PART — II
3rd Semester
FINAL DRAFT FOR
CURRICULAR STRUCTURE
AND SYLLABI OF
FULL-TIME DIPLOMA COURSES IN
ENGINEERING & TECHNOLOGY

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

(A Statutory Body under West Bengal Act XXI of 1995) "Kolkata Karigori Bhavan", 2nd Floor, 110 S. N. Banerjee Road, Kolkata – 700013

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WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

COURSE NAME: FULL TIME DIPLOMA IN ELECTRONICS & TELECOMMUNICATION ENGINEERING

DURATION OF COURSE: 6 SEMESTERS

SEMESTER: THIRD

BRANCH: ELECTRONICS & TELECOMMUNICATION ENGINEERING

SR. NO.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME						
			L	TU	PR	INTERNAL SCHEME			ESE	PR	@TW	Total Marks
						TA	CT	Total				
1.	Network Analysis	3	4	1	.-	10	20	30	70	-	-	100
2.	Analog Electronics -I	4	5	2	-	10	20	30	70	-	-	100
3.	Digital Electronics	3	4	1	-	10	20	30	70	-	-	100
4.	Electrical Machine	2	2	-	-	5	10	15	35	-	-	50
5.	Computer Programming Language	2	2	-	-	5	10	15	35	-	-	50
6.	Network Analysis Laboratory	2	-	-	2	-	-	-	-	75	-	75
7.	Analog Electronics Laboratory	2	-	-	3	-	-	-	-	100	-	100
8.	Digital Electronics Laboratory	2	-	-	2	-	-	-	-	75	-	75
9.	Electrical Machine Laboratory	1	-	-	1	-	-	-	-	50	-	50
10.	Computer Programming Language Laboratory	1	-	-	1	-	-		-	50	-	50
11.	Professional Practice - I	2	-	-	3	-	-	-	-	-	50	50
	Total	24	17	4	12	40	80	120	280	350	50	800

STUDENT CONTACT HOURS PER WEEK:33 hrs, (Teaching-15 weeks + Internal Exam-2 weeks)

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

ABBREVIATIONS: L- Lecture, TU- Tutorials, PR- Practical, TA- Teachers Assessment, CT- Class Test, ESE- End Semester Exam

TA: Attendance & surprise quizzes = 6 marks, Assignment & group discussion = 4 marks.

Total Marks : 800

Minimum passing for Sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

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Name of the course: **Network Analysis**	
Course Code: ETCE/NA/S3	Semester: Third
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 4 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: 1 contact hours / week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 75 Marks
Rationale:	
Circuit theory is one of the core subjects in Electronics and Tele Communication Engineering. The subject covers basic elements of network, AC fundamentals, Filter circuit & network synthesis.	
Objectives:	
The student will be able to 1) Understand the concept of networks, its parameters and network theorems. 2) Know passive filters and their analysis 3) Understand Transmission lines 4) Understand attenuators and equalisers. 5) Know Laplace transform and transient response to electrical networks.	

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**Network Fundamentals**	10	
	1.1 Active and passive network – Balanced and unbalanced network – Symmetrical and asymmetrical network – T and Π network and their conversion – Simple problems 1.2 Characteristic impedance – Propagation constant and image impedance – Open and short circuit impedance and their relation to characteristic impedance 1.3 Mesh Analysis and Node Analysis using independent and Controlled Source Analysis 1.4 Thevenin's theorem – Norton's theorem – Maximum Power Transform theorem – Superposition theorem – Simple problems		
Unit 2	**Coupled Circuits**	8	
	2.1 Idea of resonance – Series and parallel resonant circuits – Q-value, selectivity, bandwidth 2.2 Principle of coupling – Self-inductance & mutual inductance and their relationship – Co-efficient of coupling 2.3 Analysis of single tuned and double tuned circuits		
Group-B			
Unit 3	**Filter Circuits**	12	

	3.1 Network Synthesis -- Concept of poles and zeroes (without any mathematical analysis) 3.2 Definition and relationship between neper and decibel 3.3 Basic idea of passive filter – Definitions of pass band, stop band and cut-off frequency 3.4 CONSTANT-K PROTOTYPE FILTERS**:** a) Low pass filter, b) High pass filter, c) Band pass filter, and, d) Band stop filter 3.5 ACTIVE FILTERS**:** Basic idea – Their advantages and disadvantages over passive filters – Applications of filter circuits		
Unit 4	**Attenuators and Equaliser**	6	
	4.1 Basic idea of attenuator – Difference between attenuator and filter – Symmetrical T and Π attenuator – Field of application of attenuators 4.2 Concept of equalizer – Purpose of equalizer and its classification – Difference between series & shunt equalizer and their field of applications		
	Group C		
Unit 5	**Transmission Lines**	12	
	5.1 Types of transmission lines**:** Parallel wire and coaxial cable 5.2 Primary and secondary constants of transmission lines 5.3 Characteristic impedance – Reflection co-efficient – Standing wave ratio and their relationship 5.4 Simple matching methods, single and double stub match for transmission lines 5.5 Losses in transmission lines 5.6 Distortion in transmission line – Causes of distortion and condition for distortion less transmission – Practical feasibility for distortion less transmission		
Unit 6	**Transient Response in Electrical Network**	12	
	6.1 LAPLACE TRANSFORM**:** Definition – Condition of existence - Transforms of some elementary functions – Linearity property – First shifting property – Change of scale property – Inverse Laplace Transform 6.2 Transient response in electrical networks with sinusoidal and step function – Analysis with RL, RC, RLC circuits, time constant using differential equation		
	TOTAL	60	

Contents Practical

Skills to be developed: On satisfactory completion of the course, the students should be in a position to design few fundamental networks.

