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	-	.-	10	20	30	70	-	-	100
2.	Analog Electronics -I	4	4	-	-	10	20	30	70	-	-	100
3.	Digital Electronics	3	4	-	-	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	-	-	3	-	-	-	-	75	-	75
7.	Analog Electronics Laboratory	2	-	-	3	-	-	-	-	100	-	100
8.	Digital Electronics Laboratory	2	-	-	3	-	-	-	-	75	-	75
9.	Electrical Machine Laboratory	1	-	-	2	-	-	-	-	50	-	50
10.	Computer Programming Language Laboratory	1	-	-	2	-	-		-	50	-	50
11.	Professional Practice - I	2	-	-	3	-	-	-	-	-	50	50
12.	Environmental Studies	-	1	-	-	-	-	-	-	-	50	-
	Total	24	17	-	16	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, @TW-Term Work

TA (Teacher's assessment) = 10 marks: Attendance & surprise quizzes = 5 marks and Assignment & group discussion = 5 marks for CT= 20 Marks.

TA (Teacher's assessment) = 5 marks: Attendance & surprise quizzes + Assignment & group discussion = 5 marks for CT = 10 Marks.

Environmental Studies is a non credit based subject and only internal theoretical examination of 50 marks will be conducted

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.

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:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 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) igh 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.	Ravish Singh	Network Analysis & Synthesis	Tata McGraw-Hill
2.	Ramesh babu	Electrical Circuit Analysis	SCITECH
3.	Suresh Kumar	Electric Circuits & Networks	Pearson
4.	Sukhija and Nagsarkar	Circuits & Networks	OXFORD
5.	Kaduskar, Rajankar, Khatavkar	Network Fundamentals and Analysis	Wiley
6.	Chakraborti	Network Analysis & Synthesis	Tata McGraw-Hill
7.	Flosh	Network Theorem	Prentice Hall of India
8.	Prof. D. Chatterjee	Network and transmission line	Learning Press
9.	A. K. Chakraborty	Introduction to network, Filters and Transmission Lines	Dhanpat Rai & Sons
10.	Kaduskar, Rajankar, Shedge	Network Synthesis and Filter Design	Wiley
11.	V. Valkenburg	Network Analysis	Prentice Hall of India, N. Delhi
12.	Sudhakar	Circuit and networks	Tata MCGraw-Hill
13.	Jain & Kaur	Network, Filters and Transmission Lines	Tata MCGraw-Hill
14.	Hayt	Engineering Circuit Analysis	Tata McGraw-Hill
15.	Ryder	Network, Lines and Fields	Prentice Hall of India, N. Delhi

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: 4 contact hours./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	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 among 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	7,8	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.	KK Ghosh	Basic Electronics	Platinum Publisher
5.	BL Theraja	Basic Electronics (Solid state)	S Chand
6.	S. Salivahanan	Electronic Devices and Circuits	Tata McGraw-Hill
7.	VK Mehta, Rohit Mehta	Principles of Electronics	S Chand
8.	Nagrath	Electronics Devices and Circuits	Prentice Hall of India
9.	Millman & Halkias	Electronic Devices and Circuits	Tata McGraw-Hill
10.	Chattopadhyay & Rakhshit	Electronic Fundamentals and Applications	New Age International
11.	Boylestad & Nashalsky	Electronic Devices and Circuits	Pearson
12.	Samar Chottopadhyay	Analog Electronics - I & II	Naba Prakashani
13.	Maitreyi Ray Kanjilal	Analog Electronics Circuits	JBBL

14.	Ganesh Babu	Linear Integrated Circuits	SCITECH
15.	JB Gupta	Electronics Devices & Circuits	Kataria & Sons
16.	Sanjay Sharma	Electronics Devices & Circuits	Kataria & Sons
17.	Mottershed	Electronic Devices and Circuits	Prentice Hall of India, N. Delhi
18.	Bhargava	Basic Electronic & Linear Circuits	Tata McGraw-Hill
19.	Sahadeb	Electronic Principle	Dhanpat Rai & Sons
20.	M.L. Anand	Modern Electronics	S Chand
21.	Dr. T. Thygrajan	Fundamentals of Electrical and Electronics Engg	SCITECH
22.	Premsingh Jakhar	Basic Electronics	Dhanpat Rai Publishing Co
23.	Milman & Halkias	Integrated Electronics	Tata McGraw-Hill

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:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 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 various memory devices 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**	6	

	1.1 Number System - Introduction to Binary, Octal, Decimal, Hexadecimal number system, Conversion of number systems, 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	
	2.1 Boolean variables – Boolean function – Rules and laws of Boolean algebra – De Morgan's theorem 2.2 Max. term and min. term – Canonical form of equation – Simplification of Boolean expression 2.3 Karnaugh map technique – Don't care condition – Prime implicants – Canonical forms – Quine-McClusky method 2.4 Realization of Boolean expression with logic gates		
Unit 3	**Combinational Logic Circuits**	10	
	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**	6	
	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	Anand Kumar	Fundamental Digital Circuits	Prentice Hall of India
6	Jain	Modern Digital Electronics	Tata McGraw-Hill
7	Anokh singh, AK Chhabra	Fundamentals of Digital Electronics & Microprocessors	S.Chand
8	Taub & Schilling	Digital Electronics	Tata McGraw-Hill
9	V. K. Puri	Digital Electronics	Tata McGraw-Hill
10	S. Salivahnan & A. Arivazhgan	Digital Circuits and Design	Vikash Publishing House
11	Yarbrough	Digital Logic Applications and Design	Vikash Publishing House
12	Morris Mano	Digital Logic and Computer Design	Pearson
13	V. Kumar	Digital Technology	New Age Publishers
14	Subhasis Maitra	Digital Electronics	JBBL
15	Sanjay Sharma	Digital Electronics (Digital Logic Design)	Kataria & Sons
16	DK Chanda & S Banerjee	Digital Fundamentals and Applications	University Science Press
17	Floyd	Digital Fundamentals, 10e	Pearson
18	Dr. SK Mandal	Digital Electronics	Tata McGraw-Hill
19	Tocci	Digital Systems: Principles and Applications, 10e	Pearson

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 and pointers.
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 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() 2.6 FORMATTED CONSOLE I / O**:** printf ( ) – scanf ( )	07	
Unit: 3	**Control Flow (Decision Making)** 3.1 Introduction 3.2 IF-ELSE statement 3.3 Looping : FOR,WHILE and DO-WHILE statements 3.4 BREAK, CONTINUE and GOTO statements.	06	

	3.5 Simple Program		
	Group-B		
Unit 4	**Arrays & Pointers** 4.1 Introduction 4.2 Declaration and initialization of Array 4.3 Accessing of array elements and other allowed operations. 4.4 Simple program with a one dimensional array 4.5 Understanding pointers, declaring and accessing pointer ,'&' and '*' operators 4.6 Pointer expressions – Pointer assignments – Pointer arithmetic	08	
Unit 5	**Function** 5.1 The concepts of functions 5.2 Using functions : i) Function Declaration, ii) Function Definition, iii) Function Call 5.3 Simple program	05	
	Total	**30**	

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: 6 multiple choice and 4 short answer type questions to be answered**			**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	4	Any four	1	4x1=4
B	4,5	4			

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	4,5	5			

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 25 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.	Reema Theraja	Programming in 'C'	OXFORD
3.	Kamthane	Programming in 'C'	Pearson
4.	Kanetkar	Let's 'C'	BPB
5.	Herbert Shieldt	Complete reference C	Tata Mc-Graw Hill
6.	Kernigham & Ritchie	The C Programming Language	Mc-Graw Hill
7.	H. Schieldt	C Made Easy	McGraw Hill
8.	T. Jeyapoovan	A first course in programming with C	Vikash Publishing House
9.	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: 2 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. Acquire concept of electrical earthing.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**DC Generators**	6	
	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**	6	
	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 Applications		
	Group-B		
Unit 3	**Transformer**	7	
	3.1 Working principle of transformer, classification, brief description of each part its function and material used. 3.2 Emf equation (no derivation) 3.3 Voltage ratio, current ratio and transformation ratio. 3.4 kVA rating of a transformer		

	3.5 Equivalent circuit of transformer 3.6 Transformer tests: Open circuit or no load test, Short circuit or impedance test. 3.7 Losses in a transformer 3.8 Efficiency and regulation of transformer- definition, equation and simple numerical on it) 3.9 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	30	

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	Tata McGraw-Hill
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
	Electric Circuits	Bell	OXFORD
7.	Electrical Machines	M.N.Bandyopadhyay	Prentice Hall of India
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	Tata McGraw-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
	Electric Motor:Application and Control	Deshpande	Prentice Hall of India
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: 6 multiple choice and 4 short answer type questions to be answered			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	5			

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 25 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-I/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: 3 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-

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. Acquire knowledge on Open Source Software and its utility

7. Understand software for designing electronics circuits 8. Acquire knowledge of designing and maintenance of Electronics circuits, PCB and relevant software 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**	15	
	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) Electronic security systems for Residential building 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)**	18	
	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	12	

	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		
	TOTAL	45	

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.

PART — II

2nd 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

Further suggestion may be submitted to the syllabus committee. List of the coordinators for the branch of Diploma in Electronics & Tele Communication Engineering are:

- **Sri Sandip Kundu** **Tele: 03322277590**
- **Dr. Bijita Biswas** **Mobile:9830272981**
- **Dr. Marina Dan** **Mobile:9831115387**
- **Dr. Susmita Sen** **Mobile:9433772629**
- **Sri Anup Sarkar** **Mobile:9433521132**
- **Sri Ashim Kumar Manna** **Mobile:8902701784**
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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: FOURTH

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.	**Elementary Communication Engineering**	4	4	1	.-	10	20	30	70	-	-	100
2.	**Analog Electronics –II**	3	4	-	-	10	20	30	70	-	-	100
3.	**Consumer Electronics**	3	3	-	-	10	20	30	70	-	-	100
4.	**Microprocessor**	3	4	-	-	10	20	30	70	-	-	100
5.	**Elementary Communication Engineering Laboratory**	2	-	-	3	-	-	-	-	75	-	75
6.	**Analog Electronics-II Laboratory**	2	-	-	3	-	-	-	-	75	-	75
7.	**Consumer Electronics Laboratory**	2	-	-	2	-	-	-	-	75	-	75
8.	**Microprocessor Lab**	2	-	-	3	-	-	-	-	75	-	75
9.	**Development of Life Skill-II**	2	1	-	2	-	-		-	50	-	50
10.	**Professional Practice – II**	2		-	3	-	-	-	-	-	50	50
	Total	25	16	1	16	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, TW- Team Work

TA (Teacher's assessment) = 10 marks: Attendance & surprise quizzes = 5 marks and Assignment & group discussion = 5 marks for CT= 20 Marks.

TA (Teacher's assessment) = 5 marks: Attendance & surprise quizzes + Assignment & group discussion = 5 marks for CT = 10 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.

Development of life Cycle-II subject has been allotted with Practical of 50 marks only which consist of both the Internal sessional examination and external sessional examination of 25 marks each. Course contents of the subject can be referred from relevant link of WBSCTE website.

Name of the course: **Elementary Communication Engg.**	
Course Code: ETCE/ECE/S4	Semester: Fourth
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 hr./ week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 6 (Six)	Practical: 75 Marks
Rationale:	

Communication plays vital role in our lives. Development in communication technology have increased its applications in allied fields of electronics including satellite, mobile, RADAR, telephony, telegraphy, industrial controls, etc. This course concentrates on the field of analog modulation and pulse modulation including delta modulation. It also includes the advantages and disadvantages of digital and analog communications. After passing through the course the students will also be acquainted with the basic telephony and telecommunication switching.

Objectives:

The student will be able to:

- Classify different types of communication system.
- Explain electromagnetic spectrum.
- Know the basic requirements of an analog communication system;
- Understand analog modulation including PAM, PWM, PPM, PCM and Delta modulation;
- Know the functioning of transmitter and receiver;
- Explain the difference between digital and analog communication;
- Discuss the ideas dealing with the operation of the systems like telephony.

Content (Name of topic)		**Periods**	**Marks**
Group-A			
Unit 1	**Introduction To Electronic Communication**	8	
	1.1 Importance of communication, Elements of a communication system **1.2** Types of electronic communication –Simplex, Half Duplex and Full Duplex , Electromagnetic spectrum (different bands and their frequencies , Bandwidth-concept of transmission bandwidth **1.3** Basic idea of Fourier series and Fourier transform.		
Unit 2	**Analog Modulation**	12	

	2.1 Concept and necessity of modulation 2.2 Definition of amplitude, frequency and phase modulation 2.3 Derivation of sidebands in AM systems – Evaluation of power – Sideband depth –Efficiency of modulation, Percentage of modulation, Representation of AM signal in time and frequency domain. 2.4 METHODS OF AM**:** Principles of operation of collector modulated Class C amplifier – Balanced modulator, Ring modulator 2.5 Expression of sidebands in FM and PM systems and its interpretation – Modulation index and bandwidth requirement, Representation of FM signal in time and frequency domain. 2.6 Principles of operation of frequency modulation using Varactor diode and VCO. 2.7 Comparison of AM, FM and PM 2.8 Pulse modulation: Introduction, comparison with Continuous Wave Modulation, advantages, Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling 2.9 Concept of Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) – Principle of generation and reception of PAM, PWM & PPM with block diagram and their applications		
Group-B			
Unit 3	**Transmitting Systems**	4	
	3.1 Block diagram and function of different stages of AM and FM broadcast transmitter 3.2 WORKING PRINCIPLES OF SSB SYSTEMS WITH BLOCK DIAGRAM**:** Filter Method – Phase Shift Method		
Unit 4	**Demodulation**	6	
	4.1 Principle of detection with diode detector 4.2 AGC circuit delayed AGC 4.3 Foster-Seeley discriminator – Ratio Detector – Limiter – Standard AFC Circuits (basic principles only, no derivation) 4.4 PLL (block diagram & operation) explanation.		
Unit 5	**Receiving System**	8	
	5.1 Principle of heterodyne, Characteristics of AM radio receiver- Sensitivity, Selectivity, and Fidelity 5.2 Block diagram and principle of operation of super heterodyne receiver – IF amplifier and choice of IF – Mixer and converter – Alignment and tracking – Tone and volume control – Band spreading – Receiver characteristics & Testing – sensitivity, selectivity and fidelity 5.3 Block diagram and principle operation of FM receiver – Pre-emphasis and de-emphasis – AFC and alignment of FM receiver		

	Group-C		
Unit 6	**Basic Telephony**	12	
	6.1 Telephone transmitter – Receiver – Dial tone, side tone and antisidetone circuits – Handset – Ringer – Switch hook – Hybrid – Local loop – Tone dialling – DTMF 6.2 Electronic Exchange: Space division switching, time division switching, block diagram of electronic exchange , 6.3 Discuss the numbering plan of telephone networks (National Schemes & International Numbering) **6.4** Describe the operation of EPABX.		
Unit 7	**Pulse Code Modulation**	6	
	7.1 Idea of digital communication – Advantages of digital communication over analog communication 7.2 BASIC STEPS IN PCM SYSTEM**:** Filtering – Sampling – Quantizing – Encoding – Line coding (HDB3, AM1, CM1, NRZ, RZ) 7.3 Block schematic description of transmitter and receiver of PCM system 7.4 Principles of linear and non-linear quantization – Companding, Inter Symbol Interference		
Unit 8	**Delta Modulation**	4	
	8.1 Block schematic description of delta modulation technique 8.2 Limitations of delta modulation – Slope overload and granular noise. 8.3 Concept of adaptive delta modulation technique		
	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. Selection of appropriate sample
2. Selection of Equipment
3. Interpretation of waveforms

Motor Skill:

1. Accurate observation
2. Setting up of Equipment
3. Measurement

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	
1.	To study the amplitude modulation and demodulation technique.
2.	To study the frequency spectrum of AM and FM with the help of spectrum analyzer.
3.	To study the analog signal sampling and reconstruction of the effect of**:** — (a) different sampling frequencies on reconstructed signals; (b) Varying duty cycle of sampling frequency on the amplitude of reconstructed signal.

4.	Observe waveforms of Pulse code modulation and demodulation.
5.	Observe waveforms of Delta modulation.
6.	Observe waveforms of Adaptive delta Modulation
7.	To study some radio receiver measurements**:** (a) sensitivity, (b) selectivity and (c) fidelity.
8.	Observe input & output waveforms of AM detector.
9.	To study EPABX**:** (a) to study the electrical behaviour of different tones – dial tone, ringing tone, ring back tone and busy tone (both subscriber and exchange); (b) to study some extension features-redial, burgling, extension privacy, call forwarding, follow me etc.

MINI PROJECTS

List of MINI PROJECTS	
1.	AM/FM Radio Receiver/Transmitter using transistor
2.	AM modulator/detector/mixer using diode.
3.	FM detector.

