Principle of detection of AM 5.2 Linear and nonlinear detectors 5.3 Receivers o TRF and superheterodyne o Image frequency o IF etc 5.4 FM detection 5.5 Discriminator, Slope detector, Ratio detector 5.6 Amplitude limiter 5.7 Sensitivity, Selectivity, Fidelity	**7**
6.	**Radiation & Propagation of Waves** 6.1 Electromagnetic radiation; Wave-guides 6.2 Effect of environment wave-guide terminators 6.3 Propagation of waves - Ground waves, Sky waves, Space waves 6.4 Troposphere & Ionospheric propagation	**4**
7.	**Antennas** 7.1 Basic considerations of Antenna 7.2 Radiation mechanism 7.3 Elementary doublet 7.4 Wire radiator’s in space 7.5 Resonant and Non resonant Antennas 7.6 Antenna gain & directivity, Antenna resistance	**8**

	7.7 Bandwidth, Beam width and Polarization 7.8 Effect of ground on Antennas, Effect of Antenna Heights 7.9 Antennas required for radio reception 7.10 Loop Antenna	
8.	**Microwave Tubes & Circuits** 8.1 Microwave triodes 8.2 Klystron 8.3 Traveling – Wave Tube (TWT) 8.4 Magnetron	**3**

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, the effect of different sampling frequencies on reconstructed signals; 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 Alignment of AM receiver using CRO & standard signal generator.

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Electronic communication systems.	George Kennedy, McGraw-Hill Ltd., Singapore, Latest
2	Electronic communication	Dennis Roddy & John Coolen, Prentice Hall of India Pvt. Ltd. New Delhi, 4thed., 1995
3	Communication Systems	D. D. Ahirrao & N. S. Jadhav, EVEREST Publication Pune, 1st ed., 1998
4	Telecommunications Principles circuits and systems	S.Rambhadran, Khanna Publishers New Delhi, Latest

PROFESSIONAL PRACTICE II

L	T	P		Curri. Ref. No.: ECE511	
0	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 50	End Term Exam	:
Practical		: 30 Hrs		Progressive Assessment	:
Pre Requisite		:		Practical	
				End Term Exam	:
Credit		: 1		Progressive Assessment	:50

Rationale

Interact with industry is essential for proper understanding about implementation procedure of the theoretical knowledge gained during course of study. The course contents of professional practice-II is designed to develop interpersonal skill and adoptability to the industry so that the student will be benefited in their professional carrier.

Detailed course content

Unit/ Module	Topic/Subtopic	Hours
1.	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the, individual student to form a part of the term work. Industrial visits may be arranged in the relevant areas / industries:	
2.	**Lectures by Professional / Industrial Expert** Lectures may be organized on latest industrial development.	

L	T	P		Curri. Ref. No. : G207	
3	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		:		Practical	
				End Term Exam	: 25
Credit		: 4		Progressive Assessment	: 25

Fundamental of Electrical and Electronics Engineering

Rationale:

For a diploma holder in Electrical, Electronics, Communication and Computer Science engineering, it becomes imperative to know the fundamentals of the electrical and electronics in order to grasp the knowledge of the field. This subject will provide acquaintance with various terms, knowledge of fundamental concept of electricity, basic understanding of electronic components, their function and applications. This understanding should facilitate in operation and maintenance of equipment, which are used in various manufacturing processes in industries, power system operation, communication system, computer system etc.

Detailed course content

Unit/ Module	Topic/Subtopic	Hours
1.	**Technical Terms and Definitions With Units** 1.1 Electrical Current, Electrical pressure, Potential difference , Resistance 1.2 Factors affecting Resistance and temperature coefficient of resistance 1.3 Symbolic representation of sources, loads and basic protective devices 1.4 Conductors, Insulators and Semiconductors	
2.	**D. C. Circuits** 2.1 Ohm's Law 2.2 Kirchhoff's current and voltage Law 2.3 Analysis of series and parallel resistive circuits 2.4 Node voltage and loop current analysis 2.5 Power and Energy in such circuits. 2.6 Network Theorems-Thevenin's theorem 2.7 Norton's theorem 2.8 Maximum Power transfer theorem. 2.9 Superposition theorem. 2.10 Illustrated examples in DC circuits	
3.	**Fundamentals of A.C. Circuits** 3.1 Generation of sinusoidal AC voltage 3.2 Definition of average value, R.M.S. value, form factor and peak factor of sinusoidal voltage and current 3.3 Meaning of lagging and leading of sinusoidal wave	

	3.4 Mathematical expression of sinusoidal voltage and current 3.5 Phasor representation of sinusoidal voltage and current 3.6 Definition of real power, reactive and apparent power 3.7 Power Triangle and power factor. 3.8 Analysis of R circuit with Phasor diagram 3.9 Analysis of R-L circuit with Phasor diagram 3.10 Analysis of R-C circuit with Phasor diagram 3.11 Analysis of R-L-C circuit with Phasor diagram 3.12 Illustrative examples involving series and parallel circuits. 3.13 Necessity and advantages of three phase system 3.14 Balanced supply and load in three phase systems.	
4.	**Semiconductor and Diodes** 4.1 Introduction to Semiconductors, energy band theories. 4.2 Intrinsic and Extrinsic semiconductors 4.3 Potential barrier, 4.4 PN junction diode 4.5 Zener diode 4.6 V-I Characteristics of PN junction diode and Zener diode. 4.7 Introduction to LED, Varactor, Tunnel diode, Photo diode	
5.	**Diode Circuit Applications** 5.1 Diode as rectifying element 5.2 Operation of rectifiers: half and full wave rectifier. 5.3 Rectifier with filter circuits 5.4 Circuit applications of diode as clippers, clampers. 5.5 Zener voltage regulator circuits 5.6 Illustrated examples of diode circuits	
6.	**Bipolar Junction Transistor and Field Effect Transistor** .1 Introduction to Transistor .2 V - I characteristics of transistor .3 Transistor in active ,saturation and cut –off region .4 Transistor as amplifier .5 Introduction to FET .6 Construction of JFET .7 Mechanism of operation of a JFET .8 Characteristics of JFET .9 Compare JFETs and BJTs .10 Introduction to OP-AMP	
7.	**Number System and Logic Gates** 7.1 Introduction to digital system 7.2 Difference between digital and analog signals 7.3 Number system, Binary, Octal, Hexadecimal Binary coded decimal 7.4 1's and 2's complement arithmetic 7.5 Gray codes and excess 3 codes 7.6 ASCII code 7.7 Weighted codes 7.8 Logic gates- OR, AND, NOT, NOR, NAND, XOR 7.9 Universal logic gates 7.10 Illustrated examples related to Number system and logic gates.	
8.	**Boolean Algebra** 8.1 Boolean variables	