Intellectual Skills:

1. Interpret the results
2. Verify the tables

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments	
Sl. No.	
1.	To verify the Mesh Analysis and Node Analysis using independent and Controlled Source.
2.	To verify Thevenin's and Norton's theorems
3.	To verify Maximum Power Transfer theorem.
4.	To verify Superposition theorem.
5.	To study the series resonant circuit.
6.	To study parallel resonant circuit.
7.	To measure the characteristic impedance of symmetrical T and Π networks
8.	To test and to measure the cut –off frequencies of the following**:** — (a) constant k-type low pass filter; (b) constant k-type high pass filter
9.	To test T and Π attenuator.
10.	To study standing wave pattern for a transmission line of finite length with**:** (a) open termination, (b) shorted termination, and, (c) matched termination.
11.	To measure the attenuation constant and phase shift constant for matched termination.
12.	To study the given RC differentiator at different time constant.
13.	To study the given RC integrator at different time constant.

MINI PROJECTS

List of MINI PROJECTS	
1.	To design constant k-type low pass filter and constant k-type high pass filter
2.	To design T and Π attenuator, which attenuate given signal to desired level.

Examination scheme (Theoretical):

A) Internal Examination: Marks- 20

B) End Semester Examination: Marks-70

C) **Teacher's Assessment: Marks- 10**

(i) Marks on Attendance: Marks-05

(ii) Assignments & Interaction: Marks- 05

Group	**Unit**	**Objective questions** **Note: 10 multiple choice and 5 short answer type questions**			**Total Marks**
		To be set Multiple Choice (Twelve questions)	To be answered	Marks per question	
A	1,2	4	Any ten	1	10 X 1 = 10
B	3,4	4			
C	5,6	4			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2	3	Any five	2	5x2=10
B	3,4	3			
C	5,6	4			

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	3,4	3			
C	5,6	4			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Prof. D. Chatterjee	Network and transmission line	Learning Press
2.	A. K. Chakraborty	Introduction to network, Filters and Transmission Lines	Dhanpat Rai & Sons
3.	V. Valkenburg	Network Analysis	Prentice Hall of India, N. Delhi
4.	Sudhakar	Circuit and networks	Tata MCGraw-Hill
5.	Jain & Kaur	Network, Filters and Transmission Lines	Tata MCGraw-Hill
6.	Hayt	Engineering Circuit Analysis	Tata McGraw-Hill
7.	Ryder	Network, Lines and Fields	Prentice Hall of India, N. Delhi
8.	Kaduskar, Rajankar, Khatavkar	Network Fundamentals and Analysis	Wiley
9.	Kaduskar, Rajankar, Shedge	Network Synthesis and Filter Design	Wiley

E X A M I N A T I O N S C H E M E (SESSIONAL)

Name of Subject: Network Analysis Laboratory **Full Marks-75**

Subject Code: ETCE/LNA/S3

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 35, Viva-voce – 15.**

Name of the course: **Analog Electronics-1**	
Course Code: **ETCE/AE1/S3**	Semester: Third
Duration: 6 months (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme :**
Theory: 5 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: 2 contact hours / week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks

Credit: 6 (Six)	Prctical:100 Marks
Rationale:	
Electronics and its application play important role in our day to day life. Electronic components and circuits are used in most of the present day gadgets. Concept on analog electronics will pave easy way to understand operations and functioning of these gadgets also this subject is the basis of advance electronics. It starts with the idea of semiconductor materials, PN junction diodes which will enable the students to follow the functioning of all semiconductor devices. This is a core group subject and it develops cognitive and psychomotor skills.	
Objectives:	
The student will be able to- 1) Describe the formation of PN junction 2) Draw the characteristics of basic components like diode, transistor etc. 3) Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers. 4) Know voltage amplifiers and its small signal analysis 5) Understand characteristics, operations and application of special types of diodes.	

Content (Name of topic)		**Periods**	**Marks**
Group-A		28	
Unit 1	**Semiconductor and Diode**	8	
	1.1 Electrical properties of semiconductor materials, energy level diagrams of conductor, semi conductor and Insulator. 1.2 Elemental and compound semiconductor Formation of P-Type and N-Type materials and their properties. Drift and diffusion current. Formation and behaviour of PN junction diode. 1.3 Zener diode, Zener breakdown & Avalanche Breakdown. Varactor diode, Schottky diode. 1.4 Diode wave shaping circuits – clipper and clamper circuits		
Unit 2	**Bipolar Transistor**	8	
	2.1 Formation and properties of PNP and NPN Transistor 2.2 Transistor configurations, input and output characteristics. α, β, and γ factors 2.3 Comparison of CB, CE, and CC configurations.		
Unit 3	**Transistor Biasing**	12	
	3.1 Concept of Q-point, ac and dc load lines 3.2 Stabilization and stability factor 3.3 BIASING**:** Base bias — Collector feedback bias — Emitter feedback bias — Potential divider bias. 3.4 Bias compensation circuits using diode and thermistors – Current mirror bias		
	Group-B	30	
Unit 4	**JFET, MOSFET AND UJT**	6	
	4.1 Difference between BJT, FET and MOSFET 4.2 Symbol and basic structure, Basic operation , VI characteristics and biasing		

