PART- II

CURRICULUM OF DIPLOMA PROGRAMME

ON

ELECTRICAL & ELECTRONICS ENGINEERING (EEE)

IN

MULTI POINT ENTRY & CREDIT SYSTEM

For the State of Nagaland

Sample path for Civil Engineering, Mechanical Engineering, Automobile Engineering, Electronics and Electrical Engineering, Electronics and Communication Engineering, Computer Science and Engineering, Computer Engineering and information Technology.

SEMESTER -1

*G205A is for CSE, IT and CPE

Sl. No	Code	Name of Course	Pre-requisite	Study Scheme — Contact Hours / Week			Evaluation Scheme — Theory — End Exam	Theory — Progressive Assessment			Practical — End Exam	Practical — Progressive Assessment		Total Marks	Credit
				L	T	P	End Exam	Class Test	Assignment	Atten dance	End Exam	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 -1		3	0	2	75	10	10	5	25	25	-	150	4
4	G108	Chemistry -1		2	0	2	75	10	10	5	25	25	-	150	3
5	G201	Engineering Drawing -1		1	0	4	-	-	-	-	25	25	-	50	3
6	G203	Workshop Practice -I		0	0	4	-	-	-	-	25	25	-	50	2
7	G205B	Computer Programming		2	0	4	50	-	-	-	25	50	-	125	4
		TOTAL		13	1	18	350	40	40	20	100	175	-	750	23

SEMESTER-II

Sl. No	Code	Name of Course	Pre-requisite	Study Scheme Contact Hours / Week			Evaluation Scheme Theory				Evaluation Scheme Practical			Total Marks	Credit
				L	T	P	End Exam	Class Test	Assignment	Attendance	End Exam	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 -II	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	3	0	2	75	10	10	5	-	50	-	150	4
8	G301	Development of Life Skill-I		1	0	2	-	-	-	-	-	25	25	50	2
9		Professional Practices -1#		0	0	2	-	-	-	-	-	50	-	50	1
		TOTAL		**15**	**1**	**20**	**375**	**50**	**50**	**25**	**75**	**250**	**50**	**875**	**26**

Sl.no.	Sub. Code	Name of Course	Study Scheme: Pre-req.	L	T	P	Theory Marks: End Exam	Theory Marks: Progressive Assessment: Class Test	Theory Marks: Progressive Assessment: Assignment	Theory Marks: Progressive Assessment: Attandance	Pract. Marks: End Exam	Pract. Marks: Progressive Assessment: Sessional	Pract. Marks: Progressive Assessment: Viva	Total Marks	Credits
1	EEE401	Circuits & Networks		3	0	2	75	10	10	5	25	25	0	150	4
2	EEE402	Electronics devices and Circuits I		3	0	2	75	10	10	5	25	25	0	150	4
3	EEE404	Digital Electronics		3	0	2	75	10	10	5	25	25	0	150	4
4	EEE405	Electrical Measurements & instrumentations		3	0	2	75	10	10	5	25	25	0	150	4
5	EEE407	Electrical Machines I		3	0	2	75	10	10	5	25	25	0	150	4
6	EEE510	Professsional Practice -II		0	0	2	0	0	0	0	0	50	0	50	1
7	G302	Development life skill-II		1	0	2	0	0	0	0	25	25	0	50	2
8	G105	Applied mathematics		3	1	0	75	10	10	5	0	0	0	100	4
9	G207	Fundamental Electrical & Electronics Engg.		3	0	2	75	10	10	5	25	25	-	150	4
		Total		22	1	16	525	70	70	35	175	225	0	1100	31

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

SEMESTER - IV

Sl.no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme							Total Marks	Credits
			Pre-req.	L	T	P	Theory Marks				Pract. Marks				
							End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assign ment*	Attenda nce		Session al	Viva		
1	EEE403	Electronics Devices and Circuits II		3	0	2	75	10	10	5	25	25	0	150	4
2	EEE406	Electronic Measurement & Instrumentation		3	0	2	75	10	10	5	25	25	0	150	4
3	EEE408	Electrical Machines II		3	0	2	75	10	10	5	25	25	0	150	4
4	EEE411	Electrical & Electronic Workshop Practice		1	0	6	0	0	0	-	25	25	0	50	4
5	EEE503	Power System		3	0	0	75	10	10	5	0	0	0	100	3
6	EEE409	Electrical Drawing using CAD.		1	0	4	0	0	0	-	25	25	0	50	3
7	EEE511	Professsional Practice -III		0	0	2	0	0	0	-	0	50	0	50	1
8	G303-G307	Environmental Education		3	0	0	75	10	10	5	0	0	0	100	3
		Total		**17**	**0**	**18**	**450**	**50**	**50**	**25**	**125**	**175**	**0**	**800**	**26**

SEMESTER- V

Sl.no.	Sub. Code	Name of Course	Pre-req.	L	T	P	End Exam	Class Test	Assignment	Attendance	End Exam	Sessional	Viva-Voce	Total Marks	Credits
				Study Scheme			Evaluation Scheme								
							Theory Marks				Pract. Marks				
								Progressive Assessment				Progressive Assessment			
1	EEE501	Microprocessors		3	1	2	75	10	10	5	25	25	0	150	5
2	EEE502	Power Electronics		3	1	2	75	10	10	5	25	25	0	150	5
3	EEE601-606	Elective-I		3	0	4	75	10	10	5	25	25	0	150	5
4	EEE410	Electrical Estimation and Costing.		2	1	4	50	10	10	5	25	25	0	125	5
5	EEE512	Professsional Practice -4		0	0	2	0	0	0	-	0	50	0	50	1
6	EEE506	Communication Engineering		3	1	4	75	10	10	5	25	25	0	150	6
		Total		14	4	18	350	50	50	25	125	175	0	775	27

SEMESTER-VI

Sl.no.	Sub. Code	Name of Course	Study Scheme				Evaluation Scheme								
							Theory Marks				Pract. Marks			Total Marks	Credits
			Pre-req.	L	T	P	End Exam	Progressive Assessment			End Exam	Progressive Assessment			
								Class Test	Assignment	Attendance		Sessional	Viva-voce		
1	EEE504	Switchgear & Protection		3	0	0	75	10	10	5	0	0	0	100	3
2	EEE505	Control Systems		3	1	2	75	10	10	5	25	25	0	150	5
3	EEE507	Testing and Maintenance of Machines and Equipments		2	0	4	0	0	0	-	25	25	0	50	4
4	EEE508	Project Work		0	0	10	0	0	0	-	0	50	50	100	5
5	EEE601-606	Elective-II		3	0	4	75	10	10	5	25	25	0	150	5
6	EEE513	Professional Practice -V		0	0	4	0	0	0	-	0	50	0	50	2
7	G303-G307	Entrepreneurship Development		3	0	0	75	10	10	5	0	0	0	100	3
		Total		14	1	24	300	40	40	20	75	175	50	700	27

1	EEE514	Industrial Training of three weeks, preferably in two phases (after acquiring 100 credits)												200	10
		Total												200	10

TERM - III

CIRCUITS & NETWORKS

L	T	P		Curr. Ref. No.:EEE-401	
3	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:		45	Total Marks:150	Progressive Assessment:	25
Practical :		30		**Practical**	
Pre Requisite				End Term Exam:	25
Credit:		4		Progressive Assessment:	25

RATIONALE:

The concept of electrical circuit and networks are very essential for the study of the other subjects in electrical and electronics engineering. This subject covers the basic electrical principle of DC and AC circuits. Electric circuit terminology, ac waveform and its various quantities, network theorems, interpret the response of R, L and C elements to single phase and three phase ac supply, calculate various parameters of ac circuit and network theorems have been covered in this subject. This subject finds utility in understanding the concepts in other electrical subjects such as such as Electrical Power System, Electrical Measurement and Instrumentation, & Electrical Machines etc.

THEORY:

DETAILED COURSE CONTENT:

UNIT	TOPIC/SUB TOPICS	HOURS
I	**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	4
II	**Alternating Current Supply**	4

	2.1. Sinusoidal ac voltage generation 2.2. Definition of various terms used in circuits and networks: amplitude, frequency, time period, RMS value, average value, form factor and peak factor	
III	**Network Theorems** 3.1. Superposition theorem 3.2. Thevenin's theorem 3.3. Norton's theorem 3.4. Maximum power transfer theorem	5
IV	**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 factor 4.3. Complex numbers - Rectangular and polar form and conversion between forms 4.4. Phasor Diagram	6
V	**3 Phase A.C. circuit** 5.1. 3-0 generation 5.2. Phase sequences 5.3. Y and A connected generator 5.4. Star-Delta transformation 5.5. Balanced three phase supply with Y connected loads 5.6. Balanced three phase supply with A connected loads 5.7. Unbalanced three phase supply with Y connected loads	10
VI	**Analysis of Series and Parallel Circuits in AC supply** 6.1. Series - parallel circuits (voltage, current,	10

		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	
VII	**Analysis of A.C. Networks** 6.1. Source conversion 6.2. Mesh analysis 6.3. Nodal analysis		6

SPECIFICA TION TABLE OF MARKS & HOURS DISTRIBUTION

Abbreviations: K=Knowledge level, **C**= Comprehension Level, **A**=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Over View Of Circuits And	4	4	-	2	6
2	Alternating Current Supply	4	5	3	-	8
3	Network Theorems	5	2	2	6	10
4	Single Phase AC Circuits	6	3	5	5	13
5	AC Circuits	10	4	4	4	12
6	Analysis Of Series And Parallel Circuits In AC Supply	10	2	4	6	12
7	Analysis Of A.C. Networks	6	-	4	10	14
	Total	48				75

LEARNING RESOURCES

a) Textbooks mentioned in the references

b) Laboratory manuals

LIST OF EXPERIMENTS

1. To observe A.C. waveform on C.R.O. Calculates 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 theorem in DC and AC circuit

5. To verify Norton's Theorem in 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

REFERENCE BOOKS

S. 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
5	Circuit & Networks: analysis & synthesis	Sudhakar, Tata McGraw Hill, New Delhi, 1st, 1994

ELECTRONICS DEVICES & CIRCUITS-I

L	T	P		Curr. Ref. No.:EEE-402	
3	0	2		**Theory**	
Total Contact Hours:			Total Marks:150	End Term Exam:	75
Theory:	45			Progressive Assessment:	25
Practical :	30			**Practical**	
Pre Requisite				End Term Exam:	25
Credit:	4			Progressive Assessment:	25

RATIONALE:

Electrical and electronics Engineering cannot stand alone without the study of analog electronics which consists of different electronics devices and circuits. The modern electrical and electronics equipment are mostly controlled by electronic circuits where both 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 the practical circuits is included in this subject rather than theoretical approach. Some problems on designing of simple electronic circuits have also been included here. This is a core group subject and it develops cognitive and psychomotor.