	8.2 Boolean functions 8.3 Rules and laws of Boolean algebra 8.4 De Morgan's theorem 8.5 Algebraic reduction of Boolean expressions 8.6 Realization of Boolean expression with logic circuit 8.7 Karnaugh Map techniques	

List of Experiments

1. To observe A.C. waveform on C.R.O and to calculate average and R.M.S. Values, frequency, Time Periods.
2. To verify Kirchhoff's law in DC circuit
3. To verify Thevenin's theorem in DC and AC circuit
4. To verify superposition theoremin DC and AC circuit
5. To verify Norton's Theoremin DC and AC circuit
6. To verify Maximum Power Transfer theorem in DC and AC circuit
7. To measure Resistor, Inductor and Capacitor using voltmeter and ammeter and plot the V-I Characteristics.
8. To determine the forward and reverse characteristics of PN junction diode
9. To determine the input and output characteristics of Junction transistor
10. To determine the forward and reverse characteristics of a zener diode
11. To Verify of Truth Tables for AND, OR, NOT, Exclusive-OR gates
12. To develop exclusive-OR gate using basic building block
13. To develop the half adder and full adder circuit and verify the truth table
14. To verify De Morgan's theorem

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Text Book of Electrical Technology, Vol-I	B L Theraja
2	Basic Electrical Engineering-Vol-I	P S Dhogal and S K Mondal
3	Principles of Electrical and Electronics Engineering	V K Mehta
4	Basic Electronics	J B Gupta
5	Basic Electronics	S K Mondal
6	Principles of Electronics	A P Malvino
7	Digital Electronics Principles and Applications	S K Mondal

Development of Life Skill –II

L	T	P		Curri. Ref. No.: G302	
1	0	2			
Total Contact Hours		: 45 Hrs		Theory	
Theory		: 15 Hrs	Total Marks: 50	End Term Exam	: Nil
Practical		: 30 Hrs		Progressive Assessment	: Nil
Pre Requisite		:		Practical	
				End Term Exam	: Nil
Credit		: 2		Progressive Assessment	: 50

Units/Module	Contents	Hours
1.	**Inter personal Relation** Importance, Interpersonal conflicts, Resolution of conflicts, Developing effective interpersonal skills communication and conversational skills, Human Relation Skills (People Skills)	1
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	3
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	4

	Handling questions Respond, Answer, Check, Encourage, Return to presentation **Evaluating the presentation** : Before the presentation, During the presentation, After the presentation	
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	1
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	2
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	2
7.	**Formal Written Skills:** Memos, Emails, Netiquettes, Business correspondence Letter of enquiry, Letter of Placing Orders, Letter of Complaint	2
	Total	**15**

	Sessional Activities	
1.	**Case Studies:** 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies	4
2.	**Case Studies:**	5

	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	
3.	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	6
4.	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.	5
5.	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	5
6.	Write a memo, Write an effective official e-mail, write a letter of enquiry, letter of placing orders, letter of complaint	5
	Total	**30**

TERM IV

L	T	P		Curri. Ref. No.: ECE 403	
3	0	2			
Total Contact Hours		: 75 Hrs		Theory	
Theory		: 45 Hrs	Total Marks: 150	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		: ECE 409		Practical	
				End Term Exam	: 75
Credit		: 4		Progressive Assessment	: 25

ELECTRONICS DEVICES AND DEVICES –II

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	*Marks*
1.	**Uni-junction Transistor** 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	**7**
2.	**Field Effect transistor** 2.1 To describe the construction, operation and characteristics of	**8**

	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)** 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	**15**
4	**Opto Electronic Devices** 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	**8**
5	**Differential amplifier** 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	**12**
6	**Operational Amplifier** 6.1 To define operational amplifier 6.2 To draw the circuit symbol for a 741 Op-amp and show the in number for each terminal 6.3 To describe the power supplies required for Op-amp circuits 6.4 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 6.5 To state the seven important properties of the ideal Op-Amp 6.6 To define (a) open loop Op-Amp configuration (b) differential amplifier (c) inverting amplifier (d) non-inverting amplifier 6.7 To define (a) ground terminal (b) virtual ground 6.8 To draw the (a) inverting and non-inverting amplifier circuit 6.9 To calculate the close gain of (a) inverting and non-inverting amplifiers	**25**

	6.10	To develop mathematical expression and state the applications of (a) adder (b) subtractor (c) integrator (d) differentiator circuit (e) voltage follower	
	6.11	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	
	6.12	Describe (a) zero crossing detector with hysterisis (b) voltage to current converter (c) currents to voltage converter	
	6.13	To explain the operation of a multi vibrator circuit and sketch its output voltage waveform and calculate the frequency of Oscillation	
	6.14	To develop basic differential amplifier using op-amp	
	6.15	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 (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 use a IC 741 in differential mode and check its common mode rejection capability
13. To establish an astable multi vibrator circuit by using IC 555
14. To establish a Monostable multi-vibrator circuit by using IC 555
15. To develop a pulse width modulator circuit by using a 555 timer
16 Perform the test for different load current and input voltage and determine percent regulation
17. Develop an adjustable d.c. Voltage regulator using LM 317
18. 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

19. Use a 3 ½ digit digital Multimeter to perform the good bad test of (a) diode (b) transistor (c) SCR.
20. Use a 3 ¾ digit digital Multimeter to measure (a) true RMS (B) Average and (c) peak value of a rectified sine wave and find its form factor and peak factor
21. 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 phases 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.