	of JFET, MOSFET –depletion and enhancement 4.3 basic structure and Basic operation , VI characteristics of UJT, Application of UJT 4.4 Relation between drain resistance, amplification factor and mutual conductance		
Unit 5	**Small Signal Transistor Amplifiers**	12	
	5.1 Hybrid model and h-parameters of CB, CE & CC mode transistor amplifiers – Calculation of voltage gain, current gain, power gain, input and output impedance in terms of h-parameters – Comparison of the three configurations. 5.2 Small signal FET equivalent circuits – Common source and common drain amplifier – FET application as VVR, constant current source etc. 5.3 Operation of VMOS & CMOS and power MOSFET – Precautions in handling MOSFET		
Unit 6	**Multistage Amplifier**	12	
	6.1 COUPLING: RC coupled – Direct coupled –Transformer-coupled amplifiers – 6.2 Effect on Gain & Bandwidth and Frequency response for cascading 6.3 Comparison of different types of cascading		
	GROUP-C	17	
Unit 7	**Power Amplifier**	8	
	7.1 Characteristics of Class A, Class B, Class C and Class AB amplifier 7.2 Difference between Voltage and Power Amplifier 7.3 TRANSFORMER COUPLED CLASS A POWER AMPLIFIER**:** Circuit operation – Calculation of power, efficiency & distortion 7.4 CLASS B PUSH PULL AMPLIFIER**:** Circuit operation – Calculation of power, efficiency & distortion – Crossover distortion – Advantages and disadvantages – Complementary symmetry and quasi-complementary symmetry Class B Push Pull Amplifier 7.5 Noise in amplifier circuits		
Unit 8	**Rectifier and Power Supply**	9	
	8.1 HALF WAVE AND FULL WAVE RECTIFIERS**:** Average voltage – R.M.S. voltage, efficiency and ripple factor – Percentage voltage regulation 8.2 Function of filter circuits – Capacitor input filter – Inductive filter – Π type filter – Calculation of ripple factor and average output voltage – Function of bleeder resistor 8.3 Series and shunt regulator using transistor – IC Voltage Regulators**:** Positive & Negative, their specifications 8.4 Voltage Multiplier :Voltage doublers – Tripler – Quadrupler – Their applications		
	TOTAL	75	

Practicals

Skills to be developed: On satisfactory completion of the course, the students should be in a position to design power supply, amplifier and other analog circuits.

Intellectual Skills:

1. Interpret the results
2. Verify the tables

List of Practical: Any SIX(including MINI PROJECT)

Suggested List of Laboratory Experiments	
Sl. No.	
1.	To study the VI characteristics of a forward and reverse biased p-n junction Diode
2.	To study the VI characteristics of a reverse biased Zener diode
3.	To study the input and output characteristics and to find the h-parameters of a BJT for **: —** (a) C-E configuration, (b) C-C configuration, (c) C-B configuration
4.	To study the FET characteristics
5.	To study the MOSFET characteristics
6.	To study the rectifier with and without capacitor filter for **: —** (a) Half-wave rectifier, (b) Full-wave rectifier, (c) Bridge rectifier
7.	To determine frequency response characteristics of RC coupled amplifier circuit and calculation of bandwidth, midband gain, input impedance and output impedance for **:** (a) Single-stage amplifier, (b) Double-stage amplifier
8.	To study the output waveform of push-pull amplifier for Class-A, Class-B & Class-AB operations
9.	To study shunt and series regulator and draw the following plots: line regulation and load regulation
10.	To study the V-I characteristics of UJT (show the cut-off, saturation and negative resistance region)

MINI PROJECTS

List of MINI PROJECTS	
1.	To design a power supply
2.	To design a single stage OR double stage amplifier.

Examination scheme (Theoretical):

A) Internal Examination: Marks- 20

B) End Semester Examination: Marks-70

C) **Teacher's Assessment: Marks- 10**

(i) Marks on Attendance: Marks-05

(ii) Assignments & Interaction: Marks- 05

Group	**Unit**	**Objective questions** **Note: 10 multiple choice and 5 short answer type questions**			**Total Marks**
		To be set Multiple Choice (Twelve questions)	To be answered	Marks per question	

A	1,2,3	4	Any ten	1	10 X 1 = 10
B	4,5,6	4			
C	7,8	4			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	4	Any five	2	5x2=10
B	4,5,6	4			
C	7,8	2			

Group	**Unit**	**Subjective questions**			**Total Marks**
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	4,5,6	4			
C	5,6	3			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

E X A M I N A T I O N S C H E M E (SESSIONAL)

Name of Subject: Analog Electronics Laboratory **Full Marks -**100

Subject Code: ETCE/LAE1/S3

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 35, Notebook – 15.**
2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 35, Viva-voce – 15.**