DETAILED COURSE CONTENT:

Unit	TOPIC/SUB TOPICS	HOURS
I	**1.1. Semiconductor Diodes** 1.1.1. Semiconductor physics To describe 1.1.2. The properties of semiconductor 1.1.3. The principle of conduction in crystal 1.1.4. Doping 1.1.5. Unbiased diode 1.1.6. Forward and reverse biased diode **1.2. Characteristics and application of diodes** 1.2.1. To describe the volt amp characteristics of diode 1.2.2. To explain the property of ideal diode	10

	1.2.3. To define the resistance of diode &describe the method of measurements	
	1.2.4. To describe practical diode	
	1.2.5. To state the important specifications of semiconductor diode	
	1.2.6. To describe the half wave and full wave rectifier circuits	
	1.2.7. To calculate the efficiency of rectifier circuit	
	1.2.8. To write the formulae of calculating the parameters of filter circuit	
	1.3. Special purpose diodes	
	1.3.1. To describe the characteristics and field of application of (a) zener diode (b) capacitive diode (c) light emitting diode (d) photo diode (e) schottky diode (f) tunnel diode (g) PIN diode	
II	**2.1. Bipolar Junction Transistor**	
	2.1.1. To describe the construction of transistor	
	2.1.2. To describe the working principle of transistor	
	2.1.3. To state the types of transistor	
	2.1.4. To describe the characteristics of transistor and method of drawing characteristics curves	
	2.1.5. To describe the amplifying characteristics in (a) common base	
	2.1.6. common emitter (c) common collector configuration	15
	2.1.7. To define (a) current amplification factor (b) collector current	
	2.1.8. emitter current (d) leakage current (e) input resistance (f) output resistance (g) base current amplification factor	
	2.1.9. To establish the relation between a and |3	
	2.1.10. To describe the method of drawing the (a) input characteristics curve (b) output characteristics	

		curve	
		2.1.11. To compare the characteristics of three different configurations e.g. CB, CE, CC	
		2.1.12. To analyze the load line of a transistor (both for dc & ac)	
		2.1.13. To describe the function of the heat sink of a transistor.	
		2.1.14. To write the specification of a transistor.	
		2.1.15. To state the conditions for faithful amplification.	
III		**3.1.** **Biasing of BJT**	
		3.1.1. To define transistor biasing and essential requirement of a transistor Biasing circuit.	
		3.1.2. To define the function of a small single stage amplifier, and calculate its voltage and power gain.	
		3.1.3. Classification of Amplifiers.	8
		3.1.4. To define the multistage amplifiers and different type of coupling.	
		3.1.5. To describe the different types of power amplifiers	
		3.1.6. To describe and draw the different stages of an amplifier used in PA system.	
		3.1.7. To study the feedback amplifier (concept of feedback, gain in feedback, advantage & disadvantage in feedback amplifiers).	
IV		**4.1. Sinusoidal Oscillators**	
		4.1.1. To state the type of electronic oscillators	
		4.1.2. To describe damped and un-damped oscillations	10
		4.1.3. To state the conditions of oscillation	

	4.1.4. To study different types of oscillators like Hartley, Colpitt, Phase-shift, Wein Bridge and Crystal oscillators and their application.	
V	**5.1. Wave Shaping Circuits** 5.1. To study the working of diode clipping and diode clamping circuit	2

SPECIFICA TION TABLE OF MARKS & HOURS DISTRIBUTION

Abbreviations: K=Knowledge level, **C**= Comprehension Level, **A**=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Semiconductor Diodes	10	5	9	6	20
2	Bipolar Junction Transistor	15	10	10	4	25
3	Biasing of BJT	8	2	4	2	8
4	Sinusoidal Oscillators	10	2	10	-	12
5	Wave Shaping Circuits	2	2	8	-	10
	Total	**48**				**75**

LEARNING RESOURCES:

a) Textbooks mentioned in the references
b) Laboratory manuals

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. Construct Hartley Oscillator and adjust (a) gain to obtain sinusoidal wave output and
(b) L-C to vary the frequency (2) Determine the resonance frequency and amplitude of Oscillation

13. Construct a phase shift Oscillator and adjust its gain to obtain sinusoidal output. Determine (a) gain and (b) frequency of oscillation during Oscillation

14. Construct the diode clipping and clamping circuit and observe the clipping level with change in biasing voltage

15. Construct a differentiating and integrating circuit by using R-C network.

REFERENCE BOOKS

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

DIGITAL ELECTRONICS

L	T	P		Curr. Ref. No.: EEE-404	
3	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:		45	Total Marks:150	Progressive Assessment:	25
Practical :		30		**Practical**	
Pre Requisite				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 the basic principles. So different topics of digital electronics have been included in this subject. As the field of Digital Electronics and Microprocessor is very vast the subject is divided into two parts. In the first part the study of fundamental principles, the study of combinational and sequential logic application of different IC chips have been included. The knowledge of digital to Analog and Analog to Digital converters are very essential for interfacing the analog to Digital System. So these topic have also been included.

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Marks
I	**1.1. Number system, radix conversion and binary codes:**	
	1.1.1. Definition of a) binary b) bit c)base or radix d)numeric code	
	1.1.2. Generalized equation for the conversion of a number from other systems to the decimal systems	10
	1.1.3. Conversion of a number from other systems to the decimal system by using the generalized equation	
	1.1.4. Conversion a) decimal number to binary	

	number b) octal to binary c) binary to octal d) hexadecimal to binary 1.1.5. e) binary to hexa decimal f) octal to hexadecimal g) hexa decimal to octal number. 1.1.6. Classification of the numeric codes 1.1.7. 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-correcting code m) alphanumeric code. 1.1.8. Performing i) binary addition ii) binary substraction iii) binary multiplication iv) binary division 1.1.9. Performing the a) 1's complement operation of binary number b) binary substraction by using 1's complement operation c) 2's complement operation d) binary substraction using 2's complement.	
II	**Digital Logic Circuit and Boolean algebra** 1. Description of (a) switching circuits (b) Logic gates (c) Symbols for logic gates (d) truth table for different type of gates 2. Realision of exclusive-OR in terms of basic building blocks 3. Universal building blocks and realisation of basic logic gates in terms of universal logic gates 4. Boolean Algebra for the verification De-Morgan's theorem and other Boolean Functions 5. Description of (a) sum of product (b) NAND gate realization (c) Product of Sum (d) NOR gate realization 6. Definition of (a) Minterm (b) Maxterm (c) canonical 7. Use of Karnaugh Map for simplification of Boolean equation (Karnaugh map utilizing Minterms and Maxterms)	8

III	**Combinational and arithmetic Logic Circuits**
	
	  1. Development of (a) Half Adder (b) Full Adder (c) Binary parallel Adder (d) Subtractor (e) Full & half subtractor (f) Adder / Subtractor in I's complement and 2's complement system (g) BCD addition and subtraction in 9's complement system (h) excess 3 adder and subtractor
	
	  2. Development of (a) comparators (b) Encoder (c) decoder, (d) multiplexing (e) demultiplexing (f) priority encoder (g) BCD to seven segment display decoder
	
	  3. Application of above circuit
		8

IV	**Sequential Circuits**
	
	  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
	
	  2. Application of the above circuits
	
	  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. To state the application of above counters
		10

V	**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)
		4

	(f) Bidirectional shift Registers (h) Universal Shift Register **5.2.** Connection diagram and application of IC Shift Registers		
VI	**Digital Memories** **6.1** Functions and applications of Digital memories like (a) RAM (b) ROM (c) PROM (d) PLA (e) FIFO	2
VII	**DA and AD converter** **7.1.** Explanation of working principles of **7.2.** D/A Converter with binary weighted register **7.3.** D/A converter with R and 2 R resistors **7.4.** Description of a practical circuit for using D/A converter in instrumentation and control circuit **7.5.** Working principle of a) Successive approximation A/D converters b) Single and dual slope integration ADC c) Parallel type ADC **7.6.** Practical circuit for using ADC in instrumentation and control circuit	3

LEARNING RESOURCES:

c) Textbooks mentioned in the references
d) Laboratory manuals

SPECIFICA TION TABLE OF MARKS & HOURS DISTRIBUTION

Abbreviations: K=Knowledge level, **C**= Comprehension Level, **A**=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Number system, Radix conversion and binary codes	10	5	2	8	15
2	Digital Logic circuit and Boolean Algebra	8	3	6	6	15
3	Combinational and Arithmetic Logic Circuits	8	-	8	2	10

4	Sequential Circuits	10	2	8	2	12
5	Shift Register	4	2	6	-	8
6	Digital Memories	2	3	3	-	6
7	DA and AD Converter	3	-	7	2	9
	Total	**48**				**75**

LEARNING RESOURCES

    a) Textbooks Mentioned in the references

    b) Laboratories Manuals

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 BOOKS:

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

ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

L	T	P		Curr. Ref. No.:EEE-405	
3	0	2		**Theory**	
Total Contact Hours:			Total Marks:150	End Term Exam:	75
Theory:	45			Progressive Assessment:	25
Practical :	30			**Practical**	
Pre Requisite				End Term Exam:	25
Credit:	4			Progressive Assessment:	25

RATIONALE:

The subject Electrical Measurement and Measuring Instruments is an important subject in the field of Electrical and Electronics Engineering and for the diploma holders those have to work as technical supervisor, maintenance engineer, production engineer in industries, electrical power generation, transmission and distribution system, traction installation system and machine operation etc. this subject deals with the technique of measuring voltage, current and powered by the indicating type instruments. The technique of measurement of electrical power in single phase and three phase circuits will be studied here. Measurement of energy and testing of energy meter 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.