L	T	P	Total Marks: 150	Curri. Ref. No.: ECE 407	
3	1	2			
Total Contact Hours		: 90 Hrs		Theory	
Theory		: 45 Hrs		End Term Exam	: 75
Tutorials		:15 Hrs		Progressive Assessment	: 25
Practical		: 30 Hrs		Practical	
Pre Requisite		:		End Term Exam	: 25
Credit		: 5		Progressive Assessment	: 25

COMMUNICATION ENGINEERING-II

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	Marks
1.	**RF Modulation for Base Band Signal** 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.	12
2.	**Performance of Digital Communication Link**	10

	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*** 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.	**8**
4	**Radar Systems** 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.	**8**
5	**Satellite Communication** 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.	**12**
6	**Modern Telephony** 6.1 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, 4G.	**10**

	6.2 Blue tooth.	

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 generate and detect ASK, FSK and PSK.
5. To be familiar with rectangular and circular wave guide.
6. To be familiar with installation of modem.
7. 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.

L	T	P		
3	1	2		**Curri. Ref. No.: ECE 501**
Total Contact Hours		**: 90 Hrs**		**Theory**
Theory		**: 45 Hrs**	**Total Marks: 150**	**End Term Exam : 75**
Tutorials		**:15 Hrs**		**Progressive Assessment : 25**
Practical		**: 30 Hrs**		**Practical**
Pre Requisite		**:**		**End Term Exam : 25**
Credit		**: 5**		**Progressive Assessment : 25**

Microprocessor

RATIONALE:

This course under the applied technology group is intended to help the students to understand principle of working of microprocessors and their applications so that he/she can use the knowledge and skills to apply them in new related situations.

DETAILED COURSE CONTENTS:

Unit	Topic/ Sub-Topic	Marks
1	**Introduction to Microprocessor** 1.1 Structure of a micro-computer 1.2 Definition (i) Programmable (ii) Memory (iii) Input/ output (iv) CPU 1.3 Microcomputer organization and the function of a micro processor 1.4 Principle of operation of a micro-processor	
2	**Microprocessor 8085** 2.1 Architecture of 8085 – Address bus, data bus, control bus, ALU, Registers, control logic etc. 2.2 Operation – Microprocessor initiated, internal data, memory Read/Write, I/O Read/Write 2.3 Timing Cycle	
3	**Programming 8085 Microprocessor** 3.1 Data transfer instruction 3.2 Arithmetic and logic operation 3.3 Branch operation	

	3.4 Writing assembly language programs and debugging 3.5 Looping, counting, indexing 3.6 Additional data transfer and 16 bit Arithmetic instructions 3.7 Arithmetic operation (memory related) 3.8 Rotate, compare 3.9 Counters and time delays – Illustrative programs 3.10 Stack and subroutines – conditional call and return instructions 3.11 Code conversion, BCD arithmetic and 16 bit data operations 3.12 Assemblers	
4	**Interfacing Peripherals** 4.1 Parallel I/O & interfacing applications 4.2 Interrupts 4.3 Interfacing data converters – D/A , A/D converters 4.4 Programmable I/O chips 8155 / 8156, 8355 / 8755 4.5 Programmable keyboard / display interface 8279 4.6 General purpose programmable peripheral devices – 8255 , 8253, 8259, 8257 4.7 Serial I/O and data communication	
5	**Microprocessor-Based Systems** 5.1 Single board 8085-microprocessor kit development 5.2 Microprocessor based stepper motor control 5.3 Temperature controllers 5.4 Liquid level controllers	

SUGGESTED PRACTICAL EXPERIENCES

a) Develop Assembly language programming for the following problems.
- One's compliment.
- Shift left.
- Bit addition of two numbers.
- 16-bit addition of two numbers.
- Bit subtraction.
- Bit multiplication.
- Binary division.
- Find largest number.
- Find smallest number.
- Data transfer.
- Arranging numbers in ascending / descending order.

b) Interface IC 8155 with microprocessors for simple application problems
c) Interface IC 8279 with microprocessors for simple application problems
d) Interface IC 8255 with microprocessors for simple application problems

e) Interface IC 8257 with microprocessors for simple application problems

f)To develop a Programme for driving a stepper motor

g)To develop a Programme for a Running display of HELP US in Address and Data field

h)To develop a Programme for Traffic Control System

i)To develop a Programme for the operation of a counter

REFERENCES:

SUGGESTED REFERENCES

S.No.	Title	Author & Publisher/Edition/Year
1.	Microprocessor	Douglus Hall/ Prentice Hall, New York, Latest
2.	Microprocessor Architecture	Gaonkar/ Wiley Eastern, New Delhi, 1st, 1989
3.	Microprocessor	Gaonkar/ Wiley Eastern, New Delhi, 1st, 1993
4.	8086 / 8088 family architecture programming and design	Gibson and Lice/ Prentice Hall, New York, Latest
5.	Introduction to microprocessors	Laventhal/ Prentice Hall, New Delhi, Latest
6.	Introduction to microprocessor	Mathur/ Tata McGraw Hill, New Delhi, 1st, 1990
7.	8086 / 8088 family design programming and interfacing	Uffenbeck/ Prentice Hall, New York, Latest

L	T	P		
0	0	4		
Total Contact Hours		**: 60 Hrs**		**Curri. Ref. No.: ECE 408**
Theory		**: 0**		**Theory**
Tutorials		**:0**	**Total Marks: 50**	**End Term Exam :**
Practical		**: 60 Hrs**		**Progressive Assessment :**
Pre Requisite		**:**		**Practical**
				End Term Exam : 25
Credit		**: 2**		**Progressive Assessment : 25**

ELECTRONIC WORKSHOP PRACTICE

RATIONALE:

This subject envisages to develop practical skills in handling various tools, accessories, equipment used in the manufacturing and testing electronic circuits. It will also make the students familiar with the measuring techniques used in electrical/electronic systems. The student will also be able to implement, test electronics circuits on breadboard and prepare PCB.

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Marks
1	**Identification and use of different tools and accessories used in manufacturing of electronic circuits** 1.1Different types of cutters. 1.2 Nose pliers. 1.3 Wire strippers 1.4 Screw drivers 1.5 Lead straightners 1.6 Extracters 1.7 Soldering Iron 1.8Desoldering Pump 1.9Crimping tool.	