	Text Books:		
Sl. No.	**Name of the Author**	**Title of the Book**	**Name of the Publisher**
1.	Malvino	Electronic Principles	Tata McGraw-Hill
2.	David A. Bell	Electronic Devices and Circuits	Oxford University Press
3.	Anil K. Maini	Electronics Devices and circuits	Wiley
4.	S. Salivanan	Electronic Devices and Circuits	Tata McGraw-Hill
5.	Millman & Halkias	Electronic Devices and Circuits	Tata McGraw-Hill
6.	Chattopadhyay & Rakhshit	Electronic Fundamentals and Applications	New Age Int
7.	Boylestad & Nashalsky	Electronic Devices and Circuits	Pearson
8.	Ganesh Babu	Linear Integrated Circuits	SCITECH
9.	Mottershed	Electronic Devices and Circuits	Prentice Hall of India, N. Delhi
10.	Bhargava	Basic Electronic & Linear Circuits	Tata McGraw-Hill
11.	Sahadeb	Electronic Principle	Dhanpat Rai & Sons

12.	M.L. Anand	Electronics Devices and Circuits	S.K. Kataria and sons
13.	Dr. T. Thygrajan	Fundamentals of Electrical and Electronics Engg	SCITECH
14.	Subhadeep Chowdhury	Fundamentals of Electronics	Paragon Publisher
15.	Premsingh Jakhar	Basic Electronics	Dhanpat Rai Publishing Co
16.	A. Dey Roy and D Dey Roy	Basic Electronics and Laboratory Manuals	Lakshmi Prakashani

Name of the course: **Digital Electronics**	
Course Code: ETCE/DE/S3	Semester: Third
Duration: One Semester (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100
Teaching Scheme:	Examination Scheme
Theory: 4 contact hrs./ week	Class Test(Internal Examination): 20 Marks
Tutorial: 1 contact hours / week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5(five)	Practical: 75 Marks
Rationale:	
The advancements in microelectronics design, manufacturing, computer technology and information systems have caused the rapid increase in the use of digital circuits. Hence this subject is intended to learn facts, concepts, principles and applications of digital techniques. Thus, students can sharpen their skills of digital design by learning the concept of number systems, logic gates, combinational and sequential logic circuits etc.	
Objectives:	
The student will be able to- 1. Do conversion of number systems 2. Understand the concept of logic gates and its operation 3. Design simple logic circuits using logic gates 4. Design of combinational circuit 5. Design of sequential circuit 6. Gain the comprehensive idea on different types Semiconductor 7. Understand Analog to Digital Conversion and Digital to Analog Conversion techniques 8. Understand different logic families and their comparison	

Content (Name of topic)		**Periods**	**Marks**
Group-A			
Unit 1	**Numbers System & Basic Logic Gates**	10	
	1.1 Number System - Introduction to Binary, Octal, Decimal, Hexadecimal number system, Conversion of number systems, Characteristic impedance – Propagation constant and image impedance – Open and short circuit impedance and their relation to characteristic impedance		

	1.2 1's complement and 2's complement, Binary arithmetic (addition, subtraction, division, multiplication). **1.3** Symbolic representation and truth table for logic gates**:** BUFFER – NOT – OR – AND – NAND – NOR – XOR – X-NOR		
Unit 2	**Boolean Algebra**	8	
	2.2 Boolean variables – Boolean function – Rules and laws of Boolean algebra – De Morgan's theorem 2.3 Max. term and min. term – Canonical form of equation – Simplification of Boolean expression 2.4 Karnaugh map technique – Don't care condition – Prime implicants – Canonical forms – Quine-McClusky method 2.5 Realization of Boolean expression with logic gates		
Unit 3	**Combinational Logic Circuits**		
	3.1 ARITHMETIC CIRCUITS**:** Half adder – Full adder – Half subtractor – Full subtractor – Parallel and serial full adder (1's complement, 2's complement and 9's complement addition) 3.2 Design of circuits using universal gates 3.3 Code converter, encoder and decoder – Multiplexer & demultiplexer 3.4 Parity generator and checker – Comparator		
	Group-B		
Unit 4	**Sequential Logic Circuits**	12	
	4.1 Difference between combinational and sequential logic circuits – Triggering of sequential logic circuits 4.2 Difference between flip flop and latch – Construction of RS, D, JK, JK master slave, T flip flops using basic gates, preset and clear signal 4.3 COUNTERS**:** Asynchronous and synchronous counter – Ripple counter – Mod-N counter – Up-down counter – Ring counter – Johnson counter – Programmable counter – Applications 4.4 REGISTERS**:** Shift registers – Serial in serial out – Serial in parallel out – Parallel in serial out – Parallel in parallel out – Applications		
Unit 5	**Memory Devices**	6	
	5.1 MEMORY ADDRESSING**:** Read, Write and Read Only operations 5.2 MEMORY CELLS**:** ROM, PROM, EEROM, EPROM, CDROM, Flash Memory 5.3 Circuit diagram using CMOS transistors and working of static and dynamic RAM 5.4 Digital Logic Arrays- PLA, PAL, GAL, FPLA, FPGA		
	Group C		
Unit 6	**Data Converters**	12	
	6.1 DIGITAL TO ANALOG CONVERTERS**:** Binary weighted resistor type – R-2R ladder type – Specifications and applications of DA converter 6.2 ANALOG TO DIGITAL CONVERTER**:** Comparator type – Successive approximation type – Dual slope AD converter – Specifications and applications of AD converter		