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	3,4,5	4			
C	6,7,8	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	3,4,5	3			
C	6,7,8	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	3,4,5	3			
C	6,7,8	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.	Chandrasekhar	Communication system	OXFORD
2.	**Ganesh Babu**	Communication Theory	SCITECH
3.	Wayne Tomasi	Electronic communication system	Pearsons Eduction
4.	Singh & Sapre	Communication Systems	Tata McGraw Hill
5.	B.P. Lathi	Analog and Digital communication	OXFORD
6.	Sanjay Sharma	Analog and digital Communication	S.K. Kataria
7.	Simon Heykin	Communication system	Wiley
8.	John C Bellamy	Digital telephony	Wiley India
9.	Anokh Singh and Chabaria	Principles of Communication Engg	S Chand
10.	Couch	Digital & Analog Communication System	Pearson
11.	Kennedy	Electronic Communication System	Tata MCGraw-Hill
12.	Taub & schilling	Analog and digital communication	Tata MCGraw-Hill
13.	Frenzel	Communication Electronics	Tata McGraw-Hill
14.	K.Rekha	Digital Communication	SCITECH
15.	K. Sam. & Shanmugar	Digital & Analog Communication	Wiley
16.	RAO	Analog Communication	Tata McGraw-Hill
17.	RS Sedha	Analog communication	S chand
18.	NIIT	Advanced Digital Communication	Prentice Hall of India
19.	Taub & Schilling	Analog and Digital communication	Tata McGraw-Hill
20.	Rice	Digital Communications	Pearson
21.	Sklar & Ray	Digital Communications, 2e	Pearson
22.	Roddy Coolen	Electronic Communication	Prentice Hall of India
23.	VK Khanna	Digital Communication	S Chand
24.	Tomasi	Electronic Communications System: Fundamentals Through Advanced, 5e	Pearson
25.	Wayne Tomasi	Advanced Electronics Communication System	Eastern Economoy Edition
26.	Sudhakshina Kundu	Analog and Digital communication	Pearson
27.	Viswanathan	Tele Communication	PHI

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

Name of Subject: Elementary Communication Engg. Laboratory **Full Marks-75**

Subject Code: ETCE/LECE/S4

1.Continuous Internal Assessment of 25 marks is to be carried out by the teachers throughout the 4th Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2.External Assessment of 50 marks shall be held at the end of the 4th 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-II**	
Course Code: ETCE/AE1I/S4	Semester: Fourth
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:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 75 Marks
Rationale:	
The physical world is inherently analog.	
Objectives:	

The student will be able to

1. describe an operational amplifier,
2. explain how its operation in a circuit depends on certain parameters,
3. recognize various op-amp circuit and its applications,
4. be familiar with microelectronic technology,
5. observe, measure and record various types of waveforms through the use of applicable measuring instruments and perform essential tests, diagnosis & repairs.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**Tuned Amplifier**		
	1.1 Circuit operation of single tuned, double tuned and stagger tuned amplifiers	4	
Unit 2	**Feedback Amplifier**	7	
	2.1 Basic idea of positive and negative feedback – Effect of negative feedback on gain, gain stability, distortion, noise, bandwidth, phase shift, input and output impedances 2.2 Voltage and current, series and shunt feedback 2.3 Performance of emitter follower circuit – Calculation of gain and input & output impedances – Darlington pair		
Unit 3	**Operational Amplifier**	16	
	3.1 Circuit operation of differential amplifier – single & double ended 3.2 INTRODUCTION TO OPERATIONAL AMPLIFIER**:** Inverting and non-inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current – Slew rate – Open loop and closed loop gain – Input and output impedance – Frequency response and virtual ground 3.3 APPLICATIONS OF OPAMP**:** Adder – Subtractor – Voltage Follower – Integrator – Differentiator – Comparator – Schmitt Trigger – Voltage Limiter – Log		

	Amplifier – Clipper – Clamper 3.4 Concept of Active Filter		
	Group B		
Unit 4	**Oscillator**	8	
	4.1 Concept of oscillation – Barkhausen criteria 4.2 Operation of following oscillators**:** — a) tuned collector, b) Hartley, c) Colpitt, d) Wein-bridge, e) Phase Shift, and, f) Crystal.		
Unit 5	**Relaxation Oscillator**	6	
	5.1 Operation of monostable, astable and bistable multivibrator with waveforms 5.2 Schmitt trigger circuits 5.3 IC-555, internal block diagram and pin function, construction of different multivibrators with IC-555		
	Group-C		
Unit 6	**Sweep Circuits**	6	
	6.1 Fundamentals of sweep circuit operation – Difference between voltage time base generator and current time base generator 6.2 Operation of Miller and Bootstrap circuits – Applications of Sweep Circuits.		
Unit 7	**Microelectronics Technology**	13	
	7.1 Advantages of ICs over discrete elements 7.2 TYPES OF ICS**:** Linear and Digital – Monolithic and Hybrid 7.3 PLANAR TECHNOLOGY**:** Crystal growth of wafer – Epitaxial growth – Oxidation – Photolithography – Chemical etching – Diffusion – Ion implantation and metallisation (ideas only) 7.4 Fabrication of BJT, diode, resistor and capacitor (salient features), Fabrication of NMOS, PMOS & CMOS		
	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 determine the frequency response characteristics of a tuned amplifier.
2.	To determine the frequency characteristics of a negative feedback amplifier and compare with that of an amplifier without feedback.
3.	To study the waveforms and measure the frequency of **:** — a) Wien bridge, b) Hartley, c) Colpitt, d) tuned collector, e) RC phase shift, and, f) crystal oscillator circuit.

4.	To study the waveform of UJT as relaxation oscillator.
5.	To study the characteristics of IC555 timer connected as**:** a) astable multivibrator, b) monostable multivibrator.
6.	To observe the waveform at the input and output of clipping circuits in different clipping configuration.
7.	To study the operation of positive and negative clamper circuit.
8.	To study the characteristic parameters of differential amplifier in single ended and double ended versions**:** — a) input impedance, b) common mode voltage gain, c) differential mode voltage gain, d) CMRR.
9.	To determine the following characteristics of op-amp**:** — a) input offset voltage, b) slew rate, c) non-inverting gain, d) inverting gain.
10.	To study the following applications of op-amp using IC741**:** — a) adder, b) subtractor, c) differentiator, d) integrator, and, e) voltage follower

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

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	3			
C	6,7	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.	Boylestad & Nashalsky	Electronic Devices and Circuits	Pearsons Eduction
2.	David A. Bell	Electronic Devices and Circuits	Oxford University Press

3.	Anil K. Maini	Electronics Devices and circuits	Wiley
4.	Chattopadhyay & Rakhshit	Basic Electronic & Linear Circuits	New Age International
5.	Ramesh Babu	Electronic Devices & Circuits	**Scitech**
6.	Shredhra Smith	Microelectronics	Oxford University Press
7.	Sanjay Sharma	Electronics Devices and circuits	S K Kataria and sons
8.	J B Gupta	Electronics Devices and circuits	S K Kataria and sons
9.	S. Salivanan,uresh Kumar, Vallavaraj	Electronic Devices and Circuits	Tata McGraw-Hill
10.	Malvino	Electronic Principles	Tata McGraw-Hill
11.	Milman & Halkias	Integrated Electronics	Tata McGraw-Hill
12.	Gayakwad	OP Amp and Linear Integrated Circuits	Prentice Hall of India, N. Delhi
13.	Ganesh Babu	Linear Integrated Circuits	SCITECH
14.	Mottershed	Electronic Devices and Circuits	Prentice Hall of India, N. Delhi
15.	Bhargava	Basic Electronic & Linear Circuits	Tata McGraw-Hill
16.	Sahadeb	Electronic Principle	Dhanpat Rai & Sons
17.	Rashid	Microelectronics	Wiley
18.	M.L. Anand	Electronics Devices and Circuits	S.K. Kataria and sons
19.	Dr. T. Thygrajan	Basic Electronics	SCITECH
20.	Subhadeep Chowdhury	Basic Electronics	Dhanpat Rai & sons
21.	Premsingh Jakhar	Basic Electronics	Dhanpat Rai Publishing Co
22.	Maitreyi Ray Kanjilal	Analog Electronics Circuits	JBBL
23.	Cheruku	Electronics Devices and circuits	Pearson
24.	Bogart	Electronic Devices and Circuits, 6e	Pearson
25.	Floyd	Electronic Devices,7e	Pearson
26.	Kaduskar, Baru	Electronic Product Design	Wiley India
27.	Nagrath	Electronics Analog & Digital	Prentice Hall of Indi
28.	Milman and Halkias	Electronics Devices and Circuits	Tata McGraw-Hill
29.	Razavi	Microelectronics	Wiley India
30.	Sedra & Smith	Microelectronics Circuits	OXFORD

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

Name of Subject: Analog Electronics-II Laboratory **Full Marks-75**

Subject Code: ETCE/ LAEII/ S4

1. Continuous Internal Assessment of 25 marks is to be carried out by the teachers throughout the 4th Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2. External Assessment of 50 marks shall be held at the end of the 4th 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: **Consumer Electronics**

Course Code: ETCE/ CONSUMER/ S4	Semester: Fourth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	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:	

This course is designed to provide required knowledge and skills in the communication systems such as microphone and loudspeakers. Revolution in electronics technology has brought radical changes in Audio & Video system in the recent years and the state of art will enable the students to comprehend, the fact, concept, working principle and its application. The knowledge so gathered by the students will help them to be familiar with designing concepts and repairing of audio & video system.

The low cost video system VCR, cameras have brought about video revolution in the field of home entertainment, education, training, advertising and electronic newsgathering. Dramatic developments in flat panel display, reduction in the cost of image scanning system, LCD display and integrated subsystems is going to affect our communication capabilities and life-style in a big way.

Objectives:

The student will be able to:

- Understand the basic concept dealing with the operations of microphone, loudspeakers and Stereo phonic system;
- Understand the basic concepts dealing with the operation of B/W TV circuits, Colour TV circuits, CD player mechanism & fault finding in CD player with advance technique MP3 player & DVD unit.
- This will also touch the advance topic of the plasma LCD Television system & flat panel display.
- Learn the comparison of NTSC, PAL, and SECAM system.
- Understand the principle of DTH, and HDTV.
- Discuss the principle of CCD & remote control.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**Microphone**	4	
	1.1 Discuss the characteristics of Microphones (Sensitivity, Frequency Response, Output Impedance, Distortion, Directivity) 1.2 Discuss the Principle of operation, construction, of Advantages and disadvantages of Carbon Microphone — Capacitance Microphone — Moving Coil Microphone - Wireless Microphone.		
Unit 2	**Loud Speaker**	5	
	2.1 Constructions and working principles of Moving Coil Loudspeaker – Impedance and Power Level of loudspeaker 2.2 Frequency response of Practical Loudspeakers**:** Woofer, Tweeter, Squawker – Loudspeaker Enclosure		
Unit 3	**Stereos**	4	

	3.1 Explain the concept of monophonic & stereo phonic sound system. 3.2 DETAILS OF STEREO COMPONENTS**:** Tone control, Bass, Treble, Balance & Control – Crossover Networks – Graphic Equalizer – Noise Reduction Techniques		
Unit 4	**Advanced Sound Systems**	4	
	4.1 Basic principles of Magnetic Recording, Playback. 4.2 Basic principles of digital recording & block diagram of MP3 player & Explanation.		
	Group-B		
Unit 5	**Black and White TV System**	7	
	5.1.State and explain the following terms. 5.1.1 Aspect ratio. 5.1.2 Flicker. 5.1.3 Resolution. 5.1.4 Video bandwidth. 5.1.5 Interlaced scanning. 5.1.6 Composite video signal, discuss horizontal & vertical sync. 5.2 Working principle with block diagram of TV transmitter and receiver 5.3 Brief description with circuit diagram: TV Tuner – Video IF stage – Sound stage – Picture tube & its associated circuit – Synchronizing circuits – Automatic Gain Control (AGC) – Horizontal & vertical deflection circuits – EHT section – Remote control of a TV receiver **5.4** Television broadcast standards, Describe principle of operation of CCD cameras.		
Unit 6	**Colour TV System**	11	
	6.1 Fundamental concepts of RGB colour systems and RGB drivers of a colour picture tube, Distinguish between additive and subtractive mixing of colours. 6.2 Explain complementary colours, hue, saturation, and Colour circle. 6.3 Explain compatibility in TV system. 6.4 Different colour systems like NTSC, SECAM and PAL system and their comparison 6.5 Working principle of Vidicon camera, Block schematic description of a colour TV Transmitter and Receiver, explain working principle of PAL encoder and decoder, discuss Colour picture tube & its associated circuits. 6.6 Discuss the colour TV signals (Luminance Signal & Chrominance Signal,(I & Q, U & V Signals), bandwidth of Chrominance Signal, colour subcarrier frequency & colour brust. 6.7 Discuss the principle of operation of Shadow mask and Trinitron picture tube. 6.8 Explain the De-gaussing circuit in Colour TV receiver 6.9 Basic concept on Flat panel Display, Plasma Display, LCD display, LED		

	display		
	Group- C		
Unit 7	**CD Player**	4	
	7.1 Working principle of CD recording and CD playing – Explain 7.2 Block diagram and working principle of VCD and DVD Player		
Unit 8	**Principle of Cable, Satellite and HDTV System**	6	
	6.1 Modern cable TV system block diagram - Head end processor - Trunk & cable distribution system with block diagram – scrambling – descrambling 6.2 State the need for satellite for TV broadcasting over wide area. 6.3 Concepts of HDTV system, List HDTV standards. 6.4 Explain TV Remote control transmitter and Receiver with block diagram. 6.5 Direct to Home System (DTH) Introduction & Block Diagram. Concept of set top box 6.6 Block diagram of dB meter with working principle.		
	TOTAL	45	

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. Reading
2. Sourcing of Websites

Motor Skill:

4. Testing
5. Measurement
6. Detection of faults and remedial measures

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	
1.	To study the internal layout of black and white TV receiver.
2.	To study the Internal adjustment, control and fault finding procedure of Black & White TV.
3.	To study the internal layout of colour television
4.	To study the internal adjustments control and simple troubleshooting techniques of Colour TV.
5.	Fault finding in given Colour TV : i) No color ii) Red Colour only iii) Blue color only iv) Green color only. v) Magenta color only vi) Cyan only vii) Yellow only viii)No raster, No Sound.
6.	Fault finding in given Colour TV : i) In HSYNC section ii) In VSYNC section iii) In SYNC separator
7.	Installation of DTH System
8.	Estimate the cost, layout of Cable TV.
9.	Collect information about Set Top box used for Cable TV at home

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

Group	**Unit**	**Subjective Questions**			**Total Marks**
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3,4	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	5,6	4			
C	7,8	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.

Sl. No.	**Name of the Author**	**Title of the Book**	**Name of the Publisher**
1.	A.K. Maini	Colour Television and Video Technology	Wiley
2.	B.R.Gupta,	Consumer Electronics	Sk Kataria & Sons.
3.	Ajay Sharma	Audio and Video systems	Dhanpat Ray & Sons
4.	R.G. Gupta	Audio and Video Systems	Tata McGraw-Hill
5.	Gulati	Monochrome and colour TV	New Age International
6.	Newness	Book View	BPB
7.	Manohar Lotia	Modern CD Player Servicing Manual	BPB Publication
8.	Bartlett	Cable TV Technology and Operation	Tata MCGraw-Hill
9.	R.G. Gupta	Electronic Instruments and Systems	Tata MCGraw-Hill
10.	ST Thilagam	Television and Video Engg.	SCITECH
11.	A.M.Dhake	Television & Video Engineering	Tata McGraw-Hill
12.	Chandrasekhar	Electronics Communication	OXFORD
13.	Bernard Grob	Basic Television and Video System	Tata McGraw-Hill

14.	S. Sharma	Basic Radio and Television	Tata McGraw-Hill
15.	R.R Gulati	Colour Television Principles and Pratice	New age International
16.	Bali	Consumer electronics	Pearson
17.	RN Baral	Telemetry & Transmission	Kataria and Sons

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

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

Subject Code: ETCE/LCONSUMER/S4

1. Continuous Internal Assessment of 25 marks is to be carried out by the teachers throughout the 4th Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2.External Assessment of 50 marks shall be held at the end of the 4th 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: **Microprocessor**	
Course Code: ETCE/ MP /S4	Semester: Fourth
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:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 75 Marks
Rationale:	

This course is designed to introduce the student to the field of microprocessor and microcomputers. Topics covered include organization of a computer, the architecture of typical 8 bit and 16 bits microprocessors, its function and its instruction set. Machine language of the 8085 and 8086 microprocessors is covered in details and the students are given the opportunity of writing programs and controlling devices using an 8085 and 8086 based system development kit

Objectives:

The student will be able to:

1. identify the main function and application of microprocessor and microcomputers;
2. describe the basic organization of a computer;
3. describe the architecture of 8 bit microprocessor;
4. write machine language program for an 8085 based microcomputer;
5. describe memory and I/O interfacing technique;
6. describe I/O interfacing scheme and devices;
7. program I/O interface devices;
8. describe the architecture and instruction set of 8086 and write program.
9. Understand the concept of advance microprocessors

Content (Name of topic)	**Periods**	**Marks**
Group-A		

Unit 1	**Introduction to Microprocessor and 8 BIT Microprocessor**	7	
	1.1 Distinguish between microprocessor & microcomputer, Generation and evaluation of microprocessor 1.2 Architecture of intel-8085- registers, timing and control, add buffer and add data, interrupts control, serial input and output control 1.3 Concept of Bus, bus organization of 8085 1.4 Pin details of 8085 and related signals 1.5 Demultiplexing of address and data bus by ALE signal.		
Unit 2	**Timing Cycle of 8085**	5	
	2.1 Machine cycle, instruction cycle 2.2 Instruction fetch cycle, read cycle and write cycle 2.3 Bus idle cycle, Hold and Halt state 2.4 Timing diagram of opcode fetch cycle or memory read cycle, Memory write, I/O read and I/O write cycle, MVI A, 8 bit data; LXI rp, 16 bit data; STA, 16 bit address.		
Unit 3	**Programming of 8085**	8	
	3.1 Addressing modes of 8085A 3.2 Classification of instruction and Instruction set of 8085A 3.3 Concept of assembly language programming- basic assembler directives and labels 3.4 Instruction Format (one byte, two byte and three byte instruction), opcode format 3.5 Different operations of 8085 with respect to the status of IO/M, S_1, S_0, RD, WR signals. Instructions related with interrupt. 3.6 Concept of stack, subroutine and interrupts. 3.7 Hardware and software interrupts, maskable and non-maskable interrupts, vectored interrupts, Enabling, disabling and masking of interrupts 3.8 Hardware structure of the interrupts of 8085		
	Group-B		
Unit 4	**Memory Interfacing & I/O Interfacing**	6	
	4.1 Basic bus interface 4.2 Address decoding 4.3 Interfacing ROM, static RAM and dynamic RAM- Simple example of memory interfacing (RAM /ROM) with microprocessor. 4.4 Address space provided by 8085A 4.5 Interfacing I/O devices 4.6 Comparison of I/O mapped I/O & memory mapped I/O system		
Unit 5	**I/O Data Transfer scheme**	6	
	5.1 Synchronous and asynchronous data transfer 5.2 Explain functional block diagram 8251 and interfacing with microprocessor 5.3 Interrupt driven data transfer, single interrupt, multiple interrupt- polling, priority interrupt controller, dairy chaining		

	5.4 Direct memory access – Block transfer DMA – Cycle stealing DMA		
Unit 6	**I/O Interfacing Devices**	8	
	6.1 Functional block diagram of **:** — a) 8253(programmable counter), c) 8279 (Keyboard and display controller) 6.2 Functional block description and control word development of **:**— a) 8257(programmable DMA controller), b) 8259 (programmable interrupt controller) C) 8255(PPI) 6.3 Interfacing DAC & ADC with 8085		
	Group C		
Unit 7	**Introduction to 8086 and instruction set**	14	
	7.1 **Functional Block Diagram of 8086:** Bus interface unit, execution unit, general purpose register, flag register, pointer and index register 7.2 Memory address space and generating a memory address 7.3 Dynamically allocable relocatable code 7.4 Dedicated and reserved memory location 7.5 Pin configuration of 8086- minimum and maximum mode 7.6 Addressing mode of 8086, interrupts of 8086 and interrupt vector table 7.7 Instruction set of 8086		
8	**Advance Microprocessor**	6	
	8.1 Concept of virtual ,cache memory and memory management 8.2 MULTI-TASKING & MULTI-USER OPERATING SYSTEM**:** Prescribing the environment – Accessing resources – Need for protection. 8.3 Real address mode – Protected virtual address mode. 8.4 Concept of super scalar and dual pipeline architecture		
	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:

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
    - Problem definition
    - Analysis
    - Design of logic
    - Coding
    - Testing
    - Maintenance (Modifications, error corrections, making changes etc.)