2	**Power supply, voltmeter and ammeter** a) Study of regulated power supply. • Front panel controls and their functions. b) Study and use of DC and AC voltmeter to measure DC and AC voltage. c) Study and use of DC and AC ammeter to measure DC and AC current. d) Study and use analog multi-meter to measure:	
3	**Study and use digital multimeter** Study and use digital multimeter to measure**:** 3.1 AC and DC voltage 3.2 AC and DC current 3.3Different resistor 3.4Continuity testing	
4	**Study and use Function Generator and CRO.** 4.1Front panel controls and there uses. 4.2Frequency changes and amplifies. 4.3Front panel control and their functions. 4.4Observing different waveforms. 4.5 Measurement of amplitude and frequencies	
5	**Study and use Function Generator and CRO.** 5.1 Front panel controls and there uses. 5.2Frequency changes and amplifies. 5.3Front panel control and their functions. 5.4Observing different waveforms. 5.5Measurement of amplitude and frequencies	
6	**Study and use different cables** 5.1 Co-axial cable 5.2 Twisted pair cable 5.3Flat ribbon cable 5.4Fibre optic cable	

7	**Study and use different connectors** 7.1 BNC connector 7.2 Banana connector 7.3 Crocodile connector 7.4 Male and female Dtype connector 7.5 Flat cable connector 7.6 Printed circuit connector 7.7 UTP connector	
8	**Study and use different switches and Display Devices** **8.1** Co-axial cable 8.2Twisted pair cable 8.3Flat ribbon cable 8.4Fibre optic cable	
9	**Study and use different switches and Display Devices** 9.1 Toggle switches-SPST, SPDT,DPST,DPDT 9.2 Thumb-wheel switches 9.3 Rotary switches 9.4 Push on/Push off switches 9.5 Keyboard switches-mechanical, capacitive, membrane 9.6 DIP switches 9.7 LED display 9.7Seven segment display 9.8LCD display	
10	**Preparing cables and boards** 10.1 Prepare computer network cable (use different type of cable and connectors stated as in unit 6 and 7). 10.2Study and use bread boards to implement simple electronic circuits using resistors/ capacitors/ diodes/transistors/switches/display devices. 10.3Prepare two simple electronic circuits using general purpose PCBs. 10.4Prepare two PCBs for simple electronic circuits	

IMPLEMENTATION STRATEGIES

The subject content is expected to be taught by the teacher through demonstration. The teacher is expected to explain functions of the front panel controls of all electronic instruments/equipment along with measuring techniques. Teacher in the electronic workshop should demonstrate and guide students for developing the skills of soldering and PCB manufacturing.

SUGGESTED LIST OF PRACTICALS:

- Total paper is Practical based and the entire practical, as given in content should be first demonstrated by the tutor and then performed by the students.

REFERENCE BOOKS

Author	Title	Edition	Year of Publication	Publisher & Address
S.M.Dhir	Electronic Component and Materials			Tata McGraw Hills publishing company Ltd., N.Delhi
W.C.Bosshart	Printed circuit boards design and technology			Tata McGraw Hills publishing company Ltd., N.Delhi

Electrical Machines and Measurement

L	T	P		
3	1	2		
Total Contact Hours		**: 90 Hrs**	**Total Marks: 150**	**Curri. Ref. No.: ECE 409**
Theory		**: 60**		**Theory**
Tutorials		**:30**		**End Term Exam : 75**
Practical		**: 60 Hrs**		**Progressive Assessment : 25**
Pre Requisite		**:**		**Practical**
				End Term Exam : 25
Credit		**: 5**		**Progressive Assessment : 25**

Rationale:

The subject Electrical Measurement and Measuring Instrument is an important subject in the field of Electrical 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 thee phase circuits will be studied here. Measurement of energy and testing 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. Uses of ac bridges and other resistance measuring instruments are included under this subject. It is noteworthy to mention that 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.

Course Objective :-

Module/Unit	After completion of the course, students will be able to:
1.	Explain the construction and working principle of different types of electrical measuring instruments.
2.	Connect different types of electrical measuring instruments to measure various electrical parameters.
3.	Select the right instruments for the measurement of voltage, current, power and energy.
4	Apply the appropriate technique to measure resistance, inductance and capacitance.

Unit	**Topic/Sub Topic**	**Marks**

1	**Types of Measuring Instruments**: 1.1 To classify different type of instruments e.g. indicating integrating, and recording. 1.2 To describe type of (a) deflection system (b) controlling System and (c) damping systems. 1.3 To describe the advantage and disadvantages of above mentioned systems. 1.4 To describe the constructional detail of pointer, control spring and Instrument bearings.	**12**
2	**Construction and Working principles of Measuring Instruments:** To describe the constructions, working principles for following instruments 2.1 moving coil instruments 2.2 moving iron instruments 2.3 Electro-dynamic instruments 2.4 Induction instruments 2.5 Electrostatic Instruments	**10**
3	**Extension of Range of Measuring instruments:** 3.1 To describe the method of extensions of range of ammeters and voltmeters (d.c meters) 3.1 To describe the concept of swamping resistor 3.2 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 3.3 To describe the working principles of rectifier type instruments 3.4 To solve of problems on above concepts	**10**
4	**Measurement of Resistance** 4.1 To classify the resistance according to the range values 4.2 To define the accuracy of measurements 4.3 To describe method of measurement of resistances 4.3.1 To state ammeter voltmeter method of measurement. 4.3.2 To state method of substitution for the measurement of resistance. Discuss the sources of error 4.3.3 To state Wheatstone bridge principle of measurement of resistances with precautionary measures 4.3.4 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. 4.3.5 To describe the basic principles of series and shunt ohmmeter. 4.3.6 To describe the constructions working principles of	**15**

	Megger. 4.3.7 State the type of Megger tester and their field of application. 4.3.8 To state the method of measuring the insulation resistance while the power is on. 4.3.9 To solve problems on above topic	
5	**Measurement of Power** 5.1 To describe the method of connecting a wattmeter for measurement of single-phase power 5.2 To describe the method of measuring single phase power by (a) three ammeter and (b) three voltmeter method 5.2.1 To describe the method of measurement of p.f by using wattmeter, voltmeter and ammeter in single-phase circuit. 5.3 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. 5.4 To solve problems on power measurement	**10**
6	**Measurement of Energy** 6.1 To describe the construction and working principle of d.c energy meters 6.2 To describe the construction and working principles of induction type energy meter. 6.2.1 To describe the method of testing of Energy meter 6.2.2 To describe the method of construction of three phase energy meters 6. 3 Solve problems on energy meter testing	**10**
7	**AC Bridges** To describe the principles of a.c bridges on the following 7.1 Capacitance comparison bridge 7.2 Inductance comparison bridge 7.3 Describe the precautionary measure to be taken for high frequency measurement 7.4 Description of the method of Wagner's earth connection 7.5 Solution of problems on above concepts	**8**