Unit 7	**Logic Families**	12	
	7.1 Introduction to digital ICs, 7.2 TTL logic family - Introduction to TTL logic, Realization of basic gates using TTL logic, TTL NAND gate – Totem pole output, open collector 7.3 ECL logic family - Introduction to ECL logic, ECL OR, NOR gate. 7.4 MOS families - Introduction to PMOS, NMOS & CMOS logic, Realization of PMOS inverter, NAND, NOR, Realization of NMOS inverter, NAND, NOR, Realization of CMOS inverter, NAND, NOR. 7.5 Comparative studies of different type of logic families like DTL, TTL, CMOS, and ECL etc. with the following characteristics**:** (a) logic levels, (b) power dissipation, (c) fan in and fan out, (d) propagation delay, and, (e) noise immunity, Basic gates using CMOS. 7.6 Interfacing of ICs of different logic families – Logic hazards 7.7 Study of 7400 TTL series / CD 4000 series gate ICs.		
	TOTAL	60	

Practical:

Skills to be developed:

Intellectual skills:

1. Identification of digital IC's of logic gates. Flip-flops, multiplexer and demultiplexers.
2. Ability to test different digital ICs.
3. Ability to design the combinational and Sequential logic circuits.

Motors skills:

1. Ability to build the circuit.
2. To observe the result and handling the equipments.

1. To verify the truth table of NOT, OR, AND, NAND, NOR, XOR, X-NOR with TTL logic gates and CMOS logic gates.
2. To realize different Boolean expressions with logic gates.
3. To realize half-adder, full-adder, subtractor, parallel and serial full-adder.
4. To design 1's complement, 2's complement and 9's complement adder-subtractor.
5. To implement encoder, decoder, multiplexer and demultiplexer.
6. To construct parity generator and checker & comparator.
7. To verify the function of SR, D, JK and T Flip-flops.
8. To construct binary synchronous and asynchronous counter.
9. To design programmable up / down counter.
10. To design controlled shift register and study their function.
11. To study different memory ICs.
12. To study DA and AD converters.
13. To interface TTL and CMOS ICs.

Mini Projects:

1. Design 1 digit BCD to 7 segment decoder using IC7447.
2. Design 4 bit binary adder/subtractor using IC7483.
3. Design 4 bit synchronous counter using IC7476.
4. Design decade counter using IC7492/93.

EXAMINATION SCHEME (Theoretical)

A) Internal Examination: Marks- 20

B) End Semester Examination: Marks-70

C) **Teacher's Assessment: Marks- 10**

(i) Marks on Attendance: 05

(ii) Assignments & Interaction: 05

Group	**Unit**	**Objective questions** **Note: 10 multiple choice and 5 short answer type questions**			**Total Marks**
		To be set Multiple Choice (Twelve questions)	To be answered	Marks per question	
A	1,2,3	4	Any ten	1	10 X 1 = 10
B	4,5	4			
C	6,7	4			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	4	Any five	2	5x2=10
B	4,5	4			
C	6,7	2			

Group	**UNIT**	**Subjective Questions**			**Total Marks**
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3	4	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	4,5	3			
C	6,7	3			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

E X A M I N A T I O N S C H E M E (SESSIONAL)

Name of Subject: Digital Electronics Laboratory **Full Marks - 75**

Subject Code:ETCE/LDE/S3

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 35, Viva-voce – 15.**

	Text Books:		
Sl. No.	**Name of the Author**	**Title of the book**	**Name of the Publisher**
1.	G K Kharate	Digital Electronics	OXFORD
2.	Anil K. Maini	Digital Electronics	Wiley
3.	P Raja	Digital Electronics	SCITECH
4.	Malvino & Leach	Digital Principles and Applications	Tata McGraw-Hill
5.	Jain	Modern Digital Electronics	Tata McGraw-Hill
6.	Taub & Schilling	Digital Electronics	Tata McGraw-Hill
7.	V. K. Puri	Digital Electronics	Tata McGraw-Hill
8.	S. Salivahnan & A. Arivazhgan	Digital Circuits and Design	Vikash Publishing House
9.	Yarbrough	Digital Logic Applications and Design	Vikash Publishing House
10.	Morris Mano	Digital Logic and Computer Design	Pearson
11.	V. Kumar	Digital Technology	New Age Publishers

Course Code: ETCE/ CPGM/ S3	Semester: Third
Duration: One Semester (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	Examination Scheme
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial: Nil	Teacher's Assessment (Attendance, Assignment & interaction): 05 Marks
Practical: 1 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks

Rationale:	
Sl. No.	
1.	Programming concept finds utility in understanding of high-level language, low-level language and the subjects like Microprocessor, Microcontroller, PLC etc. This subject covers from the basic concept of C to the arrays and function in C. This subject will act as "programming concept developer" for students. It will also become helpful to understand various application Software such as Matlab, Pspice etc.
Objective:	
Sl. No.	The students will be able to:
1.	Define program and programming
2.	Briefly understand compiler, interpreter, linker and loader function.