Motor Skill:

Proper handling of Computer System**.**

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments	
Sl. No.	**a.Write assembly language programs for 8085:**
1.	for addition and subtraction of two 8 bit & 16 bit numbers.
2.	to transfer data bytes from memory block to another memory block
3.	to multiply two 8 bit numbers using add and shift techniques
4.	to find the biggest number in the given array
5.	to arrange the given bytes in ascending & descending order using bubble sort.
6.	to find one's and two's complement of a given number.
7.	to find LCM for the given data
8.	to exchange the lower & upper nibble of a byte.
9.	to sort odd and even byte from given 10 bytes.
	b. To practice simple assembly language program of 8086 using PC and trainer kit.
	Mini Project
	Design a stepper motor interface card using driver IC.
	Design an interface A/D converter using 8085 microprocessor.
	Interface D/A converter using 8085 microprocessor.

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

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, 6	3			

C	7,8	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.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Senthil Kumar	Microcrocessor & Microcontroller	OXFORD
2.	Bizu Azzez	Microprocessor & Microcontroler	SCITECH
3.	Krishna Kant	Microprocessor & Microcontroler	PHI
4.	A Nagoor Kani	Microprocessors and Microcontrollers	Tata MacGraw Hill
5.	B. RAM	Microprocessor 8085	New
6.	Ramesh A. Gaonkar	Microprocessor Architecture programming & application with the 8085	Penram International
7.	James L. Antonakos	An introduction to the Intel family of Microprocessors	Pearson Education Asia
8.	Naresh Grover	Microprocessor Comprehensive Study: Architecture, Programming & Interfacing	Dhanpat Rai & Co.
9.	Nikhil Marriwala	Microprocessors and interfacing	S.K. Kataria & Sons
10.	Savaliya	8086 Programming & Advanced Processor Architecture	Wiley India
11.	Douglas V-Hall	Microprocessor & interfacing (programming & hardware)	Tata McGraw Hill
12.	A.K. Ray & K.M. Bhurchandi	Advanced microprocessor & peripheral	Tata McGraw Hill
13.	Liu & Gibson	Microprocessor System: 8086/8088 Family	Prentice Hall of India
14.	Subhasis Maitra	Micrprocessor and Microcontroller	JBBL
15.	Berry B Brey	The Intel Microprocessor 8086, 8086286, 80386	PEARSON
16.	B. RAM	Microprocessor 8085	New Age
17.	Laylla B Das	The 8086 Microprocessors and Microcontroller	Pearson
18.	B RAM	Advanced Microprocessor	Tata McGraw-Hill
19.	Mathur	Microprocessor 8085 & Interfacing	Prentice hall India
20.	Bahadure	Microprocessor:The 8086/8088,80186/286 ..and Pentium family	Prentice hall India
21.	Dr. S K Mandal	Microprocessors and Microcontrollers	Tata McGraw Hill
22.	Chowdhury	Microprocessors & peripherals	Scitech

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

Name of Subject: Microprocessor Laboratory **Full Marks-75**

Subject Code: ETCE/ LMP/S4

1.Continuous Internal Assessment of 25 marks is to be carried out by the teachers throughout the 4th Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2.External Assessment of 50 marks shall be held at the end of the 4^{th} 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: Professional Practice-II	
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: 1	Internal Teachers' Assessment: 50 Marks
Tutorial:	
Practical: 3 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.

Activity	Content	Hours
1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas/ industries : i) Electronic equipment manufacturing unit ii) Resistance Welding unit iii) Industrial automation unit iv) Adarsh Gram v) Shops using electronic billing system vi) Telephone Exchange	**8**
2	**Lectures by Professional / Industrial Expert lectures to be organized from any of the following areas (any 3 from the list):** a. Telephone Exchange Switching Theory b. Open source Software PHP & MySql **PHP&MySQL** **Unit:1** Introduction and Installation Of PHP and Operators **Unit:2** Arrays, Statements and functions in PHP **Unit:3** MySQL **Unit:4** Functions, Cookies and Sessions in PHP **Unit: 5** Sending Email, User Login and Registration c. Fiber optics communication system d. Nano Technology e. Use of signal for Telephone, television, internet f. Industrial Safety g. Ethical Hacking h. Any other suitable topic	**10**
3	Information Search : **Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report.** **Following topics are suggested :** a. Collection of information about tools used in electronic workshop b. Market survey for motors used in electronic application c. Non Conventional Energy Sources with focus on solar energy d. Elevators installation and maintenance e. Any other suitable areas f. Study of performance of various processors using "bench mark comparison" (Refer the website: www.cpubenchmark.net)	**6**
4	**Seminar :** Seminar topic should be related to the subjects of fourth semester or any other suitable topics from emerging areas of ETCE like the topics mentioned below. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10	

	minutes) a. Micorstrip Antenna b. Semiconductor Microwave Devies c. Cryptography d. Bluetooth Technology	
5	**Mini Project / Activities:** a) Design of P.C.B. using software b) Web page Design using PHP & MySql c) Developing small unit of eliminator battery or D.C. power supply d) Study of networking in computer laboratories e) Comparative study of cables	**07**
	Total	**31**

PHP&MySQL for Professional Practices courses

PHP is a general-purpose server-side scripting language originally designed for Web development to produce dynamic Web pages. It is one of the first developed server-side scripting languages to be embedded into an HTML source document, rather than calling an external file to process data. Ultimately, the code is interpreted by a Web server with a PHP processor module which generates the resulting Web page.

MySQL can be used for managing databases

PHP&MySQL can be useful in field of Information technology and Computer Science.
All the tutorials are useful in the above mentioned subjects.

FOSS	**Relevance**
PHP&MySQL	**Unit:1** Introduction and Installation Of PHP and Operators
	Unit:2 Arrays, Statements and functions in PHP
	Unit:3 MySQL
	Unit:4 Functions, Cookies and Sessions in PHP
	Unit:5 Sending Email, User Login and Registration

Notes:

We encourage students to go for workshops and tests. See link **spoken-tutorial.org.**

Assignments are provided for each topic. These should be solved when students revise for the test.

An individual has to go through the tutorials and practice the assignments given after each tutorial for better learning.

The timing specified in the duration column is the maximum time required by an individual to view and practice that particular tutorial.

Content (Name of topic)	
Group-A	
Unit 1	**Introduction and Installation Of PHP and Operators**
	Installation Of PHP in the Linux Operating Systems
	Installation Of PHP in the Windows Operating Systems
	Getting Started with PHP • Echo Function

	• Variables
	Operators • If Statement • Switch Statement • Arithmetic Operators • Comparison Operators • Logical Operators
Unit 2	**Arrays, Statements and functions in PHP**
	Assignments to be solved on the above topics
	Arrays : Arrays Multi-dimensional Arrays
	Statements: • While Statement • Do-While Statement • For Statement • For each Statement
	Functions: • Functions (Basic) • Functions (Advanced) • GET Variable • POST Variable
	Embedding PHP: Common Way to Display HTML Common Errors • Common Errors 1 • Common Errors 2 • Common Errors 3
Unit 3	**MySQL**
	MySql - I MySql - II MySql - III MySql - IV
	MySql - V MySql - VI MySql - VII MySql - VIII
Unit 4	**Functions, Cookies and Sessions in PHP**
	Functions in PHP • Simple Visitor Counter • String Functions 1 • String Functions 2
	Cookies in PHP • File Upload 1 • File Upload 2

	• Cookies 1 • Cookies 2
	Sessions in PHP • Sessions • MD5 Encryption
Unit 5	**Sending Email, User Login and Registration**
	How to Send Email in PHP • Sending Email 1 • Sending Email 2 • Sending Email 3
	How to create User Login in PHP • Display images from a Directory • User Login 1 • User Login 2 • User Login 3
	How to create Registration in PHP • User Password Change 1 • User Password Change 2 • User Password Change 3 • User Registration 1 • User Registration 2 • User Registration 3 • User Registration 4 • User Registration 5 • User Registration 6

Recommended Text Books:

It is alright to go ahead with teaching from the prescribed books as per the existing syllabus. Text books can be referred from the link given below.

Text Books link for PHP :

http://www.flipkart.com/beginning-php-mysql-novice-professional-4th/p/itmdyggzm6ygzccg?pid=9788184897456&ref=73b694e2-81dc-4d9f-b929

Name of the Course : All Branches in Diploma in Engineering and Technology (Development of Life Skills - II)		
Course code : CE/ME/IE/EJ/DE/ET/EX/EE/EP/CO/IF/IS/ CO/CM/IF/CV/MH/FE/IU/CD/ED/EI	Semester : FOURTH	
Duration: One Semester (16 hours)	**Maximum Marks:** 50	
Teaching Scheme	**Examination Scheme:**	
Theory: 01 hrs / week	Internal Sessional: 25	
Tutorial: -- hrs / week	External Sessional : 25	
Practical: 02 hrs / week		

UNITS	CONTENTS	Hours
Unit - 1	**Interpersonal Relation** Importance, Interpersonal conflicts, Resolution of conflicts, Developing effective interpersonal skills - communication and conversational skills, Human Relation Skills (People Skills)	5
Unit - 2	**Problem Solving** **I) Steps in Problem Solving (Who? What? Where? When? Why? How? How much?)** 1. Identify, understand and clarify the problem 2. Information gathering related to problem 3. Evaluate the evidence 4. Consider feasible options and their implications 5. Choose and implement the best alternative 6. Review **II) Problem Solving Technique** 1. Trial and Error, 2. Brain Storming 3. Thinking outside the Box	8
Unit - 3	**Presentation Skills** Concept, Purpose of effective presentations, ***Components of Effective Presentations*** : understanding the topic, selecting the right information, organising 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	8

Unit - 4	**Looking for a Job** Identifying different sources announcing Job vacancies, Skim, scan and read advertisements in detail, write efficacious CVs, write covering letters to accompany CVs, write Job Application Letters - in response to advertisements and self-applications	5
Unit - 5	**Job Interviews** ***Prepare for Interviews*** : Intelligently anticipating possible questions and framing appropriate answers, Do's and don'ts of an interview (both verbal and non-verbal), ***Group Discussion:*** Use of Non-verbal behaviour in Group Discussion, Appropriate use of language in group interaction, Do's and don'ts for a successful Group Discussion	10
Unit - 6	**Non-verbal - graphic communication** Non - verbal codes: A - Kinesics, B - Proxemics, C- Haptics, D - Vocalics, E- Physical appearance, F- Chronemics, G - Artifacts Aspects of Body Language	6
Unit - 7	**Formal Written Skills:** Memos, E-mails, Netiquettes, Business correspondence - Letter of enquiry, Letter of Placing Orders, Letter of Complaint	6
	Total	48

Sessional Activities	
Unit - 1 Interpersonal Relation	Case Studies: 1. from books 2. from real life situations 3. from students' experiences Group discussions on the above and step by step write of any one or more of these in the sessional copies
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 Powerpoint) on a Particular topic. The students may refer to the Sessional activity (sl. No. 8) of the Computer Fundamental syllabus of Semester 1. For engineering subject-oriented technical topics the co-operation 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 reponse to an advertisement and a Self Application Letter for a job.

Unit - V Job Interviews & Group Discussions	Write down the anticipated possible questions for personal interview (HR) along with their appropriate responses Face mock interviews. The 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

PART — III

1st 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

Further suggestion may be submitted to the syllabus committee. List of the coordinators for the branch of Diploma in Electronics & Tele Communication Engineering are:

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- **Dr. Bijita Biswas** **Mobile:9830272981**
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- **Dr. Susmita Sen** **Mobile:9433772629**
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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: FIFTH

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.	Digital and Microwave Communication Engg.	3	4	1	.-	10	20	30	70	-	-	100
2.	Electronics Measurement	3	3	-	-	10	20	30	70	-	-	100
3.	Industrial Electronics-I	2	2	1	-	5	10	15	35	-	-	50
4.	Microcontroller & Embedded System	3	3	-	-	10	20	30	70	-	-	100
5.	<u>Elective-I (Select any one)</u> Computer Network-I Medical Electronics-I Digital Signal Processing-I Computer Hardware Maintenance-I	2	2	-	-	5	10	15	35	-	-	50
6.	Digital and Microwave Communication Engg. Laboratory	2	-	-	3	-	-	-	-	75	-	75
7.	Electronics Measurement Laboratory	1	-	-	2	-	-	-	-	75	-	75
8.	Industrial Electronics-I Laboratory	2	-	-	2	-	-	-	-	75	-	75
9.	Microcontroller and Embedded system Lab	2	-	-	2	-	-	-	-	75	-	75
10.	Elective- I Laboratory	1	-	-	2	-	-		-	50	-	50
11.	Industrial Project & Entrepreneurship Development	3	1	-	2	-	-	-	-	100	-	100
12.	Professional Practice – III	1	-	-	3	-	-	-	-	-	50	50
	Total	25	15	2	16	40	80	120	280	450	50	900

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, TW-Term Work

TA (Teacher's assessment) = 10 marks: Attendance & surprise quizzes = 5 marks and Assignment & group discussion = 5 marks for CT= 20 Marks.

TA (Teacher's assessment) = 5 marks: Attendance & surprise quizzes + Assignment & group discussion = 5 marks for CT = 10 Marks.

Total Marks : 900

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.

Name of the course: **Digital and Microwave Communication Engg.**	
Course Code: ETCE/ DMCE /S5	Semester: Fifth
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 hrs./ week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 75 Marks
Rationale:	

Long range communication systems and its applications have always been the consideration for technocrats since many years. This has led the development of Digital, microwave and RADAR communication. Communication system of this kind will help in transmission of increase data rate so that more information could be sent or increase transmission distance by incorporating relay stations a microwave links.

As a result & accelerating rate of growth of communication technology in research and industry students who are preparing themselves for electronics engineers and who are working in these area are faced with the need to understand the theoretical and experimental design and analysis

This course is continuation of the one titled 'ELEMENTARY COMMUNICATION ENGINEERING', offered in Part – II Second Semester. After completion of this course, the students will be able to get some idea about modern digital communication techniques like multiplexing, ASK, FSK, PSK etc. They will also know the basics of radar system, microwave amplifiers and antenna and wave guides.

Objectives:

The student will be able to:

- Understand digital communication like multiplexing techniques, ASK, PSK, FSK
- Acquire knowledge on propagation of EM waves
- Learn different microwave amplifiers , their applications and EMI, EMCs
- Understand the concept of RADAR, MTIs and ILS systems
- Gain comprehensive knowledge on antenna

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**MULTIPLEXING**	8	
	1.1 IDEA of multiplexing and its necessity. 1.2 TYPES of multiplexing**:** TDM and FDM 1.3 TDM**:** Principles of time division multiplexing and synchronization in a digital Communication system. 1.4 PCM – TDM in modern applications (plesiochronous digital hierarchy and Synchronous digital hierarchy). 1.5 Frequency Division Multiplexing with practical examples, phase locked loop.		