DETAILED COURSE CONTENT:

Unit	Topic	Hours
I	**Introduction to Electrical Measuring** 1.1. Purpose of measurement and significance of measurement 1.2. Various effects of electricity employed in	**4**

	measuring instruments.	
	1.3. Desirable qualities of measuring instruments Systems of Units	
	1.4. To indicate the units and dimensions of the following: frequency, speed, acceleration, force, work, energy, power, charge, potential reactance, Conductance, capacitance, inductance, magnetic field, flux density, magnetic flux.	
	Types of Instruments 2.1. To classify different type of instruments e.g. indicating integrating, and recording. 2.2. To describe type of(a) deflection system (b) Controlling System and (c) damping systems. 2.3. To describe the advantage and disadvantages of above mentioned systems. 2.4. To describe the constructional detail of pointer, control spring and Instrument bearings. 2.5. Types of errors 2.6. Different types of torque in Analog Instruments.	6
	Construction and Working principles 3.1. To describe the constructions, working principles for following instruments 3.2. moving coil instruments 3.3. moving iron instruments 3.4. Electrodynamic instruments (air cored and iron cored 3.5. Induction instruments 3.6. Electrostatic Instruments 3.7. Thermal instruments	7

	Extension of Range of instruments and conversion 4.1. To describe the method of extensions of range of ammeters and 4.2. To describe the method of extensions of range of Voltmeters (D.C Meters) 4.3. Describe the concept of Swamping resistor 4.4. To describe the method of extension of range of ammeter and voltmeter (A.C meters)	**5**
	Measurement of Resistance 5.1. To classify the resistance according to the range values 5.2. To describe method of measurement of resistances 5.3. To state ammeter voltmeter method of measurement (Connection for ammeter for different ranges of resistance state the sources of error in different measurement techniques) 5.4. To state method of substitution for the measurement of resistance. 5.5. To state wheat-stone bridge principle of measurement of resistances with precautionary measures 5.6. To describe the Kelvin-Double bridge principle. 5.7. Deduce the expression for calculation for the value of unknown resistance. 5.8. Discuss the methods for eliminating the errors for measurements. 5.9. To describe the basic principles of series and shunt ohmmeter 5.10. To describe the constructions working principles of Megger. 5.11. State the type of Megger tester and their field of application (Insulation Tester & Earth Tester).	**10**

		Measurement of Power	
		6.1. To describe the method of connecting a wattmeter for measurement of single-phase power	
		6.2. To describe the method of measuring single phase power by (a) three ammeter and (b) three voltmeter method	**4**
		6.3. To describe the method of measurement of p.f by using wattmeter, voltmeter and Ammeter in single-phase circuit.	
		6.4. To describe the method of three phase power by two wattmeter method	
		Energy Meter	
		7.1. To describe the construction and working principle of D.C Energy meters	
		7.2. To describe the construction and working principles of Induction Type Energy Meter.	**4**
		7.3. To describe the method of testing of Energy meter	
		Bridges and Potentiometers	
		8.1. To describe the principles of A.C Bridges on the following	
		8.2. Capacitance comparison Bridge	**4**
		8.3. Describe the precautionary measure to be taken for high frequency measurement(Description of the method of Wagner's Earth Connection)	

LEARNING RESOURCES:

    a) Textbooks mentioned in the references

    b) Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Introduction to Electrical Measurement	4	3	2	-	5
2	Types of Instruments	6	3	7	-	10
3	Construction and Working principles	7	-	12	-	12
4	Extension of Range of instruments and conversion	5	-	6	4	10
5	Measurement of Resistance	10	3	9	6	18
6	Measurement of Power	4	2	6	-	8
7	Energy Meter	4	-	6	-	6
8	Bridges and Potentiometers	4	-	6	-	6
	Total	**44**				**75**

LIST OF EXPERIMENT

1. Dismantling and Assembly of indicating type instrument PMMC type, identification and drawing the following

2. deflecting system

3. Controlling System

4. Damping System

5. Dismantling and assembly of indicating type instrument e.g. 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

6. 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.

7. Dismantling and assembly of Single phase energy meter, identification and

8. drawing of (a) deflecting system (b) braking system (c) current coil (d) potential coil (e) creep adjustment (f) Pf adjustment (g) speed   adjustment

9. Extension of Range of a PMMC voltmeter

10. Measurement of resistance by Wheatstone Bridge (and Kelvin's Double Bridge)

11. Measurement of Medium Value resistance by Ammeter Voltmeter method

12. Measurement of earth resistance.

13. Measurement of insulation resistance by Megger.

14. Use of potentiometer for the measurement of Resistance and EMF

REFERENCES BOOKS

S. No.	Title	Author/ Publisher/Ed./ Year
1	Instrumentation for Engineering Measurements	Cerni& Foster; Tata McGraw Hill, New Delhi5th, 1986
2	Instrumentation for Engineering Measurements	Dally, J.W. et al; John Wiley & Sons, New York1st, 1984
3	Electrical & electronic measurement & instruments	Rambhadran, S,;Delhi: Khanna Publishers1st, 1994
4	Electronic Measurements & Instrumentation	Rao &Sutrave; NiraliPrakashan, Pune 2nd 1988
5	A course in electrical & electronic measurements and	Sawhney, A.K., Delhi: Dhanpat rai & sons4th, 1987
6	A course in Electrical & Electronic Measurements & Instruments	Sawhney; Dhanpatrai& Sons, Delhi11th, 2000
7	Electrical measurements & measuring instruments	Suryanarayana, New Delhi, Tata McGraw Hill 1st, 1994

ELECTRICAL MACHINES-I

L	T	P		Curr. Ref. No.:EEE-407	
3	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:		45	Total Marks:150	Progressive Assessment:	25
Practical :		30		**Practical**	
Pre Requisite				End Term Exam:	25
Credit:		5		Progressive Assessment:	25

RATIONALE:

This subject deals with the working principles and operation of electrical machine. The application of DC machines in modern industries are still in practice. The electrical engineering technicians has to look after the installations, operation and control of electrical machines. So the knowledge of electrical machine are very essential in this regard. As the field of electrical machine is very vast, this subject is divided into two parts electrical machine-I and Electrical machine-II. The Electrical Machines-I deals with DC machine and transformers, though modern industries are now-a-days uses ac motors and alternating mostly, the usage of dc machines like dc motors, generators are still in practice. The usage of transformers are also very widely used in industry so that these topics have been included in this subject.

DETAILED COURSE CONTENT:

Unit	Topic	Hours
	D.C Machine	
	6.1. Construction & Working principle of D.C. Machines, Fleming's Right Hand and Left Hand Rule.	
	6.2. To describe the Magnetic Circuit in a D.C. Machine	10
	6.3. To define geometrical axis and central axis.	
	6.4. To describe Armature Winding	

		6.5. To describe the brush positions	
		6.6. To define lap and wave winding	
		6.7. To state the field of application of Lap and Wave winding	
		6.8. To state the function of equalizing ring and dummy coils	
		6.9. To state the types of D.C. machines	
		6.10. On the basis of connection of field Coil with armature.	
		6.11. To define cumulative and differential compound machines.	
		D.C Generator	
		6.1. To describe the working principle of D.C. Generator	
		6.2. To write the emf. Equation of D.C. Generator	
		6.3. To state the method of determining O.C.C. curve of D.C. Generator (selfexcited)	
		6.4. To define critical resistance and critical speed	10
		6.5. To describe the armature reaction	
		6.6. To state the method of reducing the effect of armature reaction	
		6.7. To describe the load characteristics of D.C. Generator	
		6.8. To state the application of D.C. Generator	
		6.9. To solve problems on D.C. Generator	
		D.C Motor	
		6.1. To describe the working principle of D.C. Motor	
		6.2. To state the significance of back emf	
		6.3. To write the torque equation of D.C. Motor	10
		6.4. To describe the characteristics of	
		6.5. Speed Vs. armature Current	
		6.6. Torque Vs. armature current	

		6.7. Speed Vs. torque characteristics.	
		6.8. Speed Vs. field current characteristics	
		6.9. To state the field of application of Different type of D.C .Motor	
		6.10. To state the basic principle of starting of D.C. Motors	
		6.11. To describe the speed control of D.C. Motor by	
		6.12. y varying field current ii) By varying armature voltage	
		6.13. To describe the speed reversal method of D.C. Motor solve the problems on D.C. Motor (specify the areas)	
		Transformer	
		6.1. To define a Transformer & state its basic principle	
		6.2. To state the classification of transformer based on (application & construction)	
		6.3. To describe the construction of transformer	
		6.4. To prepare the list of components used	
		6.5. To describe the composition of the components	
		6.6. To state the type and nature of cooling of transformers	
		6.7. To describe the working principle of transformer.	15
		6.8. To describe transformer on (a) no-load (b) full load	
		6.9. To derive the emf equation of transformer	
		6.10. To state the effect of leakage flux and leakage reactance of transformer	
		6.11. To describe the Phasor Diagram on no load (specify whether ideal or actual)	
		6.12. To describe the actual approximate equivalent circuit	
		6.13. To determine the equivalent resistance,	

		reactance impedance referred to either side					
	6.14.	To determine percentage resistance, reactance and impedance of transformer					
	6.15.	To draw the phasor diagrams on load at different pf's					
	6.16.	To describe different type of losses in transformer					
	6.17.	To calculate the losses and efficiencies of transformer					
	6.18.	To state the condition for maximum efficiency of transformer					
	6.19.	To state the procedure for testing of transformer					
	6.20.	To describe the open circuit test and short circuit test					
	6.21.	To determine the voltage regulation of a transformer					
	6.22.	To describe the construction of Auto transformer					
	6.23.	To describe the working principle of Auto transformer					

LEARNING RESOURCES

a) Textbooks mentioned in the references.
b) Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS DISTRIBUTION

K=Knowledge level, C= Comprehension Level, A=Application level

Chapter No.	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	DC Machine	10	8	12	-	20
2	DC Generator	10	3	8	4	15

3	DC motor	10	4	8	3	15
4	Transformer	15	10	10	5	25
	Total	**48**				**75**

6. PRACTICAL EXPERIENCES

1. Dismantling of a d.c. machine and study its different parts.
2. Determination of No load characteristics/Drawing of OCC curve of D .C. Machine
3. Study of a single phase Transformer
4. Polarity Test on a single phase transformer
5. To determine the speed torque, speed armature current and torque armature current characteristics of a D.C. Motor (Shunt and Compound).
6. To control the speed of a D.C. Shunt Motor by (a) armature voltage Variation (b) field current variation.
7. To assemble and test the speed reversal circuit of a D.C. Shunt Motor
8. To study of transformer on No load and draw the no load phasor diagram
9. To determine the (a) no load loss (b) full load loss (c) efficiency and percentage regulation of a single phase transformer.
10. To determine the phasor diagram of transformer on load at different pfs

REFERENCES BOOKS

S.No.	Title	Ed. / Year	Author & Publisher
1	Electrical Machines		B L Theraja
2	Electrical Machines		Bimbhra, P.S.; Khanna Publishers, New Delhi1996
3	Elementary Electrical Engineering		Gupta, M.L., New Heights, New Delhi18th, 1992
4	Basic Electrical Engineering		Mittle, V.N., Tata McGraw-Hill, New Delhi1990
5	Transformers		BHEL Bhopal; Tata McGraw-Hill, New Delhi1991

PROFESSINAL PRACTICES – II

L	T	P		Curr. Ref. No.:EEE-407	
0	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	0
Theory:		0	Total Marks:150	Progressive Assesment:	0
Practical :		30		**Practical**	
Pre Requisite				End Term Exam:	0
Credit:		1		Progressive Assesment:	50

RATIONAL

To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.

AIM

 Student will be able to:

- Acquire information from different sources.
- Prepare notes for given topic.
- Present given topic in a seminar
- Interact with peers to share thoughts.
- Prepare a report on industrial visit, expert lecture

Contents

Activities

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.