3.	Understand algorithm and learn the different ways of stating algorithms.
4.	Understand the basic structure of a program in C
5.	Learn the data types, variables, constants, operators etc.
6.	Get to know the input and output streams that exist in C to carry out the input output task.
7.	Learn about decision type control construct and looping type control constructs in C.
8.	Learn about one dimensional array.
9.	Understand what a function is and how its use benefits a program

Pre-Requisite:

Sl. No.	
1.	Basic units of computer system

	Contents (Theory)	Periods	Marks
	Group –A		
Unit: 1	**Introduction to Programming and overview of C** 1.1 CONCEPT OF PROGRAMMING LANGUAGES AND EXAMPLES 1.2 Algorithm and flowcharts 1.3 Compiler, Interpreter, Loader, and Linker 1.4 Source Code and Object Code 1.5 Place of C in computer language 1.6 Basic Structure of C	04	
Unit: 2	**Types, Operator & Expression** 2.1 3. C character set, tokens, constants, variables. keywords 2.2 PRIMARY DATA TYPES – their equivalent keywords and declaration 2.3 OPERATORS**:** Arithmetic – Increment – Decrement – Relational – Logical – Conditional – Bit Wise 2.4 Assignment statement- C expressions-operator precedence 2.5 UNFORMATTED I / O FUNCTIONS**:** getchar ( ) – getch ( ) — putchar ( ) – putch ( ) – gets ( ) –puts() FORMATTED CONSOLE I / O**:** printf ( ) – scanf ( )	08	
Unit: 3	**Control Flow (Decision Making)** 5.1 Introduction 5.2 IF-ELSE statement 5.3 Looping : FOR,WHILE and DO-WHILE statements 5.4 BREAK, CONTINUE and GOTO statements. 5.5 Simple Program	06	
	Group-B		
Unit 4	**Arrays & Pointers** 6.1 Introduction 6.2 Declaration and initialization of Array 6.3 Accessing of array elements and other allowed operations. 6.4 Simple program with a one dimensional array 6.5 Understanding pointers, declaring and accessing pointer ,'&' and '*' operators	08	

	6.6 Pointer expressions – Pointer assignments – Pointer arithmetic		
Unit 5	**Function** 7.1 The concepts of functions 7.2 Using functions : i) Function Declaration, ii) Function Definition, iii) Function Call 7.3 Simple program	06	
	Total	**32**	

	Contents (Practical)
Sl. No.	Skills to be developed
1.	Intellectual Skills: **Practical:** Skills to be developed: 1. Use of programming language constructs in program implementation. 2. Improvement of Logical thinking capability 3. To be able to apply different logics to solve given problem. 4. To be able to write program using different implementations for the same problem 5. Study different types of errors as syntax semantic, fatal, linker & logical 6. Debugging of programs 7. Understanding different steps to develop program such as ▪ Problem definition ▪ Analysis ▪ Design of logic ▪ Coding ▪ Testing ▪ Modifications and error corrections of programming language
2.	Motor Skills: i) Operate various parts of computer properly. ii) Problem solving skills. iii) Draw Flow charts
List of Laboratory Experiments:	
Sl. No.	
	Write algorithm, Draw Flow chart, and Write programming codes in C on following topics
1.	To find the sum and identify the greater number between any two numbers.
2.	To interchange the numeric values of two variables.
3.	Take three sides of a triangle as input and check whether the triangle can be drawn or not. If possible, classify the triangle as equilateral, isosceles, or scalene
4.	To test whether the given character is vowel or not.
5.	To find sum of the digits of an integer .
6.	To find the roots of a quadratic equation.
7.	To check whether an input number is palindrome or not.
8.	To find the G.C.D and L.C.M of two numbers.

9.	To find the factorial of given number.
10.	To find the sum of n natural numbers.
11	To accept 10 numbers and make the average of the numbers
12	To accept 10 elements and sort them in ascending or descending order.
13.	To find the summation of three numbers using function.
14	To find the maximum between two numbers using function

Examination Scheme (theoretical):

A) Internal Examination: Marks- 10

B) End Semester Examination: Marks-35

C) **Teacher's Assessment: Marks- 5**

(i) Marks on Attendance

(ii) Assignments & Interaction

Group	Unit	Objective questions Note: 10 multiple choice and 5 short answer type questions			Total Marks
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2,3	6	Any six	1	6 X 1 = 6
B	4,5	4			
		To be set short answer type (eight questions)	To be answered	Marks per question	
A	1,2,3	3	Any four	1	4x1=4
B	4,5	3			

Group	UNIT	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3	5	Any five (Taking at least two from each group)	5	5 X 5 = 25
B	5,6	3			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

E X A M I N A T I O N S C H E M E (SESSIONAL)

Name of Subject: Computer Programming Language Laboratory **Full Marks** - 50

Subject Code: ETCE/LCPGM/S3

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 15.**

Text Books:			
Sl. No.	**Name of the Author**	**Title of the book**	**Name of the Publisher**
1.	Balgurusamy	Programming in 'C'	Tata Mc-Graw Hill
2.	Kanetkar	Let's 'C'	BPB
3.	Herbert Shieldt	Complete reference C	Tata Mc-Graw Hill
4.	Kernigham & Ritchie	The C Programming Language	Mc-Graw Hill
5.	H. Schieldt	C Made Easy	McGraw Hill
6.	T. Jeyapoovan	A first course in programming with C	Vikash Publishing House
7.	E Balaguruswamy	Programming in ANSI C (edition 2.1)	Tata McGraw-Hill

1. **Websites:**
   - http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm
   - http://computer.howstuffworks.com/c.htm
   - Objective questions:
     1. http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp

Demo lectures with power point presentations using LCD projector should be arranged to develop programming concepts of students.