	1.6 Merits and demerits of TDM and FDM.		
Unit 2	**RF MODULATION FOR BASE BAND SIGNAL**	5	
	2.1 Concepts of binary modulation techniques. 2.2 Principles of amplitude shift keying, frequency shift keying and phase shift keying. 2.3 Comparison between ASK, FSK and PSK. 2.4 Basic idea of QPSK and QAM		
Unit 3	**PERFORMANCE & TESTING OF DIGITAL COMMUNICATION LINK**	7	
	3.1 INFORMATION THEORY**:** Relationship between data speed and channel bandwidth – Shannon-Hartley theorem – Theory of line coding. 3.2 Error Correction Techniques**:** Parity checking and cyclic redundancy check. **3.3** Brief description of inter-symbolic interference and interpretation of eye pattern.		
	Group – B		
Unit 4	**PROPAGATION OF WAVES**	8	
	4.1 Elementary concepts about propagation of waves. 4.2 Propagation of ground wave, space wave and sky wave. **4.3** Iono-spheric layers – Skip distance – Plasma frequency – Critical frequency – MUF – Virtual height—Multihop and duct propagation		
Unit 5	**RADAR SYSTEMS**	8	
	5.1 Block schematic description of simple radar system – Plan position indicator, frequency and power range of radar system – Operation of duplexer – RADAR range equation. 5.2 Block schematic description of pulsed radar system and moving target indicator including Doppler Effect, blind speed		
	Group C		
Unit 6	**Microwave Amplifier**	12	
	6.1 Problems associated with conventional tubes at microwave frequency. 6.2 Basic idea of amplification with velocity and density modulation in case of MULTI-CAVITY KLYSTRON, REFLEX KLYSTRON AND TRAVELLING WAVE TUBE – Their efficiency, power output & frequency range of operation (no deduction) – Field of applications. 6.3 General features of GUNN diode and IMPATT diode – their field of applications, Electromagnetic Interference, its effect and necessary measures for Electromagnetic Compatibility (EMC)		
Unit 7	**Antenna and Waveguide**	12	
	7.1 BASIC PRINCIPLES of antenna — Different types of antenna**:** Dipole antenna – Half wave and folded, microwave antenna – Horn antenna, parabolic antenna – Dish antenna 7.2 PROPERTIES of antenna**:** Gain – Bandwidth – Beam Width – Impedance – Radiation Pattern. 7.3 ANTENNA ARRAYS**:** general idea of antenna array –Yagi Uda Antenna. 7.4 WAVE GUIDES**:** Rectangular – Circular Wave Guide, Modes of propagatioin in TE, TM amd TEM.. 7.5 MICROWAVE COMPONENTS**:** Directional Coupler – Attenuator – Isolator – Circulator		
	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.

List of Practical: Any EIGHT

Suggested List of Laboratory Experiments	
Sl. No.	
1.	Study of PCM transmission and reconstruction**:—** (a) To study the TDM and sampling of analog signal and its PCM form in the transmitter and the demultiplexing and reconstruction at the receiver section; and, (b) to study the AD and DA conversion.
2.	To study the radiation patterns and to obtain polar plots of **:—** (a) ½ λ, λ, 3/2 λ and folded ½ λ dipole antenna; (b) 3-element, 5-element, 7-element and 3-element folded yagi-uda antenna; (c) loop and log periodic antenna; horn antenna
3.	Study of the microwave components **:—** (a) to study the following parameters of multi-hole directional coupler-mainline and auxiliary line VSWR, coupling factor and the directivity of the coupler; (b) to study: magic tee, isolator and attenuator
4.	To study the V-I characteristic of Gunn Diode.
5.	To study the working of Reflex / Multi-Cavity Klystron
6.	To study the generation and detection of ASK.
7.	To study the generation and detection of FSK
8.	To study the generation and detection of PSK
9.	To be familiar with rectangular and circular wave guide.
10.	To study the working of Travelling Wave Tube.

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

C	6,7	3			

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	3			
C	6,7	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.	Kennedy	Electronic Communication System	Tata McGraw-Hill
2.	Chandrasekhar	Communication system	OXFORD
3.	T L Singhal	Analog and Digital Communication	Tata McGraw-Hill
4.	Ganesh Babu	Communication Theory	SCITECH
5.	Wayne Tomasi	Electronic communication system	Pearsons Eduction
6.	Simon Heykin	Digital Communication system	Wiley
7.	Sanjay Sharma	Analog and digital Communication	S.K. Kataria
8.	KK Sharma	Fundamental of Microwave & Radar Engg.	S Chand
9.	P Ramakrishna Rao	Communication systems	Tata McGraw Hill
10.	B.P. Lathi	Analog and Digital communication	OXFORD
11.	Grabano	Error control codes	OXFORD
12.	John C Bellamy	Digital telephony	Wiley India
13.	K.Rekha	Digital Communication	SCITECH
14.	Roddy Coolen	Electronic Communication	Prentice Hall of India, N. Delhi
15.	VK Khanna	Digital Communication	S Chand
16.	Anokh Singh, AK Chabaria	Principles of communication Engg.	S Chand
17.	Taub & schilling	Analog and digital communication	Tata MCGraw-Hill
18.	Frenzel	Electronics Communication	Tata McGraw-Hill
19.	Couch	Digital & Analog Communication System	Pearson
20.	K Sam & Shanmugam	Digital & Analog Communication	Wiley
21.	Sunder Rajan	Antenna Theory & Wave Propagation	SCITECH
22.	Dr. K.T. Mathew	Microwave Engg	Wiley India
23.	Gottapu Sashibhushana Rao	Electromagnetic Field Theory and Transmission Lines	Wiley India
24.	R.G. Kaduskar	Principles of Electromagnetics	Wiley India
25.	JD Kraus	ANTENNAS	TMH

26.	Gautam	Microwaves and Radar Engg.	SK Kataria& Sons
27.	Balanis	Antenna	Wiley
28.	Sadique	Electromagnetic Theory	OXFORD
29.	Cherukhu	Microwave Engineering	SCITECH
30.	Gowry	Electromagnetic Fields & Waves	SK Kataria& Sons

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

Name of Subject: Digital and Microwave Communication Engg. Laboratory **Full Marks-75**

Subject Code: ETCE/ LDMCE/S5

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Fifth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Fifth 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: **Electronics Measurement**	
Course Code: ETCE/ EMN /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 4 (Four)	Practical: 75 Marks
Rationale:	

Objectives: After successful completion of this course the students will be able to get familiar with the measurement fundamentals and instruments like electronic voltmeter, Multimeter, Q-meter, CRO, signal generator, spectrum analyzer etc.

	Content (Name of topic)	**Periods**	**Marks**
	Group-A		
Unit 1	**MEASUREMENT FUNDAMENTALS**	4	
	1.1 Explanation of accuracy, precision, sensitivity, resolution, dynamic range, response and repeatability of measuring instruments. 1.2 Role of Units in measurements and different types of units – Definition of Errors and type of errors – Definition of Primary and Secondary Standards – Concept of Calibration		
Unit 2	**PERMANENT MAGNET MOVING COIL METER**	4	
	2.1 Theory of operation, working principle and construction of PMMC.		

	2.2 Measurement of voltage, current and resistance. 2.2 Loading effect, extension of range and PMMC Multimeter		
Unit 3	**MEASUREMENT OF VOLTAGE, CURRENT, ENERGY & POWER**	6	
	3.1 Principle of rectifier type instrument – Average reading and peak reading – Advantages and limitations. 3.2 Compensated thermocouple type instruments – Construction and working principle of electrodynamic wattmeter.		
	Group – B		
Unit 4	**ELECTRONIC VOLTMETER & MULTI METER**	**4**	
	4.1 Advantages of electronic voltmeter over ordinary voltmeter. 4.2 Working principle of **D**igital **M**ulti **M**eter – Different types of DMM**:** Integration and successive approximation type. 4.3 Advantages of DMM over Conventional Multi Meter		
Unit 5	**IMPEDANCE BRIDGE & Q-METER**	6	
	5.1 DC Wheatstone Bridge and its application – AC bridge-balance – Detection and source of excitation – Maxwell's induction bridge – Hay's bridge – Capacitance comparison bridge – Wien Bridge. 5.2 Basic principle of Q-Meter and its working circuit. 5.3 Basic principle and operation of RLC meter		
Unit 6	**CATHODE RAY OSCILLOSCOPE**	8	
	6.1 Block diagram of CRO, constructional features of CRT and principle of operation. 6.2 Block schematic description of**:** (a) Vertical Amplifier, (b) Time Base Generator, (c) Trace Synchronization, (d) Triggering Modes, (e) Front Panel Controls, (f) Probe Characteristics. 6.3 Features of dual trace oscilloscopes, chopper beam switch, alternate beam switch. 6.4 Block schematic description of digital storage oscilloscope. 6.5 Measurement of amplitude, frequency, time period, phase angle and delay time by CRO		
Unit 7	**TIME & FREQUENCY MEASUREMENT**	4	
	7.1 Measurement of frequency by heterodyne method – Block schematic description of digital frequency counter. 7.2 Measurement of frequency, time period and time interval through frequency counter.		
	GROUP C		
Unit 8	**SIGNAL GENERATOR**		
	8.1 Block schematic descriptions, specifications and uses of**:** Audio & Radio Frequency Signal Generator – Function Generator – Pulse Generator.	4	
Unit 9	**RF POWER MEASUREMENT**	2	
	9.1 Bolometer – Method of power measurement – Balance Bridge Bolometer		

Unit 10	**FREQUENCY SPECTRUM, DISTORTION & WAVE ANALYSIS**	4	
	10.1 Basic working principle of Heterodyne Wave Analyzer 10.2 Block schematic description of Harmonic Distortion Analyzer. 10.3 Block schematic description of Spectrum Analyzer and its use.		
	TOTAL	46	

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:

Motor Skill:

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	
1.	To study the operation and to use**:** (a) Multimeter, and, (b) Oscilloscope
2.	To study the operation and to use**:** (a) AF signal generator; and, (b) RF signal generator
3.	To study the operation and to use frequency counter
4.	To study the operation and to use frequency generator
5.	To measure L & Q by Maxwell method
6.	To measure the unknown capacitance by Schering bridge
7.	To measure the unknown frequency by Wein Bridge.
8.	To measure the distortion in a given waveform
9.	To construct and test a Q-meter.
10.	To study the spectrum analyzer.

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	4,5,6,7	5			
C	8,9,10	3			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	3	Any five	2	5x2=10
B	4,5, 6,7	4			

C	8,9,10	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.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Kalsi	Electronic Instrumentation	Tata McGraw-Hill
2.	A.K. Sawhney	A Course in Electrical and Electronic Measurement and Instrumentation	Dhanpat Rai & Sons
3.	David Bell	Electronic Instrumentation and Measurement	Oxford University Press
4.	RK Rajput	Electronics Measurements & Instrumentation	S Chand
5.	Oliver Cage	Electronic Measurement and Instrumentation	McGraw Hill
6.	Wolf and Smith	Students Reference Manual for Electronic Instrumentation Lab	Prentice Hall of India
7.	J B Gupta	Electrical & Electronics Measurement	SK Kataria & Sons
8.	Brownes	Digital Instruments	Tata McGraw Hills
9.	U Sinha	Electrical & Electronics Measurements and Instrumentation	
10.	Cooper	Electronic Measurement and Measurement Technique	Prentice Hall of India

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

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

Subject Code: ETCE/ LEMN/ S5

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Fifth Semester.
   Distribution of marks: Performance of Job – 15, Notebook – 10.
2. **External Assessment of 50 marks shall be held at the end of the Fifth 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: **Industrial Electronics –I**	
Course Code: ETCE/ IE1 /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial: 1 contact hr./ week	Teacher's Assessment (Attendance, Assignment & interaction):5 Marks
Practical: 2 contact hours/ week	End Semester Examination: 35 Marks

Credit: 4 (Four)	Practical: 50 Marks
Rationale:	

Objectives:

The student will be able to:

This course is introduced to have the students become familiar with the high power electronic devices and components like power diode, IGBT, power transistor, SCR.

	Content (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**Power diode**	4	
	1.1 Switching characteristics of power diodes and its specifications. 1.2 Characteristics of fast recovery diodes. 1.3 Choice of diodes depending upon frequency of operations. 1.4 Series and parallel operations of diodes. 1.5 Thermal characteristics		
Unit 2	**Power Transistor**	6	
	2.1 Power BJT : Structure of vertical power transistor, Principle of operation, its VI and switching characteristics, Safe operating area. 2.2 Base drive circuits and Darlington configuration of Power BJT. 2.3 Construction operating principle and switching characteristics of power MOSFET and IGBT. 2.4 Study of Losses in power semiconductor devices- calculation of loss in power BJT		
Unit 3	**Mounting, Cooling and Protection of Power Semiconductor Devices**	4	
	3.1 Concept of thermal resistance, heat sink and thermal equivalent circuit 3.2 Describe different mounting techniques of power semiconductor devices 3.3 Concept of protection of Power Semiconductor Devices: Transient protection, MOV and Snubber		
	Group – B		
Unit 4	**Thyristor**	5	
	4.1 Switching characteristics & Two transistors method of SCR, Ratings of SCR. 4.2 Triggering circuits of SCR. 4.3 Need for series and parallel methods of SCR. Reasons of unequal voltage and current 4.4 distribution and equalization networks. 4.5 Layer diagram, Characteristics, operating principle and application of thyristor 4.6 family devices - Photo sensitive SCR, GTO, SCS, TRIAC & DIAC. 4.7 Commutation circuits of SCR – natural and forced commutation – class A, B, C, D And Class E		
Unit 5	**Single phase & polyphase controlled rectifier**	7	
	5.1 Single phase half wave and full wave control rectifier circuit – Principle of operation with resistive and inductive load – Use of free wheel diode. 5.2 Three phase half wave and full wave control rectifier – Operation with inductive and resistive load – Use of free wheel diode. 5.3 Calculation of Vdc, Vrms, ripple factor, PIV and efficiency of single phase & three phase control rectifier. 5.4 Concept of full control and half control rectifier.		

Unit 6	**SWITCH MODE POWER SUPPLY**	6	
	6.1 Switching Regulator (SMPS) principle of operation, Block and circuit diagram and PWM control circuit consideration of switching regulator. 6.2 Principle of operation of buck converter, boost converter and buck-boost CONVERTER. 6.3 Review of Linear Regulators. 6.4 Advantage and disadvantage of switching regulator in comparison with linear regulator		
	TOTAL	32	

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) Able to select proper instruments
2) Compare the characteristics under various conditions

Motor Skill:

1) Make accurate measurements
2) Adjust the meters to read zero at start
3) Draw graphs

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	
1.	To measure the reverse recovery time of switching diode and power BJT.
2.	To study drive circuits of power BJT.
3.	To plot V/I characteristics of Triac.
4.	To plot V/I characteristics of Diac
5.	To study drive circuit of SCR.
6.	To study a single phase rectifier—output waveform with phase control circuit.
7.	To study a polyphase rectifier
9.	To study SMPS with PWM regulator chip
	Mini Project
	Liquid level detector
	Develop light dimmer circuit using diac and Triac.

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: 6 multiple choice and 4 short answer type questions	Total Marks

		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2,3	4	Any six	1	6 X 1 = 6
B	4,5,6	6			
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2,3	4	Any four	1	4x1=4
B	4,5, 6	4			

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 two from each group)	5	5 X 5 = 25
B	4,5, 6	6			

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.	Dr. S K Mandal	Power Electronics	Tata Mc Graw Hill
2.	Khan & Chandani	Industrial Electronics	TMH
3.	Gupta & Singhal	Power Electronics	SK Kataria & Sons
4.	Biswanath Pal	Industrial Electronics	PHI
5.	H Babu	Power Electronics	Scitech
6.	Moorthi	Power Electronics	OXFORD
7.	SN Biswas	Industrial Electronics	Dhanpat Rai
8.	PC Sen	Modern Power Electronics	S Chand
9.	Chatterjee & Bhattacharya (TTTI)	Industrial Electronics	TMH
10.	Mohan	Power Electronics Converter Application and Design	Wiley
11.	M.C Sharama	Practical SCR / Triac projects	
12.	F. Graf	The Encyclopaedia of electronic circuit by Rudolf	

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

Name of Subject: Industrial Electronics Laboratory-I **Full Marks-75**

Subject Code: ETCE/ LIE1 /S5

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

2. External Assessment of 50 marks shall be held at the end of the Fifth 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: **Microcontroller & Embedded System**	
Course Code: ETCE/ MCES /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	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 technology of microprocessor has led to a single chip Microcontroller technology MCS-51 family architecture, details of 8051 Microcontroller and its programming is covered in this subject use of assembler and stimulator for programming of Microcontroller will make the students equipped for the development of embedded systems.

Objectives:

The student will be able to:

1. Use data transfer techniques.
2. Describe architecture and operation of microcontroller 8051.
3. Develop assembly language programs using instruction set of 8051.
4. Design and develop microcontroller based systems.
5. Explain various applications of microcontrollers.
6. Develop of concept on Robotics

	Content (Name of topic)	**Periods**	**Marks**
	Group-A		
Unit 1	**Microcontroller 8051 Architecture**	12	
	1.1 Difference between microcontroller & Microprocessor. 1.2 Commercial microcontroller devices and families 1.3 Explain the Block diagram of the Architectural of 8051. 1.4 Explain the PIN Diagram features of the 8051 core. 1.5 Explain the 8051 Programming Model. 1.6 Explain the Port Structure & Operation, Timer/Counters, serial Interface & External memory 1.7 Features and architecture of PIC microcontroller and its application		
Unit 2	**8051 Addressing Modes & Instruction Set**	8	
	2.1 Explain different addressing modes of 8051. 2.2 Explain the different types of Instruction sets of 8051. 2.2.1 Data Transfer 2.2.2 Arithmetic Operations 2.2.3 Logical Operations 2.2.4 Boolean Variable Manipulation		

	2.2.5 Program Branching		
	Group B		
Unit 3	**8051 Assembly Language Programming Tools**	16	
	3.1 Programs using Jump, Loop and Call Instructions, Time Delay Generation and Calculation. 3.2 I/O Port Programming, Bit manipulation 3.3 Arithmetic Programs 3.3.1 Unsigned Addition and Subtraction 3.3.2 Unsigned Multiplication and Division 3.3.3 Signed number concept and Arithmetic operations 3.3.4 Logic Programs 3.4 Programs using Logic and Compare Instructions 3.4.1 Programs using Rotate and Swap Instructions 3.4.2 BCD and ASCII Application Programs 3.5 Counter / Timer Programming 3.6 Serial Communication Programming 3.8.1 Basics of Serial communication 3.8.2 8051 Connection to RS232 3.8.3 8051 Serial Communication Programming 3.7 Interrupts Programming 8051 Interrupts 3.9.1 Programming Timer Interrupts 3.9.2 Programming External hardware Interrupts 3.9.3 Programming the Serial Communication Interrupt 3.9.4 Interrupt Priority in the 8051 3.8 Interfacing with ADC & DAC		
	Group – C		
Unit 4	**Introduction to Embedded Systems**	20	
	4.1 Embedded Systems Overview. What are they? A shortlist of embedded systems, some common characteristics of embedded systems, an embedded system example – A Digital Camera. 4.2 Processors – General purpose and specific purpose and its application, Overview and application of Digital Signal Processors(DSP) 4.3 IC Technology, Full Custom / VLSI, Semi Custom ASIC , FPGA (Gate Array & Standard Cell), 4.4 PLD (Programmable Logic Device), Draw the block diagram showing the major components of PLC and state each function of each Component, Explain the basic operation of PLC, Describe briefly PLC programming.		
Unit 5	Elementary idea on Robotics	4	
	5.1 Definition 5.2 Types of Robots 5.3 Areas of application 5.4 Fundamental components of Robots- Sensors, Actuator and Control system 5.5 Basic idea of Proximity Sensors, Limit Switch, Semiconductor displacement		

	Sensor		
	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:

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
  - Problem definition
  - Analysis
  - Design of logic
  - Coding
  - Testing
  - Maintenance (Modifications, error corrections, making changes etc.)