TWO industrial visits may be arranged in the following areas / industries:

1) Manufacturing organizations for observing various manufacturing processes including heat treatment
2) Material testing laboratories in industries or reputed organizations
3) Auto workshop / Garage
4) Plastic material processing unit

5) ST workshop / City transport workshop

Lectures by Professional / Industrial Expert be organized from **ANY THREE** of the following areas:

i.	Use of a plastics in automobiles.
ii.	Nonferrous Metals and alloys for engineering applications
iii.	Surface Treatment Processes like electroplating, powder coating etc.
iv.	Selection of electric motors.
v.	Computer aided drafting.
vi.	Industrial hygiene.
vii.	Composite Materials.
viii.	Heat treatment processes.
ix.	Ceramics
x.	Safety Engineering and Waste elimination

Individual Assignments:

Any two from the list suggested

a) Process sequence of any two machine components.

b) Write material specifications for any two composite jobs.

c) Collection of samples of different plastic material or cutting tools with properties, specifications and applications.

d) Preparing models using development of surfaces.

e) Assignments on bending moment, sheer forces, deflection of beams and torsion chapters of strength of material.

f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.

g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes.

h) List the various properties and applications of following materials - a. Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers.

OR

Conduct **ANY ONE** of the following activities through active participation of students and write report

     i.   Rally for energy conservation / tree plantation.
     ii.   Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.
     iii.   Conduct aptitude , general knowledge test , IQ test
     iv.   Arrange **any one** training in the following areas :
                a) Yoga. B) Use of firefighting equipment and First aid

    Maintenance of Domestic appliances.

Modular courses (Optional):

A course module should be designed in the following areas for max. 12 hrs. Batch size - min. 15 students.

Course may be organized internally or with the help of external organizations.

a) Forging Technology.
b) CAD-CAM related software.
c) Welding techniques.
d) Personality development.
e) Entrepreneurship development.

3-D Design Using Software

Computer screen, coordinate system and planes, definition of HP, VP, reference planes How to create them in $2^{nd}/3^{rd}$ environment. Selection of drawing site & scale. Commands of creation of Line, coordinate points, Axis, Poly lines, square, rectangle, polygon, sp line, circles, ellipse, text, move, copy, offset, Mirror, Rotate, Trison, Extend, Break, Chamfer, Fillet,Curves, Constraints fit tangency, perpendicularity, dimensioning Line convention, material conventions and lettering.

The Student should draw - different orthographic Views (including sections), Auxiliary views according to first/ Third angle method of projection. (Minimum two sheets, each containing two problems) after learning the contents as above.

DEVELOPMENT OF LIFE SKILL –II

L	T	P		Curr. Ref. No.: G 302	
1	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	0
Theory:		15	Total Marks:50	Progressive Assesment:	0
Practical :		30		**Practical**	
Pre Requisite				End Term Exam:	25
Credit:		2		Progressive Assesment:	25

Rational:

The nature of organization is changing at very rapid speed in this competitive world. In this situation the responsibility of diploma holder is not unique. He will be a part of a team in the organization. As such the individual skills are not sufficient to work at his best. This subject will develop the student as an effective member of the team. It will develop the abilities and skills to perform at higher degree of quality as an individual as well as a member of core group or team.

Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, and solving challenging problems. The subject is classified under Human Science.

UNITS	Contents	Hours
I	**Inter personal Relation** Importance, Interpersonal conflicts, Resolution of conflicts, Developing effective interpersonal skills communication and conversational skills, Human Relation Skills (People Skills)	
II	**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	
III	**Presentation Skills** Concept, Purpose of effective presentations, **Components of Effective Presentations:** Understanding the topic, selecting the right information, organizing the process interestingly, Good attractive beginning, Summarising and concluding, adding impact to the ending, **Use of audio visual aids** OHP, LCD projector, White board, **Non verbal communication:** Posture, Gestures ,Eye contact and facial expression, Voice and Language Volume, pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language Handling questions Respond, Answer, Check, Encourage, Return to presentation **Evaluating the presentation** : Before the presentation, During the presentation, After the presentation	
IV	**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	
V	**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	
VI	**Non verbal graphic communication** Nonverbal codes: A. Kinesics B. Proxemics C. Haptics D. Vocalics E. Physical appearance F. Chronemics Artifacts Aspects of Body Language	
VII	**Formal Written Skills:** Memos, Emails, Netiquettes, Business correspondence Letter of enquiry, Letter of Placing Orders, Letter of Complaint	

		Total	

	Sessional Activities	
Unit I. Interpersonal Relation	**Case Studies:** 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies	
Unit II Problem Solving	**Case Studies:** 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies	
Unit III Presentation Skills	Prepare a Presentation (with the help of a Power point) on a Particular topic. The students may refer to the Sessional activity (sl.No.8) of the Computer Fundamental syllabus of SemesterI. For engineering subject oriented technical topics the cooperation of a subject teacher may be sought. Attach handout of PPT in the sessional copy	
Unit IV **Looking for a job**	Write an effective CV and covering letter for it. Write a Job Application letter in response to an advertisement and a Self Application Letter for a job.	
Unit V Job Interviews & Group Discussions	Writedown the anticipated possible questions for personal interview (HR) along with their appropriate responses Facemock interviews. The co-operation of HR personnels of industries may be sought if possible Videos of Mock Group Discussions and Interviews may be shown	
Unit 7 Formal Written Skills	Write a memo, Write an effective official e-mail, write a letter of enquiry, letter of placing orders, letter of complaint	

LEARNING RESOURCES:

a) Textbooks mentioned in the references

b) Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	Total Marks
1	Inter Personal Relation		
2	Problem Solving		
3	Presentation Skills		
4	Looking for a Job		
5	Job Interview		
6	Non-Verbal graphic Communication		
7	Formal Written Skills		
	Total		

APPLIED MATHEMATICS

L	T	P		Curr. Ref. No.: G105	
3	1	0		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:		45	Total Marks:	Progressive Assessment:	25
Practical :				**Practical**	
Pre Requisite				End Term Exam:	0
Credit:		4		Progressive Assessment:	0

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.

DETAIL COURSE CONTENT THEORY:

UNIT	TOPIC/SUB-TOPIC	HRS
	Numerical Analysis **1.1 Interpolation.** introduction to interpolation. Lagrange's interpolation formula. The operators , and .Relation between them. Difference Table. Newton's forward and backward interpolation formula. Concept of extrapolation. **1.2 Numerical Differentiation and Integration.** Newton's forward and backward difference formula for differentiation at any point **1.1. Numerical Integration.** (i) Trapezoidal rule and Simpson's rd rule. **1.1. Numerical Solution of Ordinary Differential Equation** Introduction. Runge Kutta's 2nd and 4th order methods.	15

	Differential Equations (ordinary) 1) Introduction. 2) Order and degree of a differential equation. 3) Formation of Differential Equations. 4) Solution of a Differential Equation. 5) Differential equation of the first order and first 6) Variables separable. 7) Homogeneous Differential Equations. 8) Linear Differential Equations. 9) Equations reducible to linear form. 10) Exact differential Equations. 11) Equations reducible to the exact form. 12) Linear Differential Equations of second order with constant coefficients. 13) Complete solution = Complementary Function + Particular Integral. 14) Method of finding Particular Integral. 15) Applications of differential equations to electrical circuit problems. 16) Problems related to other physical systems.	**15**
	Graph Theory 1) Introduction. 2) Basic Terminology. 3) Simple Graph, Multigraph and Pseudo graph. 4) Degree of a Vertex. 5) Types of Graphs. 6) Subgraphs and Isomorphic Graphs. 7) Operations of Graphs. 8) Paths, Cycles and Connectivity. 9) Eulerian and Hamiltonian Graph. 10) Shortest Path Problems using known Algorithm 11) Representation of Graphs. 12) Planar Graph. 13) Graph Colouring.	**20**
	Discrete Mathematics 1) The principle of Inclusion and Exclusion with with examples 2) Generating Functions. 3) Introductory examples. 4) Definition and examples of Calculation Techniques 5) Partition of integers with problems. 6) Exponential Generating function with problems Recurrence Relations. 1) First order linear recurrence relations 2) Second order linear homogeneous recurrence Relations with constant coefficients. 3) Non-homogeneous recurrence relations	**10**

	4) Method of generating functions 5) Problems on all the above topics.	

LEARNING RESOURCES

    a)   Textbooks mentioned in the references
    b)   Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Numerical Analysis	15	2	12	4	18
2	Differential Equations	15	2	15	4	21
3	Graph Theory	20	6	12	8	26
4	Discrete Mathematics	10	3	3	4	10
	Total	**60**				**75**

REFERENCE BOOKS:

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

FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

L	T	P		Curr. Ref. No.: G 207	
3	0	2		**Theory**	
Total Contact Hours:			Total Marks:150	End Term Exam:	75
Theory:		45		Progressive Assessment:	25
Practical :		30		**Practical**	
Pre Requisite:				End Term Exam:	25
Credit:		4		Progressive Assessment:	25

RATIONALE:

For a diploma holder in electrical and 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 electronics components, their function and applications. This understanding should facilitate in operation and maintenance of equipment, which are used in various manufacturing process in industries, power system operation, communication system computer system. Etc.

DETAILED COURSE CONTENT:

UNIT	TOPIC	HOURS
I	**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	3
II	**DC CIRCUIT** 2.1. Ohm's Law	8

	2.2. Kirchhoff's current Law	
	2.3. Kirchhoff's voltage law	
	2.4. Analysis of series and parallel resistive circuits	
	2.5. Node voltage and loop current analysis	
	2.6. Power and Energy in such circuits.	
	2.7. Network Theorems-The venin's theorem	
	2.8. Norton's theorem	
	2.9. Maximum Power transfer theorem.	
	2.10. Superposition theorem.	
	2.11. Illustrated examples in DC circuits	
	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 3.3. voltage and current 3.4. Meaning of lagging and leading of sinusoidal wave 3.5. Mathematical expression of sinusoidal voltage and current 3.6. Phasor representation of sinusoidal voltage and current 3.7. Definition of real power, reactive and apparent power 3.8. Power Triangle and power factor. 3.9. Analysis of R circuit with Phasor diagram 3.10. Analysis of R-L circuit with Phasor diagram 3.11. Analysis of R-C circuit with Phasor diagram 3.12. Analysis of R-L-C circuit with Phasor diagram 3.13. Illustrative examples involving series and parallel circuits 3.14. Necessity and advantages of three phase systems . 3.15. Balanced supply and load in three phase systems.	10
	SEMICONDUCTOR AND DIODES 4.1. Introduction to Semiconductors, energy band theories 4.2. Intrinsic and Extrinsic semiconductors 4.3. Potential barrier,	4

	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	
	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 & FET 6.1. Introduction to Transistor 6.2. V -1 characteristics of transistor 6.3. Transistor in active saturation and cut -off region **6.4.** Transistor as amplifier 6.5. Introduction to FET 6.6. Construction of JFET 6.7. Mechanism of operation of a JFET 6.8. Characteristics of JFET 6.9. Compare JFETs and BJTs **6.10.** Introduction to OP-AMP	6
	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 complements arimethic 7.5. Gray codes and excess 3 codes 7.6. ASCII code 7.7. Weighted codes	5

	7.8. Logic gates –OR, AND, NOT, NOR, NAND and XOR	
	7.9. Universal Logic gates	
	7.10. Illustrated examples related to number system and logic gates	
	BOOLEAN ALGEBRA	3
	7.1. Boolean variables	
	7.2. Boolean functions	
	7.3. Rules and laws of Boolean algebra	
	7.4. De-morgan's theorem	
	7.5. Algebraic reduction of Boolean expressions	
	7.6. Realizations of Boolean expression with logic circuit	
	7.7. Karnaugh Map techniques	

LEARNING RESOURCES:
1. Textbooks mentioned in the references
2. Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS
K=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Technical terms and Definitions with	3	3	-	3	6
2	Dc Circuits	8	4	2	4	10
3	Fundamentals of Ac Circuits	10	3	4	5	12
4	Semiconductor and diodes	4	2	4	-	6
5	Diode Circuit Applications	6	2	6	2	10
6	Bipolar Junction transistor and Field Effect Transistor	6	2	10	-	12
7	Numbers system and Logic Gates	5	3	4	4	11
8	Boolean Algebra	3	2	-	6	8
	Total	45				75

LIST OF EXPERIMENTS:

1. To Observe AC waveform on CRO and to calculate average and RMs values ,

Frequency, Time Periods.