Text /Reference Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
H.S. Kalsi,	Electronics Instrumentation		T.M.H

A K Sawhney	Electrical and Electronics Measurements and Instrumentation		Dhanpatrai
Cooper D. and A.D. Heifrick	Modern Electronic Instrumentation and Measuring Techniques		P.H.I
E. Handscombe	Electrical Measurements and Measuring Instruments		The Wykeham Technologies Service
S. R. Paul	Electrical Measurement and Measuring Instruments		Rukamari Book House Calcutta
S. R. Paul	Electrical Measuring Instruments		Concept Publications

Suggested List of Laboratory Experiments :-	
S.No	**Laboratory Experiments**
1.	Dismantling and assembly of indicating type PMMC instrument, identification and drawing the following: (a) Deflecting system (b) Controlling System (c) Damping System
2.	Dismantling and assembly of indicating type 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.	4. Dismantling and assembly of rectifier type voltmeter
5.	5.1 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 5.2 Calibration of single phase energy meter
6.	Measurement of power by three voltmeter methods
7.	Measurement of power and power factor by three-ammeter method
8.	Measurement of three phase power & power factor by 2 wattmeter method
9.	Extension of range of a PMMC voltmeter
10.	Connection of CT and PT for measurement of high current and high voltage and determination of transformation ratio of current and potential transformer
11.	Measurement of resistance by Wheatstone bridge and Kelvin's double bridge
12.	Measurement of medium value resistance by ammeter voltmeter method
13.	Measurement of inductance using suitable bridge
14.	Measurement of capacitance using suitable bridge

PCB Design

L	T	P		
0	0	4		Curri. Ref. No.: ECE 508
Total Contact Hours		: 60 Hrs		Theory
Theory		: 0		End Term Exam :
Tutorials		:0	Total Marks: 50	Progressive Assessment :
Practical		: 60 Hrs		Practical
Pre Requisite		:		End Term Exam : 25
Credit		: 2		Progressive Assessment : 25

RATIONALE:

In the era of miniature electronic gadgets and automation, it is required to have electronic circuit simulation for better design and cost effective PCB layout for better performance. This course aims to teach students about how to simulate the electronic circuit and how to design PCB layout of given circuit using available circuit simulation and PCB layout design tools (free or licensed). This course helps the student to simulate the circuit and develop complete hardware circuit on PCB.

Aims

- Compare different circuit simulation and PCB layout design software.
- Analyze and simulate the electronic circuit using circuit simulation tools .
- Transfer an electronic circuit from circuit simulation tool to PCB Layout design tool.
- Design and develop layout of PCB using PCB layout design tool with fabrication

COURSE DETAILS.

Unit	Topics and Sub-topics	Hrs
Unit – I Introduction to circuit simulation and PCB design software	1.1 Demonstration of circuit simulation software.	
	1.2 Demonstration of PCB layout design software.	
Unit – II Schematic design of electronic circuits using	2.1 Wire, bus, junction, probe, voltage source, current source, and ground etc. used in circuit simulation software.	

software	2.2 Create new project, design and schematic file.	
	2.3 Search, add and create new electronic part.	
	2.4 Edit, Connect or wire the circuit.	
Unit – III Simulation of electronic circuits	3.1 Test RC, LC or RLC based electronic circuit.	
	3.2 Test diode, transistor or MOSFET based electronic circuit.	
	3.3 Test analog/digital IC based electronic circuit.	
	3.4 Transient analysis of RC, LC, or RLC based electronic circuit.	
	3.5 Bias point analysis or characteristic curve of diode, transistor or MOSFET based electronic circuit.	
	3.6 Transient analysis of diode, transistor or MOSFET etc. based electronic circuit.	
	3.7 Frequency response (AC Analysis) of RC, diode, and transistor etc. based electronic circuit.	
	3.8 Frequency response (AC Analysis) analog/ digital IC based electronic circuit.	
Unit – IV PCB layout design using software	4.1 Netlist file, back annotation, bill of material, foot print, PTH, track width, mil, etc.	
	4.2 Transfer circuit to PCB layout	
	4.3 Search, add and create footprint	
	4.4 Place, route and generate PCB Layout	
Unit – V PCB fabrication techniques	5.1 Drawing and printing layout on board, photo etching process, masking process, etc.	
	5.2 PCB manufacturing techniques	

7. SUGGESTED LIST OF EXERCISES/PRACTICALS

S. No.	Unit No.	Practical Exercises	
1	I	Evaluate different Circuit simulation tools for Circuit Simulation (Presentation)	

2	I	List and compare different PCB layout design tools used for PCB Layout Design (Presentation)	
3	II	Create and save new schematic file with Project using circuit simulation software.	
4	II	Use different options like wire, bus, junction, AC and DC voltage source, current source, probe, pulse generator, ground, and probe etc. used in circuit simulation software library.	
5	II	Search, create and add the electronic component to the schematic file from the library used in circuit simulation software.	
6	II	Connect the electronic circuit using Place and route method used in circuit simulation software.	
7	II	Connect, simulate and test the RC, LC, and RLC based electronic circuit using circuit simulation software.	
8	II	Connect, simulate and test the Diode, Transistor, MOSFET based electronic circuit using circuit simulation software.	
9	II	Connect, simulate and test IC based electronic circuit using circuit simulation software.	
10	III	Calculate the Bias point and verify V- I characteristic (DC Analysis) curve of given diode or transistor based circuitry using circuit simulation software.	
11	III	Draw the Transient analysis curve of a given diode circuit using circuit simulation software.	
12	III	Draw the Transient analysis curve of a given transistorized electronic using circuit simulation software	
13	III	Draw the Transient analysis curve of a given Analog IC based electronic circuit using circuit simulation software.	
14	III	Draw the Frequency response (AC Analysis) curve to check the functionality of RC, LC and RLC based circuit using circuit	
15	III	Draw the Frequency response (AC Analysis) curve to check the functionality of Transistorized based circuit using circuit simulation software.	
16	III	Draw the Frequency response (AC Analysis) curve to check the functionality of analog IC based circuit using circuit simulation software.	