Motor Skill:

Proper handling of Computer System**.**

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	MICROCONTROLLER:
1.	1. Write a Simple Assembly Programs for a. Addition b. Subtraction b. Multiplication d. Division
2.	Write a Programs for (any two of the following) i. 4 x 4 Matrix Keypad Interface ii. character based LCD Interface iii. Analog to Digital Conversion (On chip ADC) iv. Serial EEPROM v. Seven Segment LED Display Interface vi. Interfacing With Temperature Sensor vii. Stepper Motor Interface
3.	Programming PLC Introduction to ladder diagram,
4.	Communication between PLC and PC (any two of the following) i. Single motor on / off control ii. Interlock control of two motors iii. water level control with three sensors iv. Speed control of a motor v. Timer on –delay / off-delay of a motor

Topic of Project Work on Robotics

	Students can take up interdisciplinary project on Robotics using Micro-controller. Team might be made preferably from different preferably students from ETCE, CST, EIE, EE and ME

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	3			
C	4,5	5			
		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	3			
C	4,5	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	3			
C	4,5	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.	Manish K Patel	The 8051 Microcontroller Based Embedded Systems	Tata Mc Graw Hill
2.	Senthil Kumar	Microprocessor & Microcontroller	OXFORD
3.	Shibu KV	Embedded	Tata Mc Graw Hill
4.	Krishna Kant	Microprocessors & Microcontrollers	PHI
5.	Bizu Azzez	Microprocessor & Microcontroler	SCITECH
6.	Rajkamal	Microcontroller	Pearson
7.	Frank Vahid, Tony Givargis	Embedded System Design	Wiley India
8.	Mazidi	The 8051 Microcontroller and Embedded Systems Using Assembly and C	Pearson

9.	S K Saha	Introduction to Robotics	Tata McGraw-Hill
10.	Avilash V. pandiahkal	A Key to programme Microcontroller system	S Chand
11.	Chattopadhyay	Embedded system Design	PHI
12.	Dr. K.V.K.K. Prasad	Embedded/ Real-Time Systems concepts, design & programming	Dreamtech press/ Kogent Learning solutions
13.	Shah	Microcontroller	OXFORD
14.	Dr. SK Mandal	Microprocessor & Microcontroller	TMH
15.	Ayala	Microcontroller 8051	
16.	Ghosal	8051 Microcontroller : Internals, Instructions, Programming & Interfacing,	Pearson
17.	Subhasis maitra	Micrprocessor and Microcontroller	JBBL
18.	J Bhaskar	VHDL Primer	PHI

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

Name of Subject: Microcontroller and Embedded system Laboratory **Full Marks-75**

Subject Code: ETCE/ LMCES/ S5

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

2. External Assessment of 50 marks shall be held at the end of the Fifth 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: **Computer Network-I**	
Course Code: ETCE/ CN1 /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks
Rationale:	
Modern age is the age of computer. Global communication can be done within few seconds with the help of computer network. Preliminaries like network structure, flow and error control, LAN, internetworking, network security etc. are included in this course so that the students know about the fundamentals of computer networking.	
Objectives:	
The student will be able to: ✓ Identifying the benefits of network. ✓ Distinguish between Network classifications.	

- ✓ Describe different types of Topology.
- ✓ Describe different types of Network devices.
- ✓ Compare different transmission media.
- ✓ Compare OSI and TCP/IP model

	Content (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**Network Basics**	4	
	1.1 Definition of computer network – Network components 1.2 Distinguish between Network classifications – Classify networks by their Geography- LAN, MAN & WAN; Classify Networks by their Network role- Peer to Peer, Server Based Networks. 1.3 Network Features- File sharing; Printer Sharing, Application Services- E-mail; Remote Access. 1.4 Application of Network System – General applications like ATM Banking etc. with modern approach to Distributed Computing System		
Unit 2	**TRANSMISSION MEDIA AND NETWORKING DEVICES**	12	
	2.1 Classification of Transmissions Media: **Guided media**- UTP, STP; Coaxial Cable; Optical Fiber - Optical Fiber Structure, Light Source for Fiber, Propagation Mode, Advantages of optical fiber and Disadvantages of optical fiber. (brief idea) 2.2 **Unguided media**: Wireless Communication – Communication Band; Microwave Communication; Satellite Communication – Access Method; Cellular (Mobile) Telephone – Band in Cellular Telephony, Calls Using Mobile Phones, Transmitting receiving operations; New Developments. (brief idea) 2.3 Network Control Devices - Hubs; Switches; Routers; Bridges; Repeaters; Gateways; Modems		
	Group B		
Unit 3	**NETWORK STRUCTURES & REFERENCE MODEL**	10	
	3.1 Network topology.- Bus Topology; Ring Topology; Star Topology; Mesh Topology; Tree Topology; Hybrid Topology 3.2 SWITCHING**:** Circuit Switching – Message Switching – Packet Switching. 3.3 Layered architecture of network system – Seven layer OSI model – Functions of each OSI layer – Other ISO structure – TCP / IP Layer Structure, Comparison of the OSI and TCP/IP reference models 3.4 X.25 protocol.		
Unit 4	**FLOW CONTROL & ERROR CONTROL**	8	
	4.1 FLOW CONTROL**:** Congestion control – Necessity of flow control – Poll / select method – Stop and wait method – Sliding window method. 4.2 ERROR CONTROL**:** Error detection & correction – Types of error – Checksum – Forward error control – Automatic repeat request – Cyclic redundancy check. 4.3 ALGORITHMS**:** Routing, Fixed and Adaptive.		
	TOTAL	34	

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:

- Understanding of basics concept of network.
- Comparison of different network.
- Installation of protocols

Motor Skill:

Proper handling of Computer hardware System**.**

Suggested List of Laboratory Experiments

Sl. No.	**Write assembly language programs:**
1.	Draw layout of LAB Network and assess the network requirements.
2.	Use step by step procedure for File sharing & Printer sharing
3.	Compare Network directing devices. i.e. Hub, Switch, Router.
4.	Create a Network cable using RJ45 connectors
5.	Compare different Network Topologies

Examination scheme (Theoretical):

A). Internal Examination: Marks- 10

B). End Semester Examination: Marks-35

C) **Teacher's Assessment: Marks- 05**

(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	5	Any six	1	6 X 1 = 6
B	3, 4	5			
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2	4	Any four	1	4x1=4
B	3, 4	4			
Group	**Unit**	**Subjective Questions**			**Total Marks**
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	5	Any five (Taking at least one from each group)	5	5 X 5 = 25
B	3, 4	5			

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.	**Title of the Book**	**Name of the Author**	**Name of the Publisher**
1.	Data Communication and Networking	B.A. Forouzan	T.M.H Publishing Co. Ltd.

2.	Data Communication & Networking	DP Nagpal	S Chand
3.	Data Communication & Computer Networking	Ajit Pal	PHI
4.	Communication Network	Leon, Garcia, Widjaja	Tata McGraw-Hill
5.	Vikash Gupta	Comdex hardware and Networking Course Kit	Dreamtech press
6.	Computer Network	Tanenbaum	Prentice Hall of India
7.	Data Communications	F. Halsall	Pearson Edu.
8.	Computer Network	U. Black	Prentice Hall of India
9.	Peter Norton's Introduction to Computer	P. Norton	Tata McGraw-Hill
10.	Computer Network	Stallings	Prentice Hall of India
11.	Local Area Network	Ahuja	Tata McGraw-Hill
12.	Computer Communication ISDN Systems	Dr. D.C. Agarwal	
13.	Elements of Computer Science & Engineering	Prof. A.K. Mukhopadhyay	
14.	Computer Networks Fundamentals and Applications	Rajesh, Easwarakumar & Balasubramanian.	

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

Name of Subject: Computer Network Laboratory-1 **Full Marks-50**

Subject Code: ETCE/ CN1/S5

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

2. External Assessment of 50 marks shall be held at the end of the Fifth 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: **Medical Electronics-I**	
Course Code: ETCE/ ME1 /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks
Rationale:	
At present application of many electronics instruments are found in medical science. After successful completion of this course interested students will be able to know about radiology, ultrasound, ICU/CCU system, cardiac pacemaker, foetal system etc.	
Objectives:	
The student will be able to:	

✓ Understand different medical instruments and their applications			
Content (Name of topic)		**Periods**	**Marks**
Group-A			
Unit 1	**RADIOLOGY & MICROSCOPY INSTRUMENTS**	8	
	1.1 Properties of X-ray – Production of X-ray – Types of X-ray machine photoelectric effect – Crompton effect. 1.2 Bremostrate lung X-ray tubes – High voltage power sources – Typical X-ray machine, care, maintenance and troubleshooting designs variations. a. Scatter reductions – Image intensifiers – C.T. scan		
Unit 2	**Module 1 ANALYTICAL ,LABORATORY INSTRUMENTS AND SAFETY MEASURES**	10	
	4.1 Introduction & basic principles of PH meter. 4.2 Blood gas analysis – Densitometers – Electrophoresis. 4.3 Filter and flame photometers – Spectrometers. 4.4 Gross current, Micro Current shock, safety standards rays and considerations, 4.5 safety testing instruments, biological effects of X-rays and precautions		
	Group B		
Unit 3	**ULTRASOUND**	4	
	Ultrasonic Pulse Echo techniques – Time Motion Ultrasonography		
Unit 4	**MICROSCOPY**	4	
	Electron microscopy – Light microscope – Their comparison		
Unit 4	**Module 2 I.C.U. / C.C.U. SYSTEMS**	8	
	5.1 Introduction – System configuration – System connection – Recording instrument – Alarm modules – Displaying. 5.2 Information and servicing considerations in control systems. 5.3 Strip chart recorder – Introduction recording technique. 5.4 PMMC Galvanometer – Electronic Recorder – Adjustment & typical faults – Servo recorders.		
	TOTAL	34	

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:

Understand different medical instruments and their applications

Motor Skill:

Proper handling and trouble shooting of biomedical instrumentation

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	Minimum of eight exercises to be carried out and one field visit
9.	Operation and function of all the controls of hospital X-Ray machine (visit at hospital)
10.	Operation and function of all the controls of dental X-Ray machine (Visit to Hospital)
11.	Identification of different block/sub system of circuits in X-Ray machine
12.	Measurement of skin contact impedance and technique to reduce it.

13.	Observe its wave shape on CRO the output of blood pressure transducers body temperature transducers and pulse sensors
6.	To study the operations and control of an E.C.G. machine and to practice its troubleshooting
7.	To study the following features of an USG machine**:** Operation, Control, Troubleshooting and function of Camera.
8.	To study the following features of a PH meter**:** Electrodes, Meter, Buffer Solution, Application; and, also to study the ways & means of its maintenance.

Examination scheme (Theoretical):

A). Internal Examination: Marks- 10

B). End Semester Examination: Marks-35

C) Teacher's **Assessment: Marks- 05**

(i) Marks on Attendance: Marks

(ii) Assignments & Interaction: Marks

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

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

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.	**Title of the Book**	**Name of the Author**	**Name of the Publisher**
31.	Handbook of Biomedical Instrumentation	R.S. Khandpur	Tata McGraw Hill
32.	Handbook of Biomedical Instrumentation and Measurement	H.E. Thomas	Prentice Hall of India
33.	Biomedical instrumentation and Measurement	L. Cromwell, F.J. Weibell & E.A. Peiffer	Prentice Hall of India
34.	Electronics for Biomedical Personnel	E.J.B. Buckstein	Taraporewala
35.	Biomedical Instrumentation	Can & Brown	
36.	X-ray techniques for students	M.O. Chasney	
37.	Recent Advances in Biomedical Engineering	Reddy	

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

Name of Subject: Medical Electronics Laboratory-1 **Full Marks-50**

Subject Code: ETCE/ LME1/S5

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

4. **External Assessment of 50 marks** shall be held at the end of the Fifth 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: **Digital Signal Processing-1**	
Course Code: ETCE/ DSP1 /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Five)	Practical: 50 Marks
Rationale:	

Digital signal processing is a technology driven field which dates its growth where Computers and Digital Circuity became fast enough to process large amount of data efficiently. This subject is concerned with processing discrete-time signals or data sequences. The main objectives of this subject are to provide background and fundamental materials in discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.

Objectives:

The student will be able to:

1. Understand the concept of different types of signals and their properties
2. Acquire Knowledge on sampling and discretisation of analog signals
3. Learn Z transform technique
4. Understand Fourier transform, Discrete Fourier Transform and Fast Fourier Transform

Objectives:

The student will be able to:

Content (Name of topic)	**Periods**	**Marks**
Group-A		

Unit 1	**Introduction**	6	
	1.1 Discuss Signals, Systems & Signal processing. 1.1.1 Explain basic element of a digital signal processing system. 1.1.2 Compare the advantages of digital signal processing over analog signal processing. 1.2 Classify signals 1.2.1 Multi channel & Multi dimensional signals. 1.2.2 Continuous time verses discrete time. 1.2.3 Continuous valued verses discrete valued signals. 1.2.4 Deterministic Versus Random Signals. 1.3 Discuss the concept of frequency in continuous time & discrete time signals. 1.3.1 Continuous-time sinusoidal signals. 1.3.2 Discrete-time sinusoidal signals. 1.3.3 Harmonically related complex exponential. 1.4 Discuss Analog to Digital & Digital to Analog conversion & explain the following. 1.4.1 Sampling of Analog signal. 1.4.2 The sampling theorem. 1.4.3 Quantisation of continuous- amplitude signals. 1.4.4 Quantisation of sinusoidal signals. 1.4.5 Coding of quantized sample. 1.4.6 Digital to analog conversion. 1.4.7 Quantisation of sinusoidal signals. 1.4.8 Analysis of digital systems signals vs. discrete time signals systems.		
Unit 2	**Discrete time signals & systems.**	8	
	2.1 State and explain discrete time signals. 1.1.1 Discuss some elementary discrete time signals. 1.1.2 Classify discrete time signal. 1.1.3 Discuss simple manipulation of discrete time signal. 2.2 Discuss discrete time system. 1.1.4 Describe input-output of system. 1.1.5 Draw block diagram of discrete time system. 1.1.6 Classification of discrete time system. 1.1.7 Discuss inter connection of discrete time system. 2.3 Analysis of discrete time linear time-invariant system. 2.3.1 Discuss different technique for the analysis of linear system. 2.3.2 Discuss the resolution of a discrete time signal into impulse. 2.3.3 Discuss the response of LTI system to arbitrary I/Ps using convolution theorem. 2.3.4 Explain the properties of convolution & interconnection of LTI system. 2.3.5 Study systems with finite duration and infinite duration impulse response. 2.4 Discuss discrete time system described by difference equation. 2.4.1 Explain recursive & non-recursive discrete time system. 2.4.2 The impulse response of linear time invariant recursive		
	Group B		

Unit 3	**The z-transform & its application to the analysis of LTI system.**	10	
	3.1 Discuss Z-transform & its application to LTI system. 3.1.1 State & explain direct Z-transform. 3.1.2 State & explain inverse Z-transform. 3.2 Discuss various properties of Z-transform. 3.3 Discuss rational Z-transform. 3.3.1 Explain poles & zeros. 3.3.2 Determine pole location time domain behavior for casual signals. 3.3.3 Describe the system function of a linear time invariant system. 3.4 Discuss inverse Z-transform. 3.4.1 Determine inverse Z transform by partial fraction expansion.		
Unit 4	**Fourier transform: its applications properties**	8	
	4.1 Discuss discrete fourier transform. 4.1.1 Determine frequency domain sampling and reconstruction of discrete time signals. 4.1.2 State & explain discrete Fourier transformation (DFT). 4.1.3 Compute DFT as a linear transformation. 4.1.4 Relate DFT to other transforms. 4.2 Discuss the property of the DFT. 4.2.1 Discuss periodicity, linearity & symmetry property 4.2.2 Explain multiplication of two DFT & circular convolution.		
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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:

Motor Skill:

Proper handling of Computer System**.**

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	**Write assembly language programs:**
1.	The laboratory works will be performed on the following areas:—
2.	SIMULATION USING MATLAB
3.	Introduction to MATLABS & its various instructions.
4.	Program for Representation of Basic Signals (Unit impulse, Unit step, Ramp, Expontational, Sine, Cosine).
5.	Program for Discrete Convolution (Linear Convolution, Circular Convolution)
6.	Program for Sampling Theorem

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

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	5	Any five (Taking at least one from each group)	5	5 X 5 = 25
C	3,4	5			

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.	Nagoor Kani	Digital Signal Processing	Tata McGraw Hill
2.	Anand Kumar	Digital Signal Procesing	PHI
3.	Ramesh Babu	Digital Signal Processing	SCITECH
4.	BP Lathi	Digtal Signal Processing	OXFORD
5.	Proakis & Malonakis	Digital Signal Processing	Pearson
6.	Dr. Shaila D. Apte	Digital Signal Processing	Wiley
7.	VK Khanna	Digital Signal Procesing	S Chand
8.	Dr. Shailendra JainJain	Modeling & Simulation Using MATLAB-Simulink	Wiley India
9.	Openheim	Digtal Signal Processing	
10.	Salivanhan & Azarveizagan	Digital Signal Processing	TMH

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

Name of Subject: Digital Signal Processing Laboratory-1 **Full Marks-50**

Subject Code: ETCE/ LDSP1/S5

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

2. External Assessment of 50 marks shall be held at the end of the Fifth 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: **Computer Hardware Maintenance-1**	
Course Code: ETCE/ CHM1 /S5	Semester: Fifth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 Contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks
Rationale:	

- To do the maintenance of the Computer, peripherals and its add-on cards.
- To understand basic working of the computer motherboard, peripherals and add-on cards
- To select the proper peripheral as per their specification and requirement.