2. To verify Kirchhoffs Law in DC circuit

3. To verify thevenin's theorem in DC and AC circuits.

4. To verify Super -position theorem in DC and AC circuits

5. To verify Norton's theorem in dc and AC circuits

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 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-morgans theorem.

REFERENCE BOOKS

1. Text Book of Electrical Technology Vol-I by BL theraja, Khanna Publishers, Neww Delhi.

2. Basic Electrical Engineering Vol-I by P S Dhogal and SK Mandal, Tata McGraw-Hill, New Delhi.

3. Principles of Electrical and Electronics Engineering by VK Mehta, S. chand, New Delhi

4. Basic Electronics by JB Gupta, S.K Kataria and Sons, New Delhi

5. Basic Electronics by SK Mandal, McGraw-Hill, New Delhi

6. Principles of Electronics by AP Malvino, Tata MCGraw Hill, New Delhi.

7. Digital Electronics Principles and Applications by SK Mandal, Tat McGraw-Hill, New Delhi.

TERM - IV

ELECTRONICS DEVICE AND CIRCUITS -II

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

RATIONALE

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

DETAILED COURSE CONTENT:
THEORY:

Unit	Topics/Sub-topics	Hours
	Uni-junction Transistor To describe the construction, working principle and characteristics of Uni-junction Transistor To define (a) emitter current (b) negative resistance region (c) saturation region. To describe the UJT relaxation Oscillator circuit and write expression for the time period of the oscillator To state some application of UJT relaxation oscillator	5

	Field Effect transistor 1. To describe the construction, operation and characteristics of Junction Field Effect Transistor 2. To define (a) channel Ohmic region (b) Pinch off region (c) Drain resistance (d) Trans conductance 3. To describe the effect of temperature on FET parameters	5	
	MOSFET (Metal Oxide Semiconductor Field Effect Transistor) To describe (a) Depletion MOSFET (b) Enhancement MOSFET To differentiate the characteristics of JFET and MOSFET To describe (a) the handling precautions of MOSFET, (b) CMOS	5	
	Opto Electronic Devices To describe the Electromagnetic spectrum of Light To list the application of photo Electronic Devices To describe the photoconductive sensors e.g. Bulk-type photoconductive cells PN photodiode PIN photodiode Avalanche Photodiode NPN Photodiode NPN Phototransistor Photo Darlington Transistor To describe the applications of Photodiodes and phototransistors To describe the function of light Emitters e.g. (a) LED's (b) Infrared Emitters (c) Laser diode To describe the functions of (a) Photo-couplers (b) Application of the photo coupler circuit	10	

	Differential amplifier To define a differential amplifier and explain its significance To describe four different configuration of the differential amplifier To deference the voltage gain, differential input resistance and output resistance	5
	Operational Amplifier To define operational amplifier To draw the circuit symbol for a 741 Op-amp and show in number for each terminal. To describe the power supplies required for Op-amp circuits 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 To state the seven important properties of the ideal Op-Amp To define (a) open loop Op-Amp configuration (b) differential amplifier (c) inverting amplifier (d) non-inverting amplifier To define (a) ground terminal (b) virtual ground To draw the (a) inverting and non-inverting amplifier circuit	15

	To calculate the close gain of (a) inverting and non-inverting amplifiers
	To develop mathematical expression and state the applications of (a) adder (b) subtractor (c) integrator (d) differentiator circuit (e) voltage follower
	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
	Describe (a) zero crossing detector with hysteresis (b) voltage to current converter (c) currents to voltage converter
	To explain the operation of a multi vibrator circuit and sketch its output voltage waveform and calculate the frequency of Oscillation
	To develop a basic differential amplifier using Op- Amp
	To develop basic differential amplifier using op-amp
	To describe the (a) low pass (b) high pass and (c) Band pass filter

LEARNING RESOURCES:

1. Textbooks mentioned in the references
2. Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, C= Comprehension Level, A=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Uni-junction Transistor	5	3	2	2	7
2	Field Effect Transisitor	5	3	3	2	8
3	MOSFET	5	6	5	4	15
4	Opto Electronics Devices	10	3	2	3	8
5	Differential Amplifier	5	4	5	3	12
6	Operational Amplifier	15	8	7	10	25

	Total	45				75

LIST OF EXPERIMENTS:

1. To draw the Emitter characteristics curve of the junction Transistor and identify cutoff, negative resistance region and saturation region of the device.

2. Construct a UJT Relaxation Oscillator circuit and (a) measure the peak value of (a) Curiffer voltage (b) output voltage (c) frequency of oscillation at different value of R.C.

3. To draw the (a) Drain currents for different values of Vos (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 Ri and Rf. 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 Ri and Rf. Also check the polarity of input output signals (use IC741)

7. Construct the adder and subtractor circuit using IC 741 and verify the output voltage with various input voltages

8. Construct an integrator circuit and note the output waveform for a square wave input

9. Construct a differentiation circuit and note the output wave form for a triangular input voltage.

10. To develop a comparator circuit and note the output waveform with sinusoidal input and (a) zero volt (b) positive voltage and (c) negative voltage inputs as the reference input at the non-inverting input terminals.

11. To Develop a square wave / triangular wave generator circuit by using IC 741 as square wave generator and integrator

12. To develop (a) voltage to current and (b) current to voltage converter circuit and check and adjust its linearity

13. To use a IC 741 in differential mode and check its common mode rejection capability

14. To develop an instrumentation amplifier by using three IC 741
15. To establish an astable multi vibrator circuit by using IC 555
16. To establish a Monostable multi-vibrator circuit by using IC 555
17. To develop a pulse width modulator circuit by using a 555 timer
18. To develop a regulated power supply unit using (a) step down transformer (b) Four arm bridge rectifier (c)Filter and (d) three terminal 7800 group IC regulator
19. Perform the test for different load current and input voltage and determine percent regulation
20. Develop an adjustable d.c. Voltage regulator using LM 317
21. Use a 3 ^ digit digital Multi meter for measurement of (a) D.C. voltages (B) A.C. voltages (c) frequency of a signal (d) Value of resistor (e) value of inductors (f) value of capacitor
22. Use a 3 ^ digit digital Multimeter to perform the good bad test of (a) diode (b) transistor

    (c) SCR.
23. Use a 3 % digit digital Multimeter to measure (a) true RMS (B) Average and (c) peak value
24. of a rectified sine wave and find its form factor and peak factor
25. Use a dual trace CRO along with a signal generator to note (a) different type of wave forms of the output of signal generator (b) The amplitude and frequency of wave form (c) phase relation between two phase shifted wave forms

REFERENCE BOOKS:

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.

ELECTRIONICS MEASUREMENT & INSTRUMENTATIONS

L	T	P		Curr. Ref. No.: EEE 406	
3	0	2		**Theory:**	
Total Contact Hours:			Total Marks:150	End Term Exam:	75
Theory:	45			Progressive Assessment:	25
Practical :	30			**Practical:**	
Pre Requisite:				End Term Exam:	25
Credit:	4			Progressive Assessment:	25

RATIONALE

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

DETAILED COURSE CONTENT:

Unit/ Module	Topic/Sub-Topic	Hours
	Measurement Fundamentals 1. Explanation of accuracy, precision, sensitivity, resolution, dynamic range, response and repeatability of measuring instruments. 2. Role of Units in measurements and different types of units - Type of errors - Definition of Primary and Secondary Standards - Concept of Calibration	6
	Electronic Voltmeter & Multi Meter 1. Advantages of electronic voltmeter over ordinary voltmeter. 2. Working principle of Digital Multi Meter - Different types of DMM: Integration and successive	6

	approximation type. 1. Advantages of DMM over Conventional Multi Meter	
	Measurement with CRO: Dual Trace Oscilloscope : Working Principle; Uses of Oscilloscope for frequency response measurement; Digital Storage Oscilloscope : Working Principle; uses in the field of Transient responses. X-Y Display Unit: Working Principle; Uses as phase measurement	8
	Frequency Measurement Comparison method; Capacitor charge discharge method; Pulse counting Method by Digital frequency meter; Detail study of digital frequency meter.	5
	Phase Shift Measurement Oscilloscopic Method Null balance method Phase shift to pulse conversion method Phase shift measurement by pulse counting Phase shift measurement by Intermediate frequency (IF) method Study of phase shifters	6
	Power Measurement Basic power measurement method Power measurement method by terminating (absorption) method Feed-through power measurement Low-level power measurement	6
	Signal Conditioning and Data Acquisition System (DAS) Need of signal acquisition circuit with measuring sensor.	8

	Use of Op amp as inverting, non-inverting, summing, integrator, differentiator as signal conditioning after measuring sensor. Instrumentation amplifier design, characteristics and application. Introduction to DAS Block diagram of multichannel DAS. Application of DAS.	

LEARNING RESOURCES:

1. Textbooks mentioned in the references
2. Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, C= Comprehension Level, A=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Measurement Fundamentals	6	4	4	2	10
2	Electronics Voltmeter & Multi-meter	6	2	6	-	8
3	Measurement with CRO	8	2	7	3	12
4	Frequency Measurement	5	2	4	-	6
5	Phase Shift Measurement	6	2	7	3	12
6	Power Measurement	6	4	8	-	12
7	Signal Conditioning and Data Acquisition System (DAS)	8	3	8	4	15
	Total	45				75

LIST OF EXPERIMENTS

1. Use (a) 3/ Digit (b) 3% 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

5. lysleristicsloop

6. Measurement of ground resistance by Kelvin's Double Bridge

7. Measurement of inductance by Masewell's Bridge and Comparing of the value by measuring it with Commercial Digital R-C-L bridge and 3% DigittalMultimeter.