Name of the course: Electrical Machine	
Course Code: ETCE/EM/S3	Semester: Third
Duration: One semester (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	**Examination Scheme :**
Theory: 2 contact hrs./ week	Internal Examination (: 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 1 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3	
Rationale:	

This subject is restricted to second year diploma in Electronics & Telecommunication. Technicians / supervisors from all branches of engineering. They are expected to have some basic knowledge of major electrical equipments. Also the technicians working in different engineering fields have to deal with various types of electrical drives and equipment. Hence, it is necessary to study electric circuits, different types of electrical drives, their principles and working characteristics.

This subject covers analysis of ac and dc networks, working principles of commonly used ac and dc motors and their characteristics. The basic concepts studied in this subject will be very useful for understanding of other higher level subjects in further study.

Objectives:

The student will be able to-

1. Know importance, working and construction of single phase transformer
2. Explain construction, working, performance and applications of various types of DC Genrators and DC motors
3. Understand the idea of Polyphase circuits and star-delta connections
4. Gain principle of induction motor and construction
5. Identify and describe electrical hazards and precautions that should be taken to avoid injury in the workplace constituting electrical machine. Concept of electrical earthing.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**DC Generators**	7	
	1.1 Working principles, construction & types of dc generator 1.2 Armature winding types - Lap & Wave winding 1.3 E.m.f equation, Methods of building up of e.m.f. (Numerical) 1.4 Efficiency of DC generator, Losses in a generator, Condition for maximum efficiency		
Unit 2	**D.C. Motors**	7	
	2.1 Motor principle: Comparison of generator and motor action 2.2 Significance of back EMF and voltage equation of a motor 2.3 Motor characteristics: Torque Vs Armature current, Speed Vs Torque of a series, Shunt and compound motor. 2.4 Losses and efficiency of a DC motor 2.5 Various methods adopted to control speed of a DC motor: Electric braking of a shunt motor, Electric braking of series motor 2.6 Application		
	Group-B		
Unit 3	**Transformer**	7	
	3.1 Working principle of transformer, classification, brief description 3.2 of each part its function and material used. 3.3 Emf equation (no derivation) 3.4 Voltage ratio, current ratio and transformation ratio. 3.5 kVA rating of a transformer 3.6 Equivalent circuit of transformer 3.7 Transformer tests: Open circuit or no load test, Short circuit or impedance test. 3.8 Losses in a transformer 3.9 Efficiency and regulation of transformer- definition, equation and simple numerical on it) 3.10 Condition for maximum efficiency (no derivation)		

Unit 4	**Polyphase circuits**	6	
	4.1 Advantages of 3 phase system over 1 phase system 4.2 Principle of 3-phase e.m.f generation and its wave form 4.3 concept of phase sequence and balanced and unbalanced load 4.4 Relation between phase and line current, phase and line voltage in star connected and Delta connected balanced system. (no derivation) 4.5 Calculation of current, power, power factor in a 3 phase balanced system (simple numerical)		
Unit 5	Total construction, Operating principle and application of 3 phase induction motor	2	
Unit 6	**Electric hazards, Safety, Protections and Earthing**	3	
	5.1 Electric Shock, Effects of Electrical Current On the Human Body, Electrical Emergencies- actions to be taken when an electrical emergency arises. 5.2 Earthing – Necessity of earthing, types of earthing (name only), Earth resistance values, Eventualities in case of failure of earthing, Common electricity rules regarding earthing (related to electrical installation of lighting & machines only).		
	TOTAL	32	

Practical:

Skills to be developed:

Intellectual skills:

1. Analytical skills.
2. Identification skills.

Motor skills:

1. Measurement (of parameters) skills.
2. Connection (of machine terminals) skills.

List of Practical:

1. Study the construction features of DC Machine
2. To control the speed of D.C. shunt motor above normal speed & draw the speed characteristics.
3. To control the speed of D.C. shunt motor below normal speed & draw the speed characteristics.
4. Study of three point and four point starter
5. To determine equivalent circuit parameters of single-phase transformer by performing (i) O.C. test (ii) S.C. test.