Objectives:

The student will be able to:

- Debug and repair the faults in system.
- Assemble the system.
- Load the operating system and device drivers in the system

	Content (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**PC HARDWARE OVERVIEW**	8	
	1.1 PC EVOLUTION**:** Feature of Intel Processors - Pentium, P2, P3, P4, Dual Core, Core i3, i5, i7 and AMD processors : K6, Athlon XP, Athlon 64. 1.1 INSIDE THE SYSTEM UNIT**:** Block diagram of the PC system, system box types, system main components and their overview including the rear side connectors. 1.2 Chipset basic, chipset Architecture: North / South Bridge architecture and Hub architecture, Architecture of Intel chipset 915 G & 945 G 1.3 MOTHERBOARD**:** Motherboard Selection criteria & layouts, upgrades, functional description of important blocks and their interconnection. 1.4 BUSES & EXPANSION SLOTS**:** Different bus architecture features, of ISA, PCI-X, PCI-Xpress, AGP, PCMCIA, AGP, Processor BUS (no pin description) PCI versus PCI Express, 1.5 BIOS**:** Basic ROM BIOS organization, services, BIOS, DOS, Windows interaction principle. 1.6 CMOS**:** Setup, configuration and utility.		
Unit 2	**MAIN MEMORY SYSTEM & STORAGE DEVICES**	10	
	2.1 **Motherboard Memory:** Features of PC's memory organization: Primary, Secondary, Memory Packages: SIMM & DIMM, Extended Memory, Virtual Memory, Expanded Memory –: DRAM including features of SDRAM, DDR, DDR2, DDR3, Disk Organization in DOS**:** Sectors, Cluster, DBR, MBR, FAT, root directory.		

	2.2 Concept of cache memory : Internal cache, External cache (L1, L2, L3 cache) 2.3 **Hard Disk Drive:** Hard disk construction and working 2.3.1 Servo Techniques : Wedge servo, Embedded servo, dedicated servo Terms related to Hard Disk : Track, Sector cylinder, cluster, landing zone, MBR, Zone recording, write pre-compensation 2.3.2 Formatting, Low level formatting, High level formatting, Partitioning 2.3.3 FAT basics, Introduction to file system FAT 16, FAT 32, NTFS 2.3.4 Hard disk drive interface : features of parallel AT attachment (PATA), Serial ATA (SATA), ATA devices jumper selections : Master, slave, cable select, ATA cables 2.4 ATA RAID : RAID 0, RAID 2.5 CDROM drive : Construction, Recording **2.6 CD-ROM Disks & Drives:** Types, audio, video, DVD – Construction, Recording, Reading, Basics: Speed – Storage capacity – Subassembly components and installation. 2.7 Blu-ray disk specification and pen drive		
	Group B		
Unit 3	**MONITORS AND INTERFACING**	7	
	3.1 MONITORS AND THEIR INTERFACES**:** Block diagram description of a Video Controller Card and Monitor – Display Adapters: CGA, VGA and SVGA card — Features, Resolution and Monitor features, Graphics display characteristics – Video attributes. 3.2 Comparison of CRT display related to LCD display 3.3 LCD monitor : functional block diagram of LCD monitor, working, principal, advantages and disadvantages Types : Passive matrix and 3.4 Active matrix, Important characteristics : Resolution, Refresh rate, 3.5 Response time 3.6 Basic block diagram of a video accelerator care.		
Unit 4	INPUT & OUTPUT DEVICES AND PORTS	8	
	4.1 Keyboard : Types of key switches and signals : Membrane, Mechanical, Rubber dome, Capacitive and interface 4.2 Mouse : Mechancial, Optomechanical, optical (New design)-principle of operation and installation 4.3 Scanner : Flat bed, sheetfed, Handheld : Block diagram and specifications, OCR, TWAIN, Resolution, Interpolation 4.4 Modem : Internal and External : Block diagram and specifications 4.5 Printer : Dot matrix, Inkjet, Laser : Block diagram and specifactions, self test of printer, interface requirements. Use of tonner and ink crtridge 4.6 Plotter: Types, functional principle, capabilities, resolution and installation 4.7 PORT**:** Serial Port: Features, Signals, Connector specification – Parallel Port:		

	Features, Signals, Connector specification – Game Port: Features – Connector specification 4.8 U.S.B.**:** Features – Specification..		
	TOTAL	33	

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:

- ✓ Understanding basic hardware of computer
- ✓ Fault finding of input/output devices
- ✓ Troubleshooting of input/output devices
- ✓ Proper connection of input / output devices

Motor Skill:

- ➢ Proper handling of Computer hardware System**.**

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	**Write assembly language programs:**
1.	Drawing the motherboard layout of Pentium IV and studying the chipset through data books or Internet.
2.	CMOS setup
3.	Hard Disk Partitioning.
4.	Study of HDD: Identify various components of HDD and write their functions.
5.	Study and installation of any one display cards: VGA or SVGA display cards.
6.	Installation of Scanner, Printers and Modems.
	Mini Project

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: 6 multiple choice and 4 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	6			
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2	4	Any four	1	4x1=4
B	3,4	4			

Group	**Unit**	**Subjective Questions**			**Total Marks**
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	5	Any five (Taking at least	5	5 X 5 = 25

B	3,4	5	two from each group)		

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.	Vikash Gupta	Comdex hardware and Networking Course Kit	Dreamtech press
2.	Brenner	IBM PC troubleshooting & repair guide	BPB
3.	R. Gilster	PC Hardware a Beginner's Guide	Tata McGraw-Hill
4.	Govindrajalu	IBM PC Clone	Tata McGraw Hill
5.	Norton	Peter Norton's Problem	Prentice Hall of India
6.	Subhodeep Chowdhury	A to Z of PC Hardware Maintenance	Dhanpat Rai & Co
7.	Thompson and Thompson	PC Hardware in a Nutshell	Shroff Pub. & Distrib. Pvt. Ltd.
8.	Mark Minasy	Complete PC Upgrade and Maintenance Guide	BPB
9.	Biglow's	Troubleshooting, maintaining and repairing PCs	Tata McGraw-Hill
10.	Mueller	Upgrading and repairing PC	Tata McGraw Hill

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

Name of Subject: Computer Hardware Maintenance Laboratory-1 **Full Marks-50**

Subject Code: ETCE/ LCHM 1/S5

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

2. External Assessment of 50 marks shall be held at the end of the Fifth 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: **Industrial Project & Entrepreneurship Development**	
Course Code: ETCE/ IPED /S5	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 1Contact hrs./ week	
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction):
Practical: 2 contact hours/ week	**Internal Practical Exam : 50 and External Practical Exam: 50**
Credit: 3 (Three)	
Rationale:	

- To Understand Market Assessment
- To Identify entrepreneurship creativity and opportunities
- To improve students skill to prepare report for business venture

Objectives:

The student will be able to:

- ✓ Identify entrepreneurship opportunity.
- ✓ Acquire entrepreneurial values and attitude.
- ✓ Use the information to prepare project report for business venture
- ✓ Develop awareness about enterprise management.

	Content Theory (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**Entrepreneurship, Creativity & Opportunities**	6	
	1.1) Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea- Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea Feasibility of opportunity 1.6) SWOT Analysis		
Unit 2	**Information And Support Systems**	6	
	2.1) Information Needed and Their Sources. Information related to project, Information related to support system, Information related to procedures and formalities **2.2) SUPPORT SYSTEMS** 2.2.1 Small Scale Business Planning, Requirements. 2.2.2 Govt. & Institutional Agencies, Formalities 2.2.3 Statutory Requirements and Agencies. 2.2.4 Support Institutions and their Roles		
Unit 3	**Market Assesment**	3	
	3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment		
	Group – B		
Unit 4	**Business Finance & Accounts**	6	
	Business Finance 4.1) Cost of Project • Sources of Finance		

	• Assessment of working capital • Product costing • Profitability • Break Even Analysis • Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,		
Unit 5	**Business Plan & Project Report**	4	
	5.1) Business plan steps involved from concept to commissioning- Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) **Components of project report/profile (Give list)** a) Project Summary (One page summary of entire project) b) Introduction (Promoters, Market Scope/ requirement) c) Project Concept & Product (Details of product) d) Promoters (Details of all Promoters- Qualifications, Experience, Financial strength) e) Manufacturing Process & Technology f) Plant & Machinery Required g) Location & Infrastructure required h) Manpower (Skilled, unskilled) i) Raw materials, Consumables & Utilities j) Working Capital Requirement (Assumptions, requirements) k) Market (Survey, Demand & Supply) l) Cost of Project, Source of Finance m) Projected Profitability & Break Even Analysis n) Conclusion. 5.3) **Project Appraisal** a) Meaning and definition b) Technical, Economic feasibility c) Cost benefit Analysis		
Unit 6	**Enterprise Management And Modern Trends**	8	
	6.1) **Enterprise Management**: 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance : Importance of Quality, Importance of testing 6.2) **E-Commerce:** Concept and process 6.3) **Global Entrepreneur**		

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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

Motor Skill

Suggested List of Laboratory Experiments

Students will take up project work on Electronics and its different applications and the work will be suggested by the department faculty members.

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

Name of Subject: Industrial Project and Entrepreneurship **Full Marks-100**

Subject Code: ETCE/ LIPE /S5

1. Continuous Internal Assessment of 50 marks is to be carried out by the teachers throughout the Fifth Semester. **Distribution of marks: Performance of Job – 25, Project Report – 25**

2. External Assessment of 50 marks shall be held at the end of the Fifth Semester on the entire syllabus. Marks will be awarded on the basis of their Project Work and overall knowledge of the subject

Sr. No	Assignments
1	**Assess yourself-are you are entrepreneur?**
2	**Prepare project report and study its feasibility.**

Sr.No	Author	Name Of Book	Publisher
1.	Alpana Trehan	Entrepreneurship	Dreamtech press/ Kogent Learning solutions
1	J.S. Saini, B.S.Rathore	Entrepreneurship Theory and Practice	Wheeler Publisher, New Delhi
2	E. Gorden, K.Natrajan	Entrepreneurship Development	Himalaya Publishing.
3	Prepared by Colombo Plan Staff College for Technician Education.	Entrepreneurship Development	Tata McGraw Hill
4	J.B.Patel, D.G.Allampally	A Manual on How to Prepare a Project Report	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
5	J.B.Patel, S.S.Modi	A Manual on Business Opportunity Identification & Selection	
6	S.B.Sareen, H. Anil Kumar	National Derectory of Entrepreneur Motivator & Resource Persons.	
7	Gautam Jain, ,Debmuni Gupta	New Initiatives in Entrepreneurship Education & Training	
8	P.C.Jain	A Handbook of New Enterpreneurs	

9	D.N.Awasthi, Jose Sebeastian	Evaluation of Enterpreneurship Development Programmes	
10	V.G.Patel	The Seven Business Crisis & How to Beat Them.	

Video Cassettes

Sr. No.	Subject	Source
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

Name of the course: Professional Practice-III	
Course Code: ETCE/PP-III/S5	Semester: Fifth
Duration: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	**Examination Scheme :**
Theory:	Internal Teachers' Assessment: 50 Marks
Tutorial:	
Practical: 3 contact hours/ week	End Semester Examination: Nil
Credit: 2	
Rationale:	

In addition to 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 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.

01	**Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work.** Following are the suggested type of Industries/ Fields –(Any three visits) 1. Data Acquisition System 2. Sugar Mill, Paper Mill, Cement Industry 3. Satellite Earth Station 4. Railway Station Control Room 5. Digital RPM Meter Manufacturing Unit 6. Industry where Digital Drives are used 7. Digital Counters	**12**

4. Present given topic in a seminar.
5. Interact with peers to share thoughts.
6. Develop capability of working in UNIX operating environment
7. Understand Open Source Software- "SCILAB" is a perfect substitute for MATLAB, for numerical computations.
8. Understand application of technologies in industry scenario.
9. Prepare a report on industrial visit, expert lecture.

02	**The Guest Lecture/s from field/ industry experts, professionals to be arranged (2 Hrs), minimum 3 nos. Chose any three from the following or alike topics. Students should submit a brief report on the guest lecture as part of Term Work** **a. Operating System "UNIX" an Overview:** Hands-on demonstration of Linux (ubuntu) Open Source operating system software, its installation , different features, use of its different components and its equivalency with windows operating system **b. Introduction to MATLAB & ITS Open Source Equivalent SCILAB and hands on demonstration:** 1. Introduction and Installation Of MATLAB & SCILAB and Vector Operations 2. Matrix Operations and Scripts and functions 3. Conditional Branching and Iterations and Plotting in Scilab 4. SBHS and Introduction to X-Cos in Scilab c. Peripheral Devices d. Blue Tooth Technology e. Energy Crisis and Alternative Energy Sources f. Digital Invertors g. Laptop & Tablet Repair h. Total Quality Management i. Six Sigma	**12**
03	**Information Search ,data collection and writing a report on the topic** 1. Wireless Communication 2G GSM 2. CDMA 3. GPS 4. Manufacturing process of ICs 5. WLL Technology	**8**
04	**Group Discussion:** The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members.	**8**
05	**Seminar :** Seminar topic should be related to the subjects of fifth semester Each student shall submit a report of 5 to10 pages and deliver a seminar (Presentation time – 10 minutes)	**8**
	Total	**48**

Reference Book

1. **Linux (Ubuntu):**

Authors	Title	Publisher	Weblink
CHRISTOPHER NEGUS	UBUNTU LINUX TOOLBOX: 1000+ COMMANDS FOR POWER USERS, 2ND ED	Wiley India	http://www.wileyindia.com/ubuntu-linux-toolbox-1000-commands-for-power-users-2nd-ed.html
WILLIAM VON HAGEN	UBUNTU LINUX BIBLE: FEATURING UBUNTU 10.04 LTS, 3RD ED	Wiley India	http://www.wileyindia.com/ubuntu-linux-bible-featuring-ubuntu-10-04-lts-3rd-ed.html

2. **Linux**

Authors	Title	Publisher	Weblink
REMY CARD, ERIC DUMAS, FRANCK MEVEL	THE LINUX KERNEL BOOK	Wiley India	http://www.wileyindia.com/the-linux-kernel-book.html
NEIL MATTHEW, RICHARD STONES	BEGINNING LINUX PROGRAMMING 4TH EDITION	Wiley India	http://www.wileyindia.com/beginning-linux-programming-4th-edition.html
TERRY COLLINGS & KURT WALL	RED HAT LINUX NETWORKING & SYSTEM ADMIN. (3rd Ed.)	Wiley India	http://www.wileyindia.com/red-hat-linux-networking-system-admin-3rd-ed.html
SANDER VAN VUGT	RED HAT ENTERPRISE LINUX 6 ADMINISTRATION: REAL WORLD SKILLS FOR RED HAT ADMINISTRATORS	Wiley India	http://www.wileyindia.com/red-hat-enterprise-linux-6-administration-real-world-skills-for-red-hat-administrators.html

3. **Matlab programming by Singh (PHI)**
4. **Lab Primer through MATLAB, Naresh (PHI)**

PART — III

6th 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

Further suggestion may be submitted to the syllabus committee. List of the coordinators for the branch of Diploma in Electronics & Tele Communication Engineering are:

- **Sri Sandip Kundu** **Tele: 03322277590**
- **Dr. Bijita Biswas** **Mobile:9830272981**
- **Dr. Marina Dan** **Mobile:9831115387**
- **Dr. Susmita Sen** **Mobile:9433772629**
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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: SIXTH

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.	Industrial Management	3	3	-	-	10	20	30	70	-		100
2.	Advance Communication Engineering	3	3	1	.-	10	20	30	70	-	-	100
3.	Instrumentation & Control	3	3	1	-	10	20	30	70	-	-	100
4.	Industrial Electronics-II	3	3	-	-	10	20	30	70	-	-	100
5.	Elective-II (Select any one) Computer Network-II Medical Electronics-II Digital Signal Processing-II Computer Hardware Maintenance-II	2	2	-	-	5	10	15	35	-	-	50
6.	Advance Communication Engineering Laboratory	2	-	-	3	-	-	-	-	50	-	50
7.	Instrumentation & Control Laboratory	1	-	-	2	-	-	-	-	50	-	50
8.	Industrial Electronics Laboratory-II	2	-	-	3	-	-	-	-	50	-	50
9.	Elective- II Laboratory	1	-	-	2	-	-		-	50	-	50
10.	Industrial Project	2	-	-	4	-	-	-	-	100	-	100
11.	Professional Practice – IV	2	-	-	3	-	-	-	-	-	50	50
12.	General Viva voce	2	-	-	-	-	-	-	-	-	100	100
	Total	26	14	2	17	45	90	135	315	300	150	900

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, TW-Term Work

TA (Teacher's assessment) = 10 marks: Attendance & surprise quizzes = 5 marks and Assignment & group discussion = 5 marks for CT= 20 Marks.

TA (Teacher's assessment) = 5 marks: Attendance & surprise quizzes + Assignment & group discussion = 5 marks for CT = 10 Marks.

Total Marks : 850

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: **Advance Communication Engineering**	
Course Code: ETCE/ ACE /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: 1 contact hrs./ week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 50 Marks
Rationale:	

This course is continuation of the one titled **"DIGITAL AND MICROWAVE COMMUNICATION ENGG"**, offered in Part – III, 1st Semester. After completion of this course, the students will be able to get some idea about modern communication techniques like satellite communication, optical fibre communication, computer network spread spectrum modulation, modern telephony etc.