8. Measurement of capacitance by wien Bridge and Comparing of the Measurement ofd value from those of commercial Digital R-C-L bridge and 3% Digit Digital Multimeter.

9. Measurement of frequency by Reed type frequency meter and Comparing of the value from the value measured by Digital Frequency meter of 3% Digital Multimeter.

10. Study electronic Power measurement circuit by power integration method.

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

REFERNCE BOOKS

1. Handbook of measurement Science. Volume I. Theoretical Fundamentals by P.H. Sydenham, John Wiley and Sons, 1982. .

2. Handbook of measurement Science. Volume II. Practical Fundamentals by P.H. Sydenham, John Wiley and Sons, 1983.

3. Handbook of measurement Science. Volume III by P.H. Sydenham, John Wiley and Sons

4. Measurement Systems, Application and Design, by E.O. Deobelin, McGraw-Hill, 1990.

5. Handbook of transducers by H. N. Norton, Prentice Hall.

6. Microsensors Principles and Applications by W. Gardner, John Wiley, 1994.

7. Semiconductor Sensors by S.M. Sze (Ed.), John Wiley and Sons, 1994.

8. Intelligent Instrumentation by George c. Barney , PHI

9. Electronic Instrumentation by H.S. Kalsi, TMH

10. Principles of Industrial Instrumentation by D. Patranabis, TMH

ELECTRICAL MACHINES-II

L	T	P		Curr. Ref. No.: EEE 408	
3	0	2		**Theory**	
Total Contact Hours:			Total Marks:150	End Term Exam:	75
Theory:		45		Progressive Assessment:	25
Practical :		30		**Practical**	
Pre Requisite:				End Term Exam:	25
Credit:		4		Progressive Assessment:	25

RATIONALE

The subject electrical machine-II is a subject, which deals with the ac machines, induction motors, synchronous alternators, fractional horse power motors and three phase transformers. In this subject the construction, working principles, starting principles are to be studied. The testing of the machines and the brief design ideas have also been included here. In addition to the theoretical study of the topics as mentioned above care has been taken for including the practical aspects of the topics. A few problems have aslo been included here, so that the student can develop the problem solving attitude during their service career

DETAILED COURSE CONTENT:

THEORY:

UNIT	TOPIC/SUB TOPICS	HOURS
	Basic Features of A.C. Machines	5
	Parts of A.C. Machine & their functions	
	Materials used for the various parts	
	Stator & rotor winding	
	Single Phase Motors	10
	To list various type of single phase motors	
	To explain the construction & operating principle of various type of inductor motor (split phase type)	
	To explain the double revolving field theory.	
	To explain double revolving field theory.	
	To explain the construction and working principles of single	

	phase commutator motor	
	To explain the construction and working principle of shaded pole type single phase induction motor	
	To draw the performance characteristics of all above type of single phase motors	
	To describe the testing procedure of single phase induction motor and measurement of (1) speed (2) power consumption (3) torque	
	Three phase Induction Motor	8
	Explain the concept of rotating magnetic field	
	Define slip , Synchronous speed (numericals)	
	Working of 34) induction motor	
	Expression of torque in 34) induction motor	
	Torque speed characteristics of 34) induction motor	
	Losses in induction motor	
	Explain the starting methods of a 3 4) induction motor	
	Alternators	10
	Types of alternators	
	Principle &emf equation	
	Winding factors & its effect on induced emf	
	Effect of frequency on induced emf	
	Effect of speed & excitation on induced emf	
	Different excitation systems	
	Excitation system used in modern alternators	
	Concept of leakage, armature & synchronous reactance	
	Principle of working of brushless alternators	
	Special Machines	6
	Introduction to induction generator	
	Introduction to Linear Induction motor	
	AC series motor	
	Stepper motor	
	Brushless DC motor	

	Three Phase Transformers	6
	Construction of a typical three phase transformer Different types of three phase transformers Ratings of transformer Power transformers and distribution transformers Different types of transformer terminal connection Maintenance of transformer	

LEARNING RESOURCES

1. Textbooks mentioned in the references.
2. Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, C= Comprehension Level, A=Application level

S. No.	Chapter Title	Hours	K	C	A	Total Marks
1	Basic Features of A.C. Machines	5	2	4	-	6
2	Single Phase Motors	10	3	12	-	15
3	Three phase Induction Motor	8	3	5	7	15
4	Alternators	10	5	10	3	18
5	Special Machines	6	2	6	-	8
6	Three Phase Transformers	6	4	7	2	13
	Total	45				75

PRACTICAL EXPERIENCES

1. To determine the slip of an induction motor
2. To perform the insulation resistance test of three phase induction motor
3. To perform the no-load test of the three phase induction motor
4. To perform the blocked rotor test of a three phase induction motor
5. To perform the pony brake method of the speed current and speed torque characteristics
6. To determine the effect of rotor resistance on the torque speed curves of an induction motor
7. Determination of Magnetization characteristics of an alternator (a) at no load rated speed (b) at no load half rated speed (c) at full load (non-induction) rated speed

8. Determination of the relationship between terminal voltage and load current of an alternator, keeping excitation and speed constant.
9. Determination of regulation and efficiency of an alternator from open circuit and short circuit.
10. Determination of V-curves of a synchronous machine
11. To study the construction of Three Phase Transformer.
12. To study the construction of Star-delta Starter

REFERENCE BOOKS

S.No.	Title	Author & Publisher
1	Electrical Machines	B L Theraja, Khanna Publishers, New Delhi, 1996
2	Electrical Machines	Bimbhra, P.S.; Khanna Publishers, New Delhi, 1996
3	Elementary Electrical Engineering	Gupta, M.L., New Heights, New Delhi18th, 1992
4	Basic Electrical Engineering	Mittle, V.N., Tata McGraw-Hill, New Delhi, 1990
5	Transformers	BHEL Bhopal; Tata McGraw-Hill, New Delhi, 1991
6	Transformers Design & Manufacture	Dasgupta, Indrajit; Tata McGraw-Hill, New Delhi, 1995
8	Electrical Machines	Nagrath& Kothari, Tata McGraw-Hill, New Delhi, 1995

ELECTRICAL & ELECTRONICS WORKSHOP PRACTICE

L	T	P		Curr. Ref. No.: EEE 411	
1	0	6		**Theory**	
Total Contact Hours:			**Total Marks: 50**	End Term Exam:	0
Theory:		10		Progressive Assessment:	0
Practical :		50		**Practical**	
Pre Requisite:				End Term Exam:	25
Credit:		4		Progressive Assessment:	25

RATIONALE

The role of the subject Electrical and electronics Workshop Practice is very important in building up the career of a technician. It is necessary to learn the concepts, skill, process, technique and develop attitude to work. The concept can be learned in the lecture classes, but for developing skill, learning the process or technique or to develop the attitude to work can be acquired by attending the workshop. In this curriculum case has been taken to include such type of the job which are encountered frequently in the day to day life of an electrical and electronics technician. The jobs are arranged in such a manner that technicians will learn the techniques of solving problems and importance of the IE rules and IS specification.

DETAILED COURSE CONTENT:

Unit	Topic /Sub-topic	Hours
I	1. To identify different type of tools and accessories used in electrical workshop and prepare a list with diagram. 2. To study the safety practices in electrical workshop 3. To dismantle a ceiling fan using screw driver, wrenches, bearing puller etc. and prepared a list of components 4. To dismantle and assemble single phase and three phase pump motor using screw driver, wrenches, bearing puller etc. and prepared a list of components 5. To perform the preventive maintenance operation of a three phase induction motor along with the servicing of	30

		star/delta starter and single phase preventer circuit.	
	6.	To perform the connection of a wiring installation for a) incandescent lamp controlled by a reed switch b) 5 amp, 230V, 3 pin socket controlled by a reed switch c) a ceiling fan controlled from a reed switch through a miniature circuit breaker with neon indicator must be used.	
	7.	To perform the wiring connection of twin fluorescent lamp.	
	8.	To assemble a semi-automatic star-delta starter using contactors and time delay and thermal over load unit.	
	9.	To practice the winding of coils for small transformers and assemble it in stamping of cares finally perform the testing.	
	10.	To perform the megger testing of a wiring installation and fill in the test report form of the electrical supply authorities.	
	11.	To perform the resistance measurement of an earth installation using earth megger testing equipment.	
	12.	To assemble the coils of stator, rotor of an induction motor after using different type of insulating materials and locking wedges.	
	13.	Perform the testing of insulation resistance of the stator and rotor of 3 phase 400V wound rotor induction motor.	
II	1.	Identification and use of different tools and accessories used in manufacturing of electronic circuits.	30
	2.	Different types of cutters.	
	3.	Nose pliers	
	4.	Wire strippers	
	5.	Screw drivers	
	6.	Lead strengtheners	
	7.	Extractors	
	8.	Soldering iron	
	9.	De-soldering pump	
	10.	Crimping tool	

	11. Use of regulated power supply. Font panel controls and their functions.	
	12. Use of DC and AC voltmeter and ammeter to measure DC and AC voltage current.	
	13. Use of analog multi-meter to measure.	
	14. AC and DC voltage	
	15. AC and DC current	
	16. Different resistor	
	17. Continuity testing.	
	18. Use of digital multi meter to measure:	
	19. AC and DC voltage	
	20. AC and DC current	
	21. Different resistor	
	22. Continuity testing.	
	23. Use of different switches	
	24. Toggle switches - SPST, SPDT, DPST, DPDT	
	25. Thumb-wheel switches	
	26. Rotary switches	
	27. Push on/Push off switches	
	28. Keyboard switches - mechanical, capacitive, membrane	
	29. DIP switches	
	30. Use of different display devices	
	31. LED display	
	32. Seven segment display	
	33. LCD display	
	34. Use of breadboards to implement simple electronic circuits using resistors/ capacitors/diodes/transistors/switches/display devices.	
	35. Circuit assembly on breadboards and PCBs (rectifiers, oscillators, amplifiers).	
	36. Assembly of battery eliminator, IC regulator circuits, IC timer, IC operational amplifier circuit.	
	37. Make a panel for a given circuit.	

LEARNING RESOURCES

Textbooks mentioned in the references.

Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

K=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	End practical Exam
1	Repairing of home appliances	30	15
2	Different types of tools	30	10
	Total	60	25

REFERENCE BOOKS

S. No.	Title	Author/ Publisher/Edition/Year
1	Electrical installation work	T.G Francis, ELBS
2	Printed circuit board: Design & technology	William Bosschart, Tata McGraw Hill, New Delhi, 2nd, 1983
3	Electronic Drafting & Drawing.	Y.I. Shah, Jeevandeep Prakashan, Ramdeet, Mumbai, 2nd, 1988
4	Basic Electronics & Linear circuits	Bhargava & Gupta, Tata McGraw Hill; New Delhi, 2nd, 1988
5	Practical Semiconductor Data manuals.	BPB Publications; New Delhi, 1st, 1997
6	Transistor selector data manual	Towers International, BPB Publications; New Delhi, 1st, 1990

| 7 | Laboratory Manual and Teacher Guide in Basic Electronics | TTTI, Bhopal and DTE, Goa,, 1st, 2001 |
| 8 | Laboratory Manual and Teacher Guide in Digital Electronics | TTTI, Bhopal and DTE, Goa, 1st, 2002 |

POWER SYSTEM

L	T	P		Curr. Ref. No.: EEE 503	
3	0	0		**Theory**	
Total Contact Hours:			**Total Marks:100**	End Term Exam:	75
Theory:		45		Progressive Assessment:	25
Practical :		0		**Practical**	
Pre Requisite:				End Term Exam:	0
Credit:		4		Progressive Assessment:	0

RATIONALE

The electrical power generation and energy consumption is back bone of every country. The main aim of this subject is to know power generation methods, techniques and economical strategy which methods are suitable on the base of natural resources, technical expertise and economy. This course is intended to enable the student understand the facts, concepts, principles and procedures related to the electric power generation, transmission and distribution. So that students can acquire supervisory skills, which will help him/her to discharge his/her role as a supervisor when he/she starts to work in the industry.

DETAILED COURSE CONTENT:

Units	Topics/Sub-topics	Hours
I	**Over View Of Sources Of Electrical Energy** 1. Hydro power plant 2. Steam power plant 3. Nuclear power plant 4. Wind power plant 5. Solar power plant 6. Line diagram of power generation, transmission and distribution	5
II	**Economics of Generation** 1. Load duration curve 2. Cost of electrical energy	2

	3. Tariff or charge to consumer	
III	**Transmission Line Components & Parameters**	8
	1. Types of electrical transmission systems and their comparison Line components: line conductors, insulators, line supports and supporting structures	
	2. String insulation and string efficiency	
	3. Sag in overhead lines	
	4. Corona	
	5. Line Resistance, Inductance & Capacitance Skin effect and proximity effect	
	6. Classification of transmission lines	
	7. Performance of transmission lines, voltage regulation and efficiency, equivalent circuits	
	8. Ferranti effect	
IV	**HVAC & DC Transmission System**	6
	4.1. Operation and control of HVAC transmission system	
	4.2. Concept of HVDC transmission	
	4.3. Types of HVDC transmission system	
	4.4. Comparison between HVAC and HVDC transmission system	
V	**Distribution System**	6
	4.1. Feeders and distributors	
	4.2. DC distribution system	
	4.3. AC Distribution system	
	4.4. The Indian electricity rules	
VI	**Cables**	4
	4.1. Overhead and underground cables	
	4.2. Construction of cables Types of cables	
	4.3. Laying of underground cables	
VII	**Faults and Fault Location in Underground Distribution System**	6
	4.1. Classification of faults	

	4.2. Causes of faults in underground cables		
	4.3. Method of Fault location		
VIII	**Construction of Overhead Distribution Lines**	8	
	4.1. Erection of supports		
	4.2. Erection of conductors Repairing and jointing of conductor		
	4.3. Positioning of conductor and binding with insulator Jumpers, Tee-off		
	4.4. Earthing		
	4.5. Guarding		

LEARNING RESOURCES

• Textbooks mentioned in the references.

SPECIFICATION TABLE OF MARKS & HOURS DISTRIBUTION

Legends: K=Knowledge level, **C**= Comprehension Level, **A**=Application level

Unit	Chapter Title	Hours	Marks			
			K	C	A	Total Marks
1	Over view of sources of Electrical Energy	5	3	7	-	10
2	Economics of Generation	2	4	-	2	6
3	Transmission Line Components & Parameters	8	4	4	4	12
4	HVAC & DC Transmission System	6	3	6	-	9
5	Distribution Systems	6	2	6	-	8
6	Cables	4	2	6	2	10
7	Faults and Fault Location in Underground Distribution System	6	2	4	2	8
8	Construction of Overhead Distribution Lines	8	2	6	4	12
	Total	**45**				**75**

REFERENCE BOOKS

S. No.	Title	Author/Publisher/Edition/Year
1	Generation of electrical energy	Gupta B.R.; Eurasia Publishing House, New Delhi, 1998
2	Power system engineering	Nagrath; Tata McGraw-Hill, New Delhi, 1st, 1994
3	High Voltage Engineering	Naidu; Tata McGraw-Hill, New Delhi, 2nd
4	Transmission and Distribution	Raina, K.B. et al; Tata McGraw Hill, New Delhi, 1994
5	A course in electrical power	Soni M.L., Gupta J.L.; Dhanpat Rai & Sons, New Delhi, latest
6	A text book of electrical power	Uppal S. L.; Khanna publisher, New Delhi, 1996
7	Generation, Distribution & Utilisation of Electrical Energy	Wadhwa, C.L.; Wiley Eastern Ltd., New Delhi, latest

ELECTRICAL DRAWING USING CAD

L	T	P		Curr. Ref. No.: EEE 409	
1	0	4		**Theory**	
Total Contact Hours:			**Total Marks: 50**	End Term Exam:	0
Theory:	10			Progressive Assessment:	0
Practical :	50			**Practical**	
Pre Requisite:				End Term Exam:	25
Credit:	3			Progressive Assessment:	25

RATIONALE

Drawing is the language of engineers. Any job which is to be communicated for implementation is required to be done within an optimum time span and with efficacy. Since last century, a lot of change has taken place in electrical engineering drawing for representing job specification. Standardized symbols as prescribed by Bureau of Indian specification are to be introduced while practicing the jobs on drawing. The preparation of list of materials along with the specification writing is also an important factor which is to be dealt in this subject.

DETAILED COURSE CONTENT

THEORY:

UNIT	TOPIC/SUB TOPICS	HOURS
I	**Introduction to electrical drawing** 1.1. Need of Electrical Drawing 1.2. Circuit Diagram 1.3. Wiring Diagram 1.4. Block Diagram 1.5. Symbols in Electrical Drawings	7
II	**Introduction to AutoCAD Electrical** 2.1. Starting AutoCAD Electrical 2.2. Creating a new drawing document	10

		2.3. Title Bar	
		2.4. Application Menu: New options, Creating Drawings, Creating Sheet Sets	
		2.5. Open Options: Opening Drawing File, Save, Save As, Export, Publish, Print	
		2.6. Drawing Tab Bar	
		2.7. Drawing Area: Command Window, Bottom Bar	
		2.8. Opening a Project File: New Drawing in a Project, Project Task List, Project Wide Update or Retag	
		2.9. Drawing List Display Configuration	
III		**Electrical Components**	
		3.1. Inserting Component Using Icon Menu	
		3.2. Component Tag area	
		3.3. Installation Code and Location Code	
		3.4. Pins area	
		3.5. Equipment List	
		3.6. Panel List	
		3.7. Wires	
		3.8. Multiple Bus,Creating of Multiple Buses	
		3.9. Ladders,Wire Number Leaders and Labels	13
		3.10. Wire Color/Gauge Labels	
		3.11. Markers	
		3.12. Circuit Builder, Starting a New drawing	
		3.13. Editing Title Block	
		3.14. Creating Wires	
		3.15. Assigning Numbers and Labels to Wires	
		3.16. Inserting 3 Phase Motor	
		3.17. Adding Ground symbol	
		3.18. Adding symbols for various components	
IV		**Editing Wire, Components and Circuits**	
		4.1. Introduction to Edit Tool	15
		4.2. Internal Jumper	
		4.3. Delete Component, Copy Component, Edit Circuits	

	drop-down		
	4.4. Copying Circuit, Moving Circuit, Saving Circuit to Icon Menu		
	4.5. Transforming Components drop-down		
	4.6. Aligning Components, Moving Component		
	4.7. Circuit Clipboard panel		
	4.8. Editing Wires or Wire Numbers		
	4.9. Create/Edit Wire Type		
	4.10. Change/Convert Wire Type		
V	**Drawing of Electrical Panel Layout**		
	5.1. Panel Assembly, Editor, Table Generator, Insert Terminals		15
	5.2. Edit, Copy Codes drop-down, Copy Assembly		

LEARNING RESOURCES

    Textbooks mentioned in the references.

    Laboratory manuals

SPECIFICATION TABLE OF MARKS & HOURS

Legends: **K**=Knowledge level, **C**= Comprehension Level, **A**=Application level

S. No.	Chapter Title	Hours	Total Marks
1	Introduction to Electrical Drawing	7	4
2	Introduction to AutoCAD Electrical	10	7
3	Electrical Components	13	6
4	Editing Wire, Components and Circuits	15	4
5	Drawing of Electrical Panel Layout	15	4
	Total	**60**	**25**

RFERENCE BOOKS

1. AUTOCAD ELECTRICAL 2016 BLACK BOOK, Gaurav Verma and Matt Weber, Published by CADCAMCAE Work

PROFESSIONAL PRACTICES -III

L	T	P		Curr. Ref. No.: EEE 511	
0	0	2		**Theory**	
Total Contact Hours:				End Term Exam:	0
Theory:	0		Total Marks:150	Progressive Assessment:	0
Practical :	30			**Practical**	
Pre Requisite:				End Term Exam:	0
Credit:	1			Progressive Assessment:	50

RATIONAL:

To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.

AIM

Student will be able to:

Acquire information from different sources

Prepare notes for given topic

Present given topic in a seminar

Interact with peers to share thoughts

Prepare a report on industrial visit, expert lecture

Contents   Activities

Industrial Visits

Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries: Sugar Factory / Dairy / Chemical Industry

/ Thermal Power Plant.

   i. Machine shop having CNC machines.

  ii. ST workshop / Auto service station

 iii.City water supply pumping station

 iv.Manufacturing unit to observe finishing and super finishing processes.

Lectures by Professional / Industrial Expert lectures to be organized from any two of the following areas:

Interview Techniques.

Modern Boilers - Provisions in IBR

Applications of Sensors and Transducers

Alternate fuels - CNG / LPG , Biodiesel, Ethanol, hydrogen

Piping technology

Information Search:

Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report **any one** topic.

Following topics are suggested:

   i. Engine lubricants & additives

   ii. Automotive gaskets and sealants

   iii. Engine coolants and additives

   iv. Two and Four wheeler carburetor.

   v. Power steering

   vi. Filters

vii. Different drives/Transmission systems in two wheelers.

viii. Types of bearings - applications and suppliers

   ix. Heat Exchangers

   x. Maintenance procedure for solar equipment.

Tools holder on general purpose machines and drilling machines.

Seminar:

Seminar topic shall be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time - 10 minutes)

Mini Project / Activities: (any one)

   a) Prepare one model out of card board paper / acrylic / wood / thermocol / metal such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Cams and Followers v) Geneva mechanism

   b) Dismantling of assembly (e.g. jig / fixtures, tool post, valves etc.) Take

measurement and prepare drawings / sketches of different parts.

c) Make a small decorative water fountain unit

d) Toy making with simple operating mechanisms.