17	III	Use the following options: netlist file, back annotation, Bill of material, single layer PCB, double layer PCB, PTH, footprint, track width, mil, etc. and develop a complete project file	
18	IV	Synthesize and Transfer an electronic circuit using circuit simulation software to the PCB layout design software.	
19	IV	Search, create and add footprint of different electronic components to the PCB layout design file	
20	IV	Synthesize the PCB Layout of the given RC, RLC, diode or transistor based electronic circuit with manual and auto routing technique using PCB design software.	
21	IV	Synthesize the PCB Layout of given analog or digital IC based electronic circuit with manual and auto routing technique using PCB design software.	
22	V	Synthesize complete PCB for a given electronic circuit (mini project)	
23	V	Synthesize complete PCB through Fabrication Techniques step by step.	
		Total	

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Prepare PCB layout of a given circuit on butter paper (Mini Project).
- Transfer the layout from Butter paper to Copper cladded board (Paper Phenolic or glass epoxy material etc.)
- Industrial Visit to any PCB manufacturing Industry.
- Prepare PCB layout using circuit simulation software/PCB layout software.

SUGGESTED LEARNING RESOURCES

A) List of Books

S. No.	Title of Book/user manual	Author	Publication
1	Printed Circuit Boards: Design and Technology	Bosshart	TMH 2008 or latest edition
2	Multisim user manual	National Instruments	www.ni.com
3	Ultiboard user manual	National Instruments	www.ni.com
4	Orcad online manual	Cadence	www.cadence.com

B) List of Major Equipment/ Instrument/Software with Broad Specifications

- NI Multisim (Academic Version or Licensed Version)

- NI UltiBoard (Academic Version or Licensed Version)
- Cadence Orcade (Student Version or Licensed Version)
- Express PCB (Free Version or Licensed Version)
- Circuit Maker (Free Version or Licensed Version)
- Tinapro
- CadSoft Eagle (Free Version or Licensed Version)
- PCBDesignSoftwae (Free Version or Licensed Version)
- FreePCB (Free Version)

C) List of Software/Learning Websites

- www.ni.com (Multisim and Ultiboard - Academic version)
- www.cadence.com (OrCAD - Student version)
- www.cadsoftusa.com (EAGLE – Free version)
    - www.youtube.com (PCB Manufacturing Videos)

PROFESSIONAL PRACTICE III

<table>
<tr><td colspan="3">L</td><td colspan="3">T</td><td>P</td><td rowspan="8">Total Marks: 50</td><td colspan="2">Curri. Ref. No.: ECE 512</td></tr>
<tr><td colspan="3">0</td><td colspan="3">0</td><td>2</td><td colspan="2">Theory</td></tr>
<tr><td colspan="4">Total Contact Hours</td><td colspan="3">: 30 Hrs</td><td>End Term Exam</td><td>:</td></tr>
<tr><td colspan="4">Theory</td><td colspan="3">: 0</td><td>Progressive Assessment</td><td>:</td></tr>
<tr><td colspan="4">Tutorials</td><td colspan="3">:0</td><td colspan="2">Practical</td></tr>
<tr><td colspan="4">Practical</td><td colspan="3">: 30 Hrs</td><td>End Term Exam</td><td>:</td></tr>
<tr><td colspan="4">Pre Requisite</td><td colspan="3">:</td><td>Progressive Assessment</td><td>: 50</td></tr>
<tr><td colspan="4">Credit</td><td colspan="3">: 1</td><td colspan="2"></td></tr>
</table>

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.

Applied Mathematics

L	T	P		
3	1	0		
Total Contact Hours		**: 60 Hrs**	**Total Marks:100**	**Curri. Ref. No.: G105**
Theory		**:60**		**Theory**
Tutorials		**:0**		**End Term Exam : 75**
Practical		**:**		**Progressive Assessment : 25**
Pre Requisite		**:**		**Practical**
				End Term Exam :
Credit		**: 4**		**Progressive Assessment :**

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.

Aims	
Module/Unit	After completion of the course, students will be able to:
1.	Solve algebraic basic equations using Numerical Methods
2.	Differentiate multi-variable functions using partial differentiation principle.
3.	Find Complementary Function and Particular Integral of second order differential equation.
4	Solve differential equation using Laplace and Inverse Laplace Transformation
5	Analyze non sinusoidal signals using Fourier's Series.

Unit	**Topics and Sub –topics**	**Hrs**
1	**Numerical Solution of Algebraic Equations.** 1.1 Bisection method. 1.2 Regula- falsi method /method of false position. 1.3 Newton-raphson method. 1.4 Problems on the above methods.	6
2	P**artial Differentiation.** 2.1 Introduction to functions of two or more variables. 2.2 Geometrical Interpretation of a function of two variables. 2.3 Partial derivatives.	8

	2.4 Second order partial derivative. 2.5 Homogeneous function. 2.6 Euler's theorem. 2.7 Problems	
3	**Differential Equations (ordinary):** 3.1 Linear differential equations of second order with constant coefficients. 3.2 Complete solution = Complementary function + Particular integral. 3.3 Method of finding particular integral. 3.4 Applications of differential equations to electrical circuit problems. 3.5 Problems related to other physical systems.	10
4 5	**Laplace Transform (LT):** 4.1 Piece-wise or sectional continuity. 4.2 Functions of exponential order. 4.3 Definition of function & the transform concept. 4.4 Definition and notation of Laplace Transform. 4.5 Linearity property. 4.6 First shifting theorem (first translation). 4.7 Second shifting theorem (second translation). 4.8 Change of scale property. 4.9 Laplace transform of derivatives. 4.10 Laplace transform of integral 4.11 Solution of problems using LT 4.12 Solution of ordinary differential equation up to second order using LT. **Concept of Inverse Laplace Transform & its properties** 5.1 Definition of inverse Laplace Transform and null function. 5.2 Linearity property. 5.3 First shifting property. 5.4 Second shifting property. 5.5 Change of scale property. 5.6 Inverse Laplace Transform of derivatives. 5.7 Convolution theorem. 5.8 Problems. 5.9 Solution of differential equations using Laplace Transform.	
6	**FOURIER SERIES.** 6.1 Periodic function. 6.2 Trigonometric series. 6.3 Fourier series and Fourier coefficients theorem. 6.4 Finite discontinuity, Even functions and Odd functions.	