Objectives:

The student will be able to:

1. Describe satellite communication.
2. Get an overview of optical communication.
3. Develop computer network systems.
4. Explain working principle of modern telephony.

	Content (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**SATELLITE COMMUNICATION**	8	
	1.1 Kepler's Law – Artificial Satellite – Orbits – Geostationary Orbit – Satellite Speed – Power Systems – Satellite Angles – Station Keeping – Satellite Launching – Attitude Control. 1.2 Transponder and satellite frequency allocations – Frequencies reuse. 1.3 Block schematic description of communication satellite 1.4 Elementary idea of FDMA ,TDMA and CDMA		
Unit 2	**OPTICAL COMMUNICATION**	12	
	2.1 Concept of fibre optic communication system – Advantages and limitations of optical fibre communication – Construction of optical fibre – Optical fibre types: Monomode and Multimode. 2.2 OPTICAL FIBRE PERFORMANCE**:** Bandwidth-distance product – Transmission loss. 2.3 OPTICAL SOURCES**:** LED and LASER – Modulation of LED and LASER – Functions of optical detectors.		

	2.4 Block schematic description of optical fibre communication system. 2.5 Components of optical fibre – Coupler connector splice. 2.6 Basic idea of Fibre optic networking 2.7 **F**ibre **D**istributed **D**ata **I**nterface – Synchronous optical network. 2.8 Multiplexing on optical fibre cable – Wavelength division multiplexing , Orthogonal Frequency Division Multiplexing (basic idea only) 2.9 Applications of fibre optics.		
Unit 3	**SPREAD SPECTRUM MODULATION(ONLY DESCRIPTIVE TREATMENT)**	6	
	3.1 Introduction, PN Sequence. 3.2 Model of spread spectrum modulation system. 3.3 Direct sequence spread spectrum signal. 3.4 Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping. 3.5 Application S. S. modulations		
	Group – B		
Unit 4	**COMPUTER NETWORK**	8	
	4.1 Network Architecture – Network Topology – Routing – Flow Control – Error Control (Basic idea only). 4.2 Connection of Networks**:** Bridge – Router – Gateway 4.3 Categories of Network**:** LAN – MAN – WAN – File Server Network – Client Server Network – Peer to Peer Network. 4.4 Idea of network protocol – Idea of layered protocol – Ethernet – CSMA/CD – Token ring – Token bus. 4.5 Circuit Switched and Packet Switched network. 4.6 Characteristics of modem. **4.7** Working of Internet and E-mail – IS.		
Unit 5	**MODERN TELEPHONY**	12	
	5.1 Working of facsimile or fax – Idea of image processing by **C**harged **C**oupled **D**evice. 5.2 Concept of cordless telephony. 5.3 CELLULAR TELEPHONE SYSTEM**:** Concept – **M**obile **T**elephone **S**witching **O**ffice – Cellular telephone unit – Frequency synthesizer – **N**umber **A**ssignment **M**odule – **M**obile **I**dentification **N**umber – Digital cellular telephone system – **G**lobal **S**ystem for **M**obile communication – Concept of CDMA. 5.4 Concept of 1G, 2G , 3Gand 4G 5.5 Wireless Communication—Wi-Fi and Wi max (Basic ideas only) 5.6 Concept of Video Phone		
	TOTAL	46	

Contents Practical

O B J E C T I V E

On satisfactory completion of the course, the students should be in a position to develop the skills corresponding

to the knowledge acquired in the theoretical subject ADVANCE COMMUNICATION ENGINEERING
Skills to be developed:

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments	
Sl. No.	**Write assembly language programs:**
1.	To study the function of fibre optic analog link.
2.	To study the frequency response of optical receiver at various load conditions.
3.	To study the losses in optical fibre**:**— (a) propagation loss, (b) bending loss.
4.	To study the numerical aperture of optical fibre.
5.	To be familiar with the following network components**:**— Cables – Connectors – Hubs – **N**etwork **I**nterface **C**ard.
6.	To be familiar with fax.
7.	To be familiar with cordless telephone.
8.	To be familiar with mobile telephone.
	Suggested list of MINI PROJECT (any one)
	To design a wireless fibre link
	To develop any control system using optical source
	To design a voice communication link using optical fibre.
	i) Use of OTDR (Demonstration) ii) Use of Splicing Technique (Demonstration)

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

Group	**Unit**	**Subjective Questions**			**Total Marks**
		To be set	To be answered	Marks	

		(Ten questions)		per question	
A	1,2	5	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	4,5	5			

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.	Chandrasekhar	Communication system	OXFORD
2.	Frenzel	Communication Electronics	Tata McGraw-Hill
3.	Roy	Advance Optical Fiber Communication	SCITECH
4.	Wayne Tomasi	Electronic communication system	Pearsons Eduction
5.	Anil K. Maini, Varsha Ahgarwal	Satellite Communications	Wiley India
6.	D C Agarwal	Fiber Optic Communication	S Chand
7.	Sanjay Sharma	Analog and digital Communication	S.K. Kataria
8.	Rappaport	Wireless Communications : Principles and Practice,	Pearson
9.	Behera	Mobile Communication	SCITECH
10.	Vivekananda Misra Sunita P. Ugale	Fiber optic Communication System and components	Wiley India
11.	Senior	Optical Fiber Communications : Principles and Practice	Pearson
12.	Rao	Mobile Cellular Communication	Pearson
13.	Ganesh Babu	Communication Theory	SCITECH
14.	Sudhakshina Kundu	Analog and Digital communication	Pearson
15.	Simon Heykin	Digital Communication system	Wiley
16.	John C Bellamy	Digital telephony	Wiley India
17.	Anokh Singh & AK Chabaria	Principles of Communication Engg.	S Chand
18.	Kennedy	Electronic Communication System	Tata MCGraw-Hill
19.	Taub & Schilling	Analog and digital communication	Tata MCGraw-Hill
20.	K.Rekha	Digital Communication	SCITECH
21.	K Sam & Shanmugar	Digital & Analog Communication	Wiley

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

Name of Subject: Advance Communication Engg. Laboratory Full Marks-75

Subject Code: ETCE/ LACE/S6

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

2. External Assessment of 50 marks shall be held at the end of the sixth 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: **Industrial Electronics -II**	
Course Code: ETCE/ IEII /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 3 contact hours/ week	End Semester Examination: 70 Marks
Credit: 5 (Five)	Practical: 50 Marks

Rationale:

This subject is important link between basic electricity and advanced electronic applications. Industrial electronics shall play very important role for shop floor engineers in the field of industrial applications like conversion, inversion, and stabilization of ac & dc power control etc. Also it will help engineer in the field of power generation, transformation and distribution in ac power. At the same time in the field of dc power requirement in industries, laboratories. This subject is heart of many industrial processes like battery charging, UPS, welding, time controlled processes, temperature controller operation etc.

Objectives:

The student will be able to:

1. Choose a device for a specific application.
2. Describe the operation of various converters, invertors, choppers, regulator.
3. List applications of converters, invertors, choppers, regulator.
4. Select proper device for a given application.
5. Understand the PLC and their application in industry.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**CHOPPERS**	5	
	1.1 Principle of operation of chopper and its application. 1.2 Functional operation of forced, commutated and Jone's chopper and their areas of applications. 1.3 Principle of operation of 4-quadrant chopper. 1.4 Principle of operation of Cycloconverter and its applications.		
Unit 2	**SPEED CONTROL OF DC MOTOR**	4	
	2.1 TYPES OF SPEED CONTROL OF DC MOTOR**:** Armature Volt – Field Current Control. **2.2** DRIVE SYSTEM**:** Controlled Rectifier Drive – Reversible Drive – Quadrant Drive –		

	2.3 Dual Converter		
Unit 3	**AC POWER REGULATOR**	6	
	3.1 Concept of Automatic AC Regulator and phase control 3.2 Principle of operation of: Step Regulator – Solid State Changer – Servo Regulator. 3.3 Principle of operation of Phase Control AC Regulator. 3.4 Principle of operation of CVT and Solid State Regulator.		
	GROUP-B		
Unit 4	SPEED CONTROL OF AC MOTOR	4	
	4.1 Types of speed variation – Frequency variation – Stator volt variation – Closed loop control – Types of feedback. 4.2 TYPES OF BREAKING**:** Regenerative breaking – Plugging.		
Unit 5	**INVERTERS**	4	
	5.1 Principle of operation of self-oscillating and driving inverter 5.2 Principle of operation of voltage driver, current driver, half bridge and full bridge 5.3 inverter. Inverter loads. 5.4 Three phase inverter., 5.5 Applications of inverter.		
Unit 6	**UPS AND SOLAR CELL**	8	
	6.1 Principle of operation of ON line UPS, standby UPS, cold and warm, utility of 6.2 static switch. 6.3 Use of storage devices and working principle of battery charger 6.4 Concept of Solar Cell and its application 6.5 Idea of solar battery charger and inverter		
	GROUP -C		
Unit 7	**STEPPER MOTOR**	6	
	7.1 Types and principle of operation of stepper motor. 7.2 STEPPER MOTOR CONTROL**:** Stepper Drive – Dual Voltage Drive – Chopper Drive.		
Unit 8	**PLC BASICS**	8	
	8.1 Evolution and Role of PLC in Automation 8.2 Block Diagram & Principle of Working 8.3 PLC Characteristics and hardware configuration – CPU, Racks, Power Supply, 8.4 Memory, Input & Output Modules, Application Specific Modules, Speed of Execution, Communication, Redundancy. 8.5 Introduction to PLC Programming Languages –Ladder, Instruction List, 8.6 Structured Text, Grafcet		
	TOTAL	45	

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) Able to select proper instruments
2) Compare the characteristics under various conditions

Motor Skill:

1) Make accurate measurements

2) Adjust the meters to read zero at start

3) Draw graphs

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments	
Sl. No.	
1.	To study a phase control AC regulator
2.	To study a Jones chopper
3.	To study a servo regulator
4.	To study an Online UPS system.
5.	To study a single-phase bridge inverter with resistive load.
6.	To study the speed control of DC motor by**:** —
	(a) varying field current keeping armature voltage constant; and,
	(b) varying armature voltage keeping field current constant.
7.	To study speed control of induction motor by voltage and frequency variation.
8.	To study stepper motor control system.
9.	Use of simulation package for different function of PLC.
10.	Verify function of logic gates by using PLC.
11.	Write and verify ladder program for motor ON-OFF Control with two push button
	Mini Project
	Ac voltage controller
	Battery charging regulator , emergency light using solar cell , panel and solar inverter
	Temperature controller

Examination scheme (Theoretical):

A). Internal Examination: Marks- 20

B). End Semester Examination: Marks-70

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

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

C	7,8	3			

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	5 X 10 = 50
B	4,5,6	3			
C	7,8	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.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Dr. S K Mandal	Power Electronics	TMH
2.	Biswanath Paul	Industrial Electronics	PHI
3.	Moorthi	Power Electronics	OXFORD
4.	Khan & Chandani	Industrial Electronics	Tata McGraw Hill
5.	H Babu	Power Electronics	SCITECH
6.	Gupta & Singhal	Power Electronics	SK Kataria & Sons
7.	Mohan	Power Electronics Converter Application and Design	Wiley
8.	SN Biswas	Industrial Electronics	Dhanpat Rai
9.	PC Sen	Modern Power Electronics	S Chand
10.	Chatterjee & Bhattacharya (TTTI)	Industrial Electronics	TMH
11.	M.C Sharma	Practical SCR / Triac projects	
12.	F. Graf	The Encyclopedia of electronic circuit by Rudolf	

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

Name of Subject: Industrial Electronics Laboratory-II **Full Marks-50**

Subject Code: ETCE/ LIE2/S5

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the sixth 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: **Instrumentation and Control**	
Course Code: ETCE/ IC /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks

Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 4 (Five)	Practical: 50 Marks

Rationale: Measurement of different physical quantity can be done with the help of some instruments constructed of some electrical and electronic devices. The students will be familiar with the principle of operation of different transducer processing of signals of different instrument like LVDT, strain gauge, thermocouple, thermistors etc. The students will also be acquainted with the basics of control system after successful completion of this course.

Objectives:

The student will be able to:

1. Transducer fundamentals
2. Position & displacement measurement
3. Pressure of force & vibration measurement
4. Temperature measurement
5. Signal conditioning
6. Introduction to control engineering
7. System element behaviour
8. Closed loop system

	Content (Name of topic)	Periods	Marks
	Group-A		
Unit 1	**TRANSDUCERS FUNDAMENTALS**	4	
	1.1 Principle of operation of transducer and sensor. 1.2 Measurement of physical quantities with transducer, displacement, potentiometer, LVDT, strain gauge, piezoelectric crystal. 1.3 TEMPERATURE: RTD – Thermistors – Thermocouple. 1.4 FLOW: Positive displacement – Electromagnetic heat – Thermal heat. 1.5 Other applications like measurement of pH and conductivity. 1.6 Factors for choice of transducer.		
Unit 2	**POSITION , DISPLACEMENT AND TEMPERATURE MEASUREMENT**	6	
	2.1 Principle of Potentiometric Transducer. 2.2 Capacitance Transducer. 2.3 Linear Variable Differential Transformer. 2.4 Basic types of temperature transducer: Resistance detectors, thermistors, thermocouple — Principle of operation, specifications, features and applications. 2.5 Application of platinum thin film and sensors		
Unit 3	**PRESSURE OR FORCE & VIBRATION MEASUREMENT**	4	
	3.1 Representative unit of pressure or force. 3.2 Electrical transducer alignments — Electrical strain gauges: Types – Gauge Factor – Temperature Specification. 3.3 SEMICONDUCTOR STRAIN GAUGES: Properties of piezoelectric alignments,		
	Group B		

Unit 4	**SIGNAL CONDITIONING**	6	
	4.1 Signal conditioning requirements for AC and DC transducer signal. 4.2 Transducer circuit modification. 4.3 Specification and characteristics of instrumentation amplifier. 4.4 Signal processing. 4.5 Features and advantages of computerized data acquisition.		
Unit 5	**INTRODUCTION TO CONTROL ENGINEERING**	6	
	5.1 Examples of control system. 5.2 Classification of control system. 5.3 Representation of control system. 5.4 Transfer function. 5.5 Block diagram of a feedback control system. 5.6 Simplification of a feedback control system.		
Unit 6	SYSTEM ELEMENT BEHAVIOUR	7	
	6.1 Standard test. 6.2 The steady state and transient response. 6.3 Steady State Error – Rise Time – Delay Time – Settling Time. 6.4 DAMPING: Over damped – Under damped – Critically damped. 6.5 Standard test inputs - step, ramp, parabolic& impulse. Need of them, significance, and corresponding Laplace representation Poles & zeros – definition. 6.6 Analysis of first order control system for unit step input; concept of time constant 6.7 Analysis of second order control system for unit step input; concept, definition & effect of damping; time response specifications (no derivations) ; problems on time response specifications		
	GROUP- C		
Unit 7	**CLOSED LOOP SYSTEM**	6	
	7.1 s-plane – Introduction stability - stable, unstable, critically stable & conditionally stable system; relative stability; 7.2 Routh's stability criterion-- basic idea; 7.3 Nyquist criteria—basic idea.		
Unit 8	**CONTROL ACTIONS & PROCESS CONTROLLERS**	7	

	8.1 Process control system – block diagram , elements 8.2 Role of controllers in process industry; concept of sequencing & modulating 8.3 controllers; 8.4 Control actions: discontinuous & continuous modes; 8.5 on off controllers: neutral zone 8.6 proportional controllers (offset, proportional band) integral & derivative controllers; 8.7 composite controllers; PI, PD, PID controllers		
	TOTAL	46	

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:

Motor Skill:

Proper handling of Computer System**.**

List of Practical: Any FIVE(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	
1.	To measure displacement with LVDT
2.	To measure temperature with thermocouple
3.	To measure temperature with thermistor
4.	To measure pressure with strain gauge
5.	To plot the Characteristics of RTD (PT-100)
6.	Temperature controller with on-off controller
7.	Temperature controller with PI controller
8.	Temperature controller with PID controller

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

C	7,8	3			

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	3			
C	7,8	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.	M. Gopal	Digital Control System	Tata McGraw-Hill
2.	Patranabis	Instrumentation and Controls	PHI
3.	J.J.Nagrath & M. Gopal	Control System Engg	Wiley
4.	Rameshbabu and R Anandrajan	Modern Control System	SCITECH
5.	K. Ogata	Modern Control Engg.	--
6.	K Sridhar	Automatic Control Systems	Wiley India
7.	S N Talbar & AR Upadhyay	Electronics Instrumentation	Dhanpat Rai & Sons
8.	Kumar	Control System	Tata McGraw-Hill
9.	C. D. Johnson	Process control instrumentation Technology	--
10.	RK Rajput	Electrical & Electronics Measurement and Instrumentation	S Chand
11.	JB Gupta	Electrical & Electronics Measurement and Instrumentation	SK Kataria & Sons
12.	Kalsi	Electronic Instrumentation	Tata McGraw-Hill
13.	A.K. Sawhney	A Course in Electrical and Electronic Measurement and Instrumentation	Dhanpat Rai & Sons
14.	B.C. Kuo	Automatic Control System	PHI
15.	Natarajan	Control System Engg.	SCITECH
16.	Reddy	Instrument Control	SCITECH

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

Name of Subject: : Instrumentation and Control **Full Marks-50**

Subject Code: ETCE/ LIC/S6

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 25 marks** shall be held at the end of the sixth 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: Computer Network II	
Course Code: ETCE/CNII/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: 2 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	
Rationale:	
Modern age is the age of computer. Global communication can be done within few seconds with the help of computer network. Preliminaries like network structure, flow and error control, LAN, internetworking, network security etc. are included in this course so that the students know about the fundamentals of computer networking.	
Objectives:	
The student will be able to- ✓ Identifying the benefits of network. ✓ Distinguish between Network classifications. ✓ Describe different types of Topology. ✓ Describe different types of Network devices. ✓ Compare different transmission media. ✓ Compare OSI and TCP/IP model	