SOFTCORE I

<h1 style="text-align:center">ENGINEERING ECONOMICS AND ACCOUNTANCY</h1>

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

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

THEORY:
UNIT   TOPIC / SUB-TOPIC   Lecture Hrs.

1.1   INTRODUCTION   **1**

    1.2   Introduction to Economics and its Utility of study

    1.3   Importance of the study of Economics

3.1   BASIC CONCEPTS OF ECONOMICS   **3**

    3.2   Definition of Utility, Consumption, Want, Value,
            Price, Goods, National Income.

3.3	Classification of goods, characteristics and Classification of wealth.	
3.4	Basic Laws of demand and supply.	
3.5	Concept and Measurement of Elasticity of demand	

3.1 PRODUCTION   **3**

3.2	Meaning and factors of production.
3.3	Land, Labour, Capital and Organisation
3.4	Formation of Capital, Break even chart-its uses.

4.1 SCALE OF INDUSTRIES   **2**

| 4.2 | Definition, advantages and disadvantages of small, medium and large scale production |
| 4.3 | Internal and External Economies |

5.1 MARKET FORMS   **3**

5.2	Definition and types of Markets in respect of present trends.
5.3	Features of Perfect, Imperfect and monopoly markets.
5.4	Price determination under perfect competition and monopoly

6.1 ECONOMIC PLANNING   **3**

6.2	Features of Under-developed and Developing Countries.
6.3	Meaning, objectives and needs of planning.
6.4	Introduction to industrial development in India during the five year plans.

7.0 MONEY   3

   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.

8.0 UNEMPLOYMENT   2

   8.1   Meaning, types and causes of Unemployment

   8.2   Unemployment problems in India

9.0 INDUSTRIAL POLICY   3

   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).

10.0   BUSINESS TRANSACTIONS AND ACCOUNTANCY   5

   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.

11.1 **BOOKS OF ACCOUNTS**

    11.2   Journal and Ledger, their sub-divisions; posting from journals to ledger.

    11.3   Balancing of Accounts

12.1 **CASH BOOK**   2

    12.2   Objective of Cash Book (in respect of all kinds of Cash transactions)

    12.3   Single column, double column and triple column cash book

    12.4   Imprest system of Petty Cash Book.

13.1 **TRIAL BALANCE**   2

    13.2   Objective, Preparation, errors and rectification (in respect of balance of accounts for the total period).

14.1 **FINAL ACCOUNTS**   5

    14.2   Steps of preparing accounts; Trading Account; Profit and Loss Account

    14.3   Revenue and Depreciation adjustment

    14.2   Introduction to balance sheet

15.1 **CAPITAL AND REVENUE EXPENDITURE DISTRIBUTION**   3

    15.2   Receipts and payments

    15.3   Income and Expenditure differences

16.1 **MEANING AND PURPOSE OF COSTING**   2

    16.2   Elements of Cost-Analysis and classification of expenditure for cost accounts.

    16.3   Cost Control - Prime cost, Overhead cost, and Indirect materials and tools.

17.1 **ELECTRONICS COMMERCE - MEANING - SCOPE**   1

    17.2   Accounting Software - Tally latest version

SUGGESTED LEARNING RESOURCES:

Textbooks mentioned in the references.

REFERENCE BOOKS :

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

4.2.   Wali, B.M., and A.B. Kalkundrikar - Managerial Economics, New Delhi : R.Chand and Co., 1983.

ENTREPRENEURSHIP DEVELOPMENT

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

RATIONALE

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

DETAIL COURSE CONTENT THEORY:

UNIT   TOPIC / SUB-TOPIC   Lecture Hrs.

INTRODUCTION   10

1.   Definition and functions of Entrepreneur, entrepreneurship quality, entrepreneurial spirit, need for entrepreneurship.

2.   Individual and social aspects of business - achievement motivation theory

3.   Social responsibilities of Entrepreneurs

FORMS OF BUSINESS ORGANISATION

1.   Types of company

2.   Merits and demerits of different types

3.   Registration of small scale industries

4.   Conglomeration

3.0 SMALL SCALE AND ANCILLARY INDUSTRIES 8

5. Definition - scope with special reference to self-employment

6. Procedure to start small scale and Ancillary industries

7. Pattern on which the Scheme/Project may be prepared

8. Sources of finance - Bank, govt., and other financial institutions.

9. Selection of site for factory

10. Factors of selection

11. N.O.C. from different authorities, e.g., Pollution Control Board, Factories Directorate etc.

12. Trade License.

SYSTEM OF DISTRIBUTION

1. Wholesale Trade

2. Retail trade

SALES ORGANISATION

1. Market survey, marketing trends, knowledge of competitors, product selection & its basis.

2. Sales promotion

3. Advertisement

4. Public relations and selling skills

PRICING THE PRODUCT

5. Basic guidelines

INTRODUCTION TO IMPORT AND EXPORT

Procedures for export

Procedures for import

Technical collaboration - international trade

Business insurance

Rail and road transport

Forwarding formalities, FOR, FOB, CIF, etc

BUSINESS ENQUIRIES

Enquiries: From SISI, DIC, SFC Dept. of Industrial Development Banks.

Offers and Quotations

Orders

| 9.1 | **PROJECT REPORT** | **6** |

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

    Breakeven analysis, Breakeven point.

| 10.1 | **ENVIRONMENT LEGISLATION** | **2** |

    10.2   Air Pollution Act

    10.3   Water Pollution Act

    10.4   Smoke Nui sance Control Act

    10.5   ISO: 14000, OSHA

SUGGESTED LEARNING RESOURCES:

REFERENCE BOOKS:

1. Entrepreneurship Development , Prepared by CTSC Manila Publishers by Tata Mc Graw Hill Publishing Co. Ltd.

2. Small Enterprise Management Published by ISTE, Mysore

3. Motivation Published by ISTE, Mysore

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

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

6. Essence of TQM by John Bank

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

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

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

10. Nagarazan, R.S. and A.A. Arivalagar, TQM New Delhi : New Age International

Publishers, 2005

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

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

PRINCIPLES OF MANAGEMENT

L	T	P		Curr. Ref. No.: G305	
3	0	0		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:	45		Total Marks:100	Progressive Assessment:	25
Practical :	0			**Practical**	
Pre Requisite:				End Term Exam:	0
Credit:	3			Progressive Assessment:	0

RATIONALE

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

DETAIL COURSE CONTENT
THEORY:

UNIT	TOPIC / SUB-TOPIC	Lecture Hrs.

FRAMEWORK OF MANAGEMENT 8

1.1. Nature of management

1.2. Development of management thoughts

1.3. Management and process skills

PLANNING

1.4. Fundamentals of planning

1.5. Planning premises and forecasting

1.6. Decision making

1.7. Mission and objective

ORGANIZING   1
0

1.8. Fundamentals of organizing

1.9. Design of organization structure

1.10. Forms of organization structure

1.11. Power and authority

1.12. Authority relationship

STAFFING

1.13. Fundamentals of staffing

1.14. HR planning

1.15. Recruitment and selection

1.16. Training and development

1.17. Performance appraisal

1.18. DIRECTING

1.19. Fundamentals of directing

1.20. Operational control techniques

1.21. Overall control technique

TOTAL QUALITY MANAGEMENT 4

1.22. Concepts and definitions

1.23. Sages of quality gurus and their contributions

1.24. Basic tools of TQM

1.25.

SUGGESTED LEARNING RESOURCES:

REFERENCE BOOKS:

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

2. Management by: S. P. Robins

3. Management principles by: Anil Bhat and Arya Kumar

4. Principles and practice of management by LM Prasad

5. Principles of management by LM Prasad

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

ORGANIZATIONAL BEHAVIOUR

L	T	P		Curr. Ref. No.: G305	
3	0	0		**Theory**	
Total Contact Hours:				End Term Exam:	75
Theory:		45	Total Marks:100	Progressive Assessment:	25
Practical :		0		**Practical**	
Pre Requisite:				End Term Exam:	0
Credit:		3		Progressive Assessment:	0

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.

ORGANIZATION

1.1.   Concept and Definition

1.2.   Structures (line, staff, functional divisional, matrix)

MOTIVATION :   10

1.3.   Principles of Motivation Aspects of Motivation

1.4.   Job motivation

1.5.   Theories of motivation (Maslow, Herzberg, Theory of X&Y of Mc. Gregar)

DEVELOPING GOOD WORK HABITS: 10

1.6.   Principles of habit formation Attitude and values Personality- Concepts

1.7.   Theories

1.8.   Personality

- Concepts
- Theories
- Personality and Behaviour

ORGANIZATIONAL CULTURE: 8

1.9.   Concepts and its importance

1.10.   Determinants of organizational culture

1.11.   Rules & regulations

TEAM BUILDING: 9

1.12.   Concepts Team and Group

1.13.   Formation of Team building

SUGGESTED LEARNING RESOURCES:

REFERENCE BOOKS:

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

ENVIRONMENTAL EDUCATION

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

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.**

INTRODUCTION   2

1.1.   Introduction
1.2.   Environment and its components
1.3.   Environment in India
1.4.   Public Awareness

ECOLOGICAL ASPECTS OF ENVIRONMENT   8

2.1.   Ecology

5.1. Introduction

5.2. Water Pollution

5.3. Characteristics of domestic waste water

5.4. Principles of water treatment

5.5. Water treatment plant (for few industries only- unit operations & unit processes - names only)

5.6. Air Pollution

5.7. Types of air pollutants Sources of Air Pollution Effects of Air Pollutants

5.8. Noise Pollution

5.9. Places of noise pollution Effect of noise pollution

CLEAN TECHNOLOGY   6

6.1. Introduction to Clean Technologies

6.2. Types of Energy Sources

6.3. Conventional Energy sources

6.4. Non-conventional sources of Energy

6.5. Types of Pesticides

6.6. Integrated Pest Management

ENVIRONMENTAL LEGISLATION 3

7.1. Introduction to Environmental Legislation

7.2. Introduction to Environmental Laws

7.3. ENVIRONMENTAL IMPACT ASSESSMENT 3

7.4. Introduction to Environmental Impact Assessment

7.5. Environmental Management (elements of ISO 14001)

7.6. 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:

1. Text book mentioned in the references
2. Lab Manuals

3. OHP Transparencies
4. Video film on Environment

REFERENCE BOOKS:

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

SUGGESTED LIST OF DEMONSTRATIONS/FIELD VISIT

1. pH value of water sample.

2. Hardness of water
3. Calcium hardness
4. Total Hardness
5. Residual Chlorine to a given sample of water
6. Turbidity
7. B.O.D.
8. C.O.D.

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

1. Water Treatment Plant
2. Sewage Treatment Plant
3. Maintenance work of water supply mains and Sewage