Text /Reference Books:			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
B. C. Das	Integral Calculus		U. N. Dhur & Sons Pvt. Ltd
B. K. Pal	Diploma Engineering Mathematics (Volume-II)		U. N. Dhur & Sons Pvt. Ltd
Dr. J. S. Bindra	Applied Mathematics		SK Kataria & Sons
S.Arumugam, A. Thangapandi Issac and A.Somsundaram	Engineering Mathematics (Volume – I, Volume – II & Volume – III)		Scitech Pub

	6.5 Change of interval and Change of period. 6.6 Complex form of Fourier series, half range series 6.7 Parseval's identity for Fourier series. 6.8 Problems using Fourier series.	

ENGINEERING ECONOMICS AND ACCOUNTANCY

L	T	P		Curri. Ref. No.: G303	
3	0	0			
Total Contact Hours		: 45 Hrs		Theory	
Theory		:45		End Term Exam	: 75
Tutorials		:0	Total Marks: 100	Progressive Assessment	: 25
Practical		:		Practical	
Pre Requisite		:		End Term Exam	:
Credit		: 3		Progressive Assessment	:

RATIONALE

The knowledge of Engineering Economics and Accountancy is needed by personnel dealing with the cost of products of any kind related to quality and standards of production including its financial control. Engineers / Technicians, 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 enterprise.

This particular subjects deals in basic concepts of economics, production of commodities, different types of industries, market forms, objective of economic planning, concept of value of money, causes of unemployment, industrial policy, business transaction and accountancy, maintenance of cash and balances, receipt and expenditures and final accounts.

DETAIL COURSE CONTENT

UNIT	TOPICS /SUB TOPICS	HRS
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 Utility, Consumption, Want, Value, Price, Goods, National Income. 2.2 Classification of goods, characteristics and classification of wealth. 2.3 Basic Laws of demand and supply. 2.4 Concept and Measurement of Elasticity of demand	3

3	**PRODUCTION** 3.1 Meaning and factors of production. 3.2 Land, Labour, Capital and Organisation 3.3 Formation of Capital, Break even chart-its uses.	**3**
4	**SCALE OF INDUSTRIES** 4.1 Definition, advantages and disadvantages of small, medium and large scale production 4.2 Internal and External Economies	**2**
5	**MARKET FORMS 6** 5.1 Definition and types of Markets in respect of present trends. 5.2 Features of Perfect, Imperfect and monopoly markets. 5.3 Price determination under perfect competition and monopoly	**3**
6	**ECONOMIC PLANNING** 6.1 Features of Under-developed and Developing Countries. 6.2 Meaning, objectives and needs of planning. 6.3 Introduction to industrial development in India during the five year plans.	**3**
7	**MONEY** 7.1 Meaning and functions of Money 7.2 Introduction to the concept of the value of money 7.3 Meaning of Inflation, Deflation, Stagnation.	**3**
8	**UNEMPLOYMENT**	**2**

	8.1 Meaning, types and causes of Unemployment 8.2 Unemployment problems in India	
9	**INDUSTRIAL POLICY** 9.1 Current Industrial Policy 9.2 Industrial licensing Policy, De-licensing 9.3 Monopolistic and Restricted Trade practices (MRTP) Foreign Exchange Regulation Act (FERA).	**3**
10	**10. 0 BUSINESS TRANSACTIONS AND ACCOUNTANCY** 10.1 Transactions and classifications, need and objectives of proper records including double entry system. 10.2 Classification of Accounts and its description (in respect of real accounts, personal accounts and nominal accounts) 10.3 Debit and credit concept; golden rules of debit and credit. 10.4 Objectives and principles of double entry book-keeping.	**5**
11	**BOOKS OF ACCOUNTS** 11.1 Journal and Ledger, their sub-divisions; posting from journals to ledger. 11.2 Balancing of Accounts	**2**
12	**CASH BOOK** 12.1 Objective of Cash Book (in respect of all kinds of Cash transactions) 12.2 Single column, double column and triple column cash book	**2**

	12.3 Imprest system of Petty Cash Book.	
13	**TRIAL BALANCE** 13.1 Objective, Preparation, errors and rectification (in respect of balance of accounts for the total period).	**2**
14	**FINAL ACCOUNTS** 14.1 Steps of preparing accounts; Trading Account; Profit and Loss Account 14.2 Revenue and Depreciation adjustment 14.2 Introduction to balance sheet	**5**
15	15.0 **CAPITAL AND REVENUE EXPENDITURE DISTRIBUTION** 15.1 Receipts and payments 15.2 Income and Expenditure differences	**3**
16	**MEANING AND PURPOSE OF COSTING** 16.1 Elements of Cost-Analysis and classification of expenditure for cost accounts. 16.2 Cost Control – Prime cost, Overhead cost, and Indirect materials and tools.	**2**
17	**ELECTRONICS COMMERCE – MEANING – SCOPE** 17.1 Accounting Software – Tally latest version	**1**

SUGGESTED LEARNING RESOURCES:

Reference Books :

1. Agrawal, A.N., Indian Economy, New Delhi ; wish Prahashan, 2005

2. Wali, B.M., and A.B. Kalkundrikar – Managerial Economics, New Delhi : **R.Chand and Co., 1983**

ENTREPRENEURSHIP DEVELOPMENT

L	T	P		
3	0	0		**Curri. Ref. No.: G304**
Total Contact Hours		**: 45 Hrs**		**Theory**
Theory		**:45**		**End Term Exam : 75**
Tutorials		**:0**	**Total Marks: 100**	**Progressive Assessment : 25**
Practical		**:**		**Practical**
Pre Requisite		**:**		**End Term Exam :**
Credit		**: 3**		**Progressive Assessment :**

RATIONALE

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

DETAIL COURSE CONTENT

UNIT	TOPIC /SUBTOPIC	Hrs
1	**INTRODUCTION** 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	**10**
2	**FORMS OF BUSINESS ORGANISATION** 2.1 Types of company 2.2 Merits and demerits of different types 2.2 Registration of small scale industries 2.4 Conglomeration.	**4**

3	**SMALL SCALE AND ANCILLARY INDUSTRIES** 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.	**8**
4	**SYSTEM OF DISTRIBUTION** 4.1 Wholesale Trade 4.2 Retail trade	**1**
5	**SALES ORGANISATION** 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	**3**
6	**PRICING THE PRODUCT** 6.1 Basic guidelines	**1**
7	**INTRODUCTION TO IMPORT AND EXPORT** 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.	**6**
8	**BUSINESS ENQUIRIES** 8.1Enquiries: From SISI, DIC, SFC Dept. of Industrial Development Banks. 8.2 Offers and Quotations 8.3 Orders	**4**