Text books:

Sl. No.	Titles of Book	Name of Author	Name of Publisher
1.	Electrical Machines	S.K.Bhattacharya	T.M.H Publishing Co. Ltd.
2.	Electrical Technology- Vol-II	B.L.Thereja	S.Chand
3.	Electrical Machinery	Dr. S.K.Sen	Khanna Publisher

4.	Electrical Machines	J.B.Gupta	S.K.Kataria & Sons.
5.	Principles of Electrical Machines	V.K.Mehta, Rohit Mehta	S. Chand
6.	Electrical Machinery	P.S.Bhimbra	Khanna Publisher
7.	Electrical Machines	M.N.Bandyopadhyay	P.H.I. Pvt. Ltd.
8.	Electrical Machines	Ashfaq Husain	Dhanpat Rai & Co.
9.	Principles of Electrical Machines and Power Electronics	P.C.Sen	Wiley India
10.	Fundamentals of Electrical Machines	B.R.Gupta & V.Singhal	New Age Publisher
11.	Electrical Machines	Nagrath & Kothari	T.M.Hill
12.	Electrical Technology	H.Cotton	C.B.S. Publisher New Delhi
13.	Electrical Machines	Smarajit Ghosh	Pearson
14.	Electrical Technology	E.Huges	ELBS
15.	Electrical Technology	H. Cotton	Pitman
16.	A Course in Electrical & Electronics Measurement & Instrumentation	A.K.Sawhney	Dhanpat Rai & Sons

E X A M I N A T I O N S C H E M E (THEORETICAL)

A) Internal Examination: Marks- 10

B) End Semester Examination: Marks-35

C) **Teacher's Assessment: Marks- 5**

(i) Marks on Attendance

(ii) Assignments & Interaction

Group	**Unit**	**Objective questions** **Note: 10 multiple choice and 5 short answer type questions**			**Total Marks**
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2	4	Any six	1	6 X 1 = 6
B	3,4,5,6	6			
		To be set short answer type (eight questions)	To be answered	Marks per question	
A	1,2	3	Any four	1	4x1=4
B	3,4,5,6	3			

Group	**UNIT**	**Subjective Questions**			**Total Marks**
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2	3	Any five (Taking at least two from each group)	5	5 X 5 = 25
B	3,4,5,6	3			

E X A M I N A T I O N S C H E M E (SESSIONAL)

Subject: Electrical Machine Laboratory **Full Marks-50**

Code: ETCE/LEM/S3

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: Professional Practice-I	
Course Code: ETCE/PP-II/S3	Semester: Third
Duration: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	**Examination Scheme :**
Theory: Nil	Internal Teachers' Assessment: 50 Marks
Tutorial:	
Practical: 2 contact hours/ week	End Semester Examination: Nil
Credit: 2	
Rationale:	

In addition to the exposure both in theoretical and practical from an academic institution, it is desired that student should be familiar with the present day industry working environment and understand the emerging technologies used in these organisation. Due to globalization and competition in the industrial and service sectors, acquiring overall knowledge will give student an better opportunity for placement facility and best fit in their new working environment.

In the process of selection, normal practice adopted is to see general confidence, positive attitude and ability to communicate, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

The student will be able to-

Student will be able to:

1. Acquire information from different sources.
2. Enhance creative skills
3. Prepare notes for given topic.
4. Present given topic in a seminar.
5. Interact with peers to share thoughts.
6. Understand software for designing electronics circuits
7. Acquire knowledge of designing and maintenance of Electronics circuits, PCB and relevant software
8. Acquire knowledge on Open Source Software and its utility
9. Understand application of technologies in industry scenario.
10. Prepare a report on industrial visit, expert lecture.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**Field Visits**	12	
	Structured field visits (minimum three) be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The field visits may be arranged in the following areas / industries: i) Power supply/UPS/SMPS/Inverter manufacturing unit ii) Electronics Instruments calibration laboratories iii) Residential building for Electronic security systems iv) Small hydro power station **v)** Wind mill		
Unit 2	**Lectures by Professional / Industrial Expert to be organized from of the following areas (any four)**	10	
	i) Non conventional energy sources **ii) Open Source Software- an introduction and Practice session with Libre Office** • Introduction to Libre Office Writer • Introduction to Libre Office Calc • Introduction to Libre Office Impress • Introduction to Libre Office Base • Introduction to Libre Office Math • Introduction to Libre Office Draw iii) **OSCAD - Open Source EDA tool for circuit design, simulation and PCB design**. iv) Water pollution control v) Mobile communication vi) Various government schemes such as EGS, vii) Industrial hygiene. **viii)** Recent innovations of electronic gadgets in daily life		
	Seminar : Any one seminar on the topics suggested below: Students (Group of 4 to 5 students) has to search /collect information about the topic through literature survey, visits and discussions with experts / concerned persons: Students will have to submit a report of about 10 pages and deliver a seminar for 10 minutes. 1. Water supply schemes/Problems of drinking water in rural area 2. Problems related to traffic control 3. Electronic rolling display 4. Electronic systems used in Multiplex 5. Pani Panchayat Yojana for equal distribution of water **6.** Any other suitable topic	10	
	TOTAL	32	

Reference book for OSCAD

Sl No.	Titles of Book	Name of Author	Name of Publisher
1.	OSCAD	Yogesh Save, Rakhi R, Shambhulingayyan N.D., Rupak M Rokade, Ambikeswar Srivastava, Manas Ranjan Das, Lavita Pereira, Sachin Patil, Srikant Patnaik, Kannan M. Moudgalya	Shroff Publisher & Distributor

Website: (i) http://oscad.in

(ii) http:/spoken-tutorial.org of Indian Institute of Technology, Bombay (for more detail about Open source Software such as Libre Office, OSCAD and the like) **which is a part of National Mission on Education through ICT, MHRD Govt. of India.**

Demo lectures with power point presentations using LCD projector should be arranged for developing concepts on various topics.