9	**PROJECT REPORT** 9.1 Project Report on feasibility studies for small scale industries, proposal for finances from bank and other financial institutions for establishing new industries and its extension, obtaining License enlistment as suppliers, different vetting organizations for Techno Economic feasibility report. Breakeven analysis, Breakeven point.	**6**
10	**ENVIRONMENT LEGISLATION** 10.1 Air Pollution Act 10.2 Water Pollution Act 10.3 Smoke Nuisance Control Act 10.4 ISO: 14000, OSHA	**2**

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

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

9. Khanka, S.S., Entrepreneurship Development, New Delhi : S. Chand and Co.
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		
3	0	0		Curri. Ref. No.: G305
Total Contact Hours		: 45 Hrs		Theory
Theory		:45		End Term Exam : 75
Tutorials		:0	Total Marks: 100	Progressive Assessment : 25
Practical		:		Practical
Pre Requisite		:		End Term Exam :
Credit		: 3		Progressive Assessment :

RATIONALE

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

DETAIL COURSE CONTENT

UNIT	TOPIC/SUBTOPIC	Hrs
1	**FRAMEWORK OF MANAGEMENT** 1.1 Nature of management 1.2 Development of management thoughts 1.3 Management and process skills	8
2	**PLANNING** 2.1 Fundamentals of planning 2.2 Planning premises and forecasting 2.3Decision making 2.4Mission and objective	9
3	**ORGANIZING** 3.1 Fundamentals of organizing	10

	3.2 Design of organization structure 3.3 Forms of organization structure 3.4 Power and authority 3.5 Authority relationship	
4	**STAFFING** 4.1Fundamentals of staffing 4.2 HR planning 4.3 Recruitment and selection 4.4 Training and development 4.5 Performance appraisal	**8**
5	**DIRECTING** 5.1 Fundamentals of directing 5.2 Operational control techniques 5.3 Overall control technique	**6**
6	**TOTAL QUALITY MANAGEMENT** 6.1 Concepts and definitions 6.2 Sages of quality gurus and their contributions 6.3 Basic tools of TQM	**4**

SUGGESTED LEARNING RESOURCES:

Reference books:

1. Principles of management, by: T.Ramasamy (Himalya publishing house)
2. Management by: S. P. Robins
3. Management principles by: Anil Bhat and Arya Kumar
4. Principles and practice of management by LM Prasad
5. Principles of management by LM Prasad
6. Essentials of Management / Joseph L. Massie / Prentice-Hall of India

L	T	P	Total Marks: 100	Curri. Ref. No.: G306	
3	0	0			
Total Contact Hours		**: 45 Hrs**		**Theory**	
Theory		**:45**		**End Term Exam**	**: 75**
Tutorials		**:0**		**Progressive Assessment**	**: 25**
Practical		**:**		**Practical**	
Pre Requisite		**:**		**End Term Exam**	**:**
Credit		**: 3**		**Progressive Assessment**	**:**

ORGANIZATIONAL BEHAVIOUR

RATIONALE

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

DETAIL COURSE CONTENT

THEORY:

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

3.0 DEVELOPING GOOD WORK HABITS: **10**

Principles of habit formation

Attitude and values

Personality-

- Concepts

- Theories

- Personality and Behaviour

4.0 ORGANIZATIONAL CULTURE: **8**

Concepts and its importance

Determinants of organizational culture

Rules & regulations

5.0 TEAM BUILDING: **9**

Concepts
Team and Group

Formation of Team building

SUGGESTED LEARNING RESOURCES:

Reference Books:

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

ENVIRONMENTAL EDUCATION

L	T	P		
3	0	0		Curri. Ref. No.: G307
Total Contact Hours		: 45 Hrs		Theory
Theory		:45		End Term Exam : 75
Tutorials		:0	Total Marks: 100	Progressive Assessment : 25
Practical		:		Practical
Pre Requisite		:		End Term Exam :
Credit		: 3		Progressive Assessment :

RATIONALE

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

DETAILED COURSE CONTENT

THEORY:

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.
1.0	**INTRODUCTION**	**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.

SUGGESTED LEARNING RESOURCES:

(a) Reference Books:

S. No.	Title	Author, Publisher, Edition & Year
1.	Environmental Engineering	Pandya & Carny, Tata McGraw Hill, New Delhi
2.	Introduction to Environmental Engineering and Science	Gilbert M. Masters Tata McGraw Hill, New Delhi
3.	Waste Water Engineering – Treatment, Disposal & Reuse	Metcalf & Eddy Tata McGraw Hill, New Delhi
4.	Environmental Engineering	Peavy, TMH International New York
5.	Study / training materials, references, reports etc.	Central Pollution Control Board Postal Address: Parivesh Bhawan, CBD-cum-

S. No.	Title	Author, Publisher, Edition & Year
	developed by Central Pollution Control Board, New Delhi as also State Pollution Control Boards	Office Complex East Arjun Nagar, DELHI - 110 032, INDIA Tel.: 91-11-22307233 Fax: 91-11-22304948 e-mail: ccb.cpcb@nic.in
6.	Environmental Science	Aluwalia & Malhotra, Ane Books Pvt. Ltd, New Delhi
7.	Text Book of Environment & Ecology	Sing, Sing & Malaviya, Acme Learning, New Delhi
8.	Environmental Science & Ethics	Sing, Malaviya &Sing , Acme Learning, New Delhi
9.	Environmental Chemistry	Samir K. Banerji, Prentice Hall of India, New Delhi

(b) Others:

1. Text book mentioned in the references
2. Lab Manuals
3. OHP Transparencies
4. Video film on Environment

SUGGESTED LIST OF DEMONSTRATIONS/FIELD VISIT

- pH value of water sample.
- Hardness of water
- Calcium hardness
- Total Hardness
- Residual Chlorine to a given sample of water
- Turbidity
- B.O.D.
- C.O.D.

Visits: Following visits shall be arranged by the teachers during the semester:

- Water Treatment Plant
- Sewage Treatment Plant
- Maintenance work of water supply mains and sewage system