Content (Name of topic)		**Periods**	**Marks**
Group-A			
Unit 1	**TCP/IP Fundamentals:**	8	
	1.1 TCP/IP Protocols - SLIP and PPP; ARP; IP; ICMP; TCP and UDP. 1.2 IP Addressing - IP Address Assignments; IP Address Classes; Subnet Masking; Registered and unregistered Addresses. 1.3 TCP/IP Configuration - Installing the TCP/IP Protocol; Configuring TCP/ IP - Configuring Basic TCP/IP Properties, Configuring Advanced TCP/IP Properties		

Unit 2	**LOCAL AREA NETWORK**	8	
	2.1 Basic concepts. 2.2 IEEE 802 family of standards. 2.3 ETHERNET**:** CSMA / CD – Frame formats. 2.4 Token Bus – Token Ring – Frame Formats. 2.5 FDDI: Access method – Frame format. 2.6 Wireless LAN.		
	Group C		
Unit 3	**Internet services**	9	
	3.1 VSAT. 3.2 Structure and Objectives of Intranet & Internet. 3.3 INTERNET SERVICES**:** Email – telnet – FTP – World Wide Web – Internet Telephony – Short Messaging Services (SMS) – Internet Fax – Video Conferencing: VoIP – HTML – DHTML – XML – ASP – Network programming concepts with Java / PHP – Concepts of Web Site Design and Hosting. 3.4 ISDN – ATM.		
Unit 4	**NETWORK SECURITY**	8	
	4.1 Different aspects of SECURITY**:** Privacy – Authentication – Integrity – Non-Repudiation. 4.2 ENCRYPTION / DECRYPTION**:** Data Encryption System – Secret key method – Public key method. 4.3 Digital signature.		
	TOTAL	33	

Practical

Skills to be developed

Intellectual skills:

1. Analytical skills.
2. Identification skills.

Motor skills:

1. Handling of computers and programming abilities.
2. Connection (of machine terminals) skills.

List of Practical:

The laboratory works will be performed on the following areas:—

1. LAN card (MB and GB range) installation and cabling, demonstration on Hub, Switches and wireless LAN card.
2. Optical fibre based LAN- Transceiver, commissioning of optical fibre tools.
3. To locate MAC address of computer
4. Installation of TCP/IP Protocol i.e. NetBEUI Protocol
5. Implementing a TCP/IP Network configuring

Text books:			
Sl. No.	**Titles of Book**	**Name of Author**	**Name of Publisher**
1.	Data Communication and Networking	B.A. Forouzan	T.M.H Publishing Co. Ltd.
2.	Data Communication & Networking	DP Nagpal	S Chand
3.	Data Communication & Computer Networking	Ajit Pal	PHI
4.	Communication Network	Leon, Garcia, Widjaja	Tata McGraw-Hill
5.	Vikash Gupta	Comdex hardware and Networking Course Kit	Dreamtech press
6.	Computer Network	Tanenbaum	Prentice Hall of India
7.	Data Communications	F. Halsall	Pearson Edu.
8.	Computer Network	U. Black	Prentice Hall of India
9.	Peter Norton's Introduction to Computer	P. Norton	Tata McGraw-Hill
10.	Computer Network	Stallings	Prentice Hall of India
11.	Local Area Network	Ahuja	Tata McGraw-Hill
12.	Computer Communication ISDN Systems	Dr. D.C. Agarwal	
13.	Elements of Computer Science & Engineering	Prof. A.K. Mukhopadhyay	
14.	Computer Networks Fundamentals and Applications	Rajesh, Easwarakumar & Balasubramanian.	

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: 6 multiple choice and 4 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	6			
		To be set short answer type (eight questions)	To be answered	Marks per question	
A	1,2	4			
B	3,4	4	Any four	1	4x1=4

Group	**UNIT**	**Subjective Questions**			**Total Marks**
		To be set Multiple	To be answered	Marks per	

		Choice (Ten questions)		question	
A	1,2	5	Any five (Taking at least two from each group)	5	5 X 5 = 25
B	3,4	5			

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

Subject: Computer Network Laboratory-II **Full Marks-50**

Code: ETCE/LCNII /S6

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Sixth 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: **Medical Electronics—II**	
Course Code: ETCE/ MEII /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 Contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks
Rationale:	

In recent days various electronics equipments have facilitated medical professionals for accurate and easy way of diagnosing various disease. These equipments also plays major role of survival in a critical care unit . Today, we have highly sophisticated diagnostic equipment in the field. As the technology is advancing very fast, newer versions are appearing in the hospitals. After successful completion of this course interested students will be able to understand principle of working and technical specifications of various diagnostic equipments used in modern hospital

Objectives:

The student will be able to:

1. know about cardiac pacemaker, blood pressure measurement systems foetal monitor system etc.
2. Write technical specifications of the equipment
3. Operate various diagnostic equipments
4. Understand the principle of operation of the equipment
5. Describe applications of equipment
6. Know various safety measures while handling biomedical instruments

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**CARDIAC PACEMAKER & DEFIBRILLATOR**	8	
	1.1 Types and principle of cardiac pacemaker. 1.1 D.C. defibrillator – External pacemaker – ECG recording – Block diagram –		

	Troubleshooting – Respiration measurement.		
Unit 2	**BLOOD PRESSURE MEASUREMENT, FLOW & OXYGEN SATURATION**	8	
	2.1 Principle of Blood Pressure meter – Direct and indirect measurement BP waveform.Technical specifications, block diagram, principle of operation of : blood pressure apparatus, sphygmomanometer & mercury manometer 2.2 Blood flow, cardiac output, measurement technique, technical specifications and block diagram of Doppler & electromagnetic blood flow meters 2.3 Principal of oximeter, technical specifications, block diagram and principal of operation		
	GROUP - B		
Unit 3	**FOETAL MONITOR**	2	
	Principle of foetal monitor and **E**lectro **C**ardio **G**raphy.		
Unit 4	**EMBEDDED COMPUTER & COMPUTER INTERFACING**	2	
	Electron microscopy – Light microscope – Their comparison		
Unit 5	**SAFETY INSTRUMENTATION**		
Unit 6	6.1 Introduction 6.2 Causes of electrical shock micro & macro shock 6.3 Physiological effects of electrical shock 6.4 Electrical hazards in hospital environment & leakage current 6.5 Methods of accident prevention 6.6 Test of grounding system in patient care area, chassis leakage current	6	
	TOTAL	33	

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. Interpretation
2. Selection of instrument

Motor Skill:

1. Accuracy in Measurement
2. Setting up of instruments/ equipments

List of Practical: Any EIGHT(including MINI PROJECT)

Suggested List of Laboratory Experiments

Sl. No.	**Write assembly language programs:**
1.	Measurement of blood pressure.
2.	Measurement of SpO2 using pulse oximeter & study of its controls
3.	Performance testing on & lead selector network of ECG machine.
4.	Measurement of gain and CMRR of ECG pre amplifier.
5.	Study of effect of right leg drive in ECG output waveform

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: 6 multiple choice and 4 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	4	Any four	1	4x1=4
B	3,4,5,6	4			

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

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

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

Name of Subject: Medical Electronics Lab-II **Full Marks-50**

Subject Code: ETCE/ LME II/S6

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

2. **External Assessment of 50 marks** shall be held at the end of the Sixth 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: **Digital Signal Processing II**	
Course Code: ETCE/ DSPII /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 1 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Five)	Practical: 50 Marks
Rationale:	

Digital signal processing is a technology driven field which dates its growth where Computers and Digital Circuity became fast enough to process large amount of data efficiently. This subject is concerned with processing discrete-time signals or data sequences. The main objectives of this subject are to provide background and fundamental materials in discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.

Objectives:

The student will be able to:

1. Understand FFT and DFT algorithm
2. Learn about implementation of Discrete time systems
3. Gain concept on digital filters
4. Learn various Applications of DSP.

	Content (Name of topic)	**Periods**	**Marks**
	Group-A		
Unit 1	FAST FOURIER TRANSFORM ALGORITHM	7	
	1.1 Compute DFT & FFT algorithm. 1.2 Explain direct computation of DFT. 1.3 Discuss the radix-2 algorithm. (Small Problems)		
Unit 2	Implementation of Discrete time systems	8	
	1.1 STRUCTURES FOR THE REALISATION OF DISCRETE-TIME SYSTEMS 1.2 Structures for FIR systems 1.2.1 Direct form structure 1.2.2 Cascade form structures 1.2.3 Frequency sampling structures 1.2.4 Lattice form structures. 1.3 Structures for IIR systems 1.3.1 Direct form structure 1.3.2 Cascade form structures		

	1.3.3Frequency sampling structures 1.3.4Parallel Form structures 1.3.5Lattice & Lattice ladder structures for IIR systems.		
	Group B		
Unit 3	**Introduction to digital filters.**	12	
	Design of linear phase FIR filters using windows Disgn of Linear phase filters by frequency sampling method IIR filter design by approximation derivatives IIR filter design by impulse invariance Concept of Butterworth, Chevyshev , Inverse chevyshev and butterworth filter		
Unit 4	**Application of Digital Signal Processing – a fundamental concept**	7	
	1.1.1 Introduction 1.1.2 Voice processing 1.1.3 Application to Image processing 1.1.4 Application to Radar 1.1.5 Application to Wavelet transform		
		34	

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:

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
    - Problem definition
    - Analysis
    - Design of logic
    - Coding
    - Testing
    - Maintenance (Modifications, error corrections, making changes etc.)

Motor Skill:

Proper handling of Computer System**.**

List of Practical:

Suggested List of Laboratory Experiments

Sl. No.	**Write assembly language programs:**
1.	The laboratory works will be performed on the following areas:—
2.	SIMULATION USING MATLAB/ SCILAB
3.	Program for Fast Fourier Transform
4.	Program for Butterworth Filters(Low pass, High Pass, Band Pass, Band stop)
5.	Program for Discrete Convolution (Linear Convolution, Circular Convolution)

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: 6 multiple choice and 4 short answer type questions**			**Total Marks**
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2	5	Any 6	1	6 X 1 = 10
B	3,4	5			
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2	4	Any four	1	4x1=4
B	3,4	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)	5	5 X 5 = 25
B	3,4	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.

Sl. No.	**Name of the Author**	**Title of the Book**	**Name of the Publisher**
1.	Nagoor Kani	Digital Signal Processing	Tata McGraw Hill
2.	Ramesh Babu	Digital Signal Processing	SCITECH
3.	BP Lathi	Digtal Signal Processing	OXFORD
4.	Anand Kumar	Digital Signal Processing	PHI
5.	Proakis & Malonakis	Digital Signal Processing	Pearson
6.	Dr. Shaila D. Apte	Digital Signal Processing	Wiley
7.	VK Khanna	Digital Signal Processing	S Chand
8.	Dr. Shailendra JainJain	Modeling & Simulation Using MATLAB-Simulink	Wiley India
9.	Openheim	Digtal Signal Processing	
10.	Salivanhan & Azarveizagan	Digital Signal Processing	TMH
11.	Dr. Shailendra JainJain	Modeling & Simulation Using MATLAB-Simulink	Wiley India

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

Name of Subject: Digital Signal processing Laboratory-II **Full Marks-50**

Subject Code: ETCE/ LDSP II/S4

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Sixth 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: **Computer Hardware Maintenance-2**	
Course Code: ETCE/ CHM 2 /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks
Teaching Scheme:	**Examination Scheme**
Theory: 2 contact hrs./ week	Class Test (Internal Examination): 10 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 5 Marks
Practical: 2 contact hours/ week	End Semester Examination: 35 Marks
Credit: 3 (Three)	Practical: 50 Marks
Rationale:	

- To do the maintenance of the Computer, peripherals and its add-on cards.
- To understand basic working of the computer motherboard, peripherals and add-on cards
- To select the proper peripheral as per their specification and requirement.

Objectives:

The student will be able to:

- Debug and repair the faults in system.
- Assemble the system.
- Load the operating system and device drivers in the system.

	Content (Name of topic)	**Periods**	**Marks**
	Group-A		
Unit 1	**Power supplies**	4	
	1.1 POWER APPLIANCES**:** SMPS: Output voltage and current levels, Types and variations, Uses, 1.2 Power management features – UPS & Voltage Stabilizer: Installation features, 1.3 Power requirement calculation for UPS / Stabilizer 1.4 Power problems : Blackout, Brownout, surges and spikes 1.5 Symptoms of power problems		
Unit2	**Multimedia Devices**	6	
	2.1 Sound Blaster and Video capture cards, Basics of digital sound, 2.2 Concepts of audio compression & decompression, MPEG audio		

	compression – Sound Blaster Card: Block diagram, description 2.3 VIDEO CAPTURING**:** Principle & methods, MP3, MPEG & JPEG compression / decompression technique and Processors – Video Card: Block diagram		
Unit 3	**PC ASSEMBLING & TROUBLE SHOOTING**	8	
	3.1 Motherboard configuration – Adding memory modules – Identifying connectors and cables – Upgrading CPUs – BIOS set up program and configuration. 3.2 POST**:** IPL hardware – POST sequences – Error messages. 3.3 TROUBLESHOOTING (MOTHERBOARD & KEYBOARD)**:** problem diagnosis, normal checks, power supply, clock signal check, preventive maintenance measures, verifying with diagnostic tools, troubleshooting tips. 3.4 TROUBLESHOOTING (FDD, HDD & PRINTER)**:** Problem diagnosis – Typical problems & troubleshooting — CMOS troubleshooting, isolation of the problems using self-test, cable check, port problem, software problem, head problem. 3.5 DIAGNOSTIC SOFTWARE & VIRUS**:** Basic Microsoft diagnostic features – Norton utilities – Features for data recovery – QAPLUS features for configuration study – Testing components – COMPUTER VIRUS**:** Types, nature and impact – Prevention of virus – Antivirus software and its uses.		
	Group B		
Unit 4	**SOFTWARE INSTALLATION & NETWORK**	9	
	4.1 OS Installation – DOS, Win XP (SP 2 or SP3)/ Windows7/ Windows 8/ Advanced Server, 2008 Server, Linux/Unix Installation, Device Driver Commissioning 4.2 Application Software installation – Anti Virus, Office Management etc 4.3 LAN hardware components — features and specifications, Cable laying, I/O Box, Patch Cord, HUB and Switch Installation, Jack Panel, Rack Installation 4.4 LAN Commissioning with Performance tuning, Protocol and Service Configuration with IP address configuration, Service Distribution, Security Service installation		
Unit 5	**PC Troubleshooting, Maintenance and Tools**	6	
	5.1 Preventive Maintenance : Active, Passive, periodic maintenance 5.2 procedure 5.3 Preventive maintenance of peripherals of PCs. 5.4 Fault finding and troubleshooting of the above peripherals 5.5 ESD (Electrostatic discharge), RFI protection, Earthing 5.6 Diagnostic software 5.7 Working of logic probe, logic pulser, current tracer 5.8 Block diagram and working of logic analyzar & CRO 5.9 Virus infection symptoms, precautions to prevent a virus infection		
	TOTAL	33	
Suggested List of Laboratory Experiments			

Sl. No.	
1.	Study of SMPS
2.	Study of Diagnostic Softwares. (Any one)
3.	Fault findings:
	(a) Problems related to monitor.
	(b) Problems related to CPU.
4.	Assembling of PC and Installation of Operating System.
5.	Configuration of Client and Server PC, Laptop and Network components.
6	RS232C communication between two computers.

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: 6 multiple choice and 4 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	4	Any four	1	4x1=4
B	4,5	4			

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

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.	K L James	Computer Hardware	PHI
2.	Brenner	IBM PC troubleshooting & repair guide	BPB
3.	R. Gilster	PC Hardware a Beginner's Guide	Tata McGraw-Hill

4.	Govindrajalu	IBM PC Clone	Tata McGraw Hill
5.	Norton	Peter Norton's Problem	Prentice Hall of India
6.	Subhodeep Chowdhury	A to Z of PC Hardware Maintenance	Dhanpat Rai & Co
7.	Thompson and Thompson	PC Hardware in a Nutshell	Shroff Pub. & Distrib. Pvt. Ltd.
8.	Mark Minasy	Complete PC Upgrade and Maintenance Guide	BPB
9.	Biglow's	Troubleshooting, maintaining and repairing PCs	Tata McGraw-Hill
10.	Mueller	Upgrading and repairing PC	Tata McGraw Hill

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

Name of Subject: Computer Hardware Maintenance Laboratory-2 **Full Marks-50**
Subject Code: ETCE/ CHM 2/S6

1. **Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
2. **External Assessment of 50 marks** shall be held at the end of the Sixth 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: **Industrial Project**	
Course Code: ETCE/ IP /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
Theory: nil	
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction):
Practical: 4 contact hours/ week	Term Work: 50 Marks
Credit: 2 (Two)	
Rationale:	
Diploma holder need to be capable of doing self study throughout their life as the technology is developing with fast rate. Student will be able to find out various sources of technical information and develop self-study techniques to prepare a project and write a project report. This subject is intended to teach students to understand facts, concepts and techniques of electronics equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. This will help the students to acquire skills and attitudes so as to discharge the function of supervisor in industry and can start his own small-scale enterprise.	
Objectives:	
The student will be able to: (1) Work in Groups, Plan the work, and Coordinate the work. (2) Develop leadership qualities.	

(3) Analyse the different types of Case studies.
(4) Develop Innovative ideas.
(5) Develop basic technical Skills by hands on experience.
(6) Write project report.
(7) Develop skills to use latest technology in Electronics field.

Contents:

During fifth semester students will collect information, analyse the information and select the project. They will also prepare the List of the components required, PCB design, Testing Procedure, Design of the Cabinet or Box or Board as the case may be. They will also prepare a synopsis of the project.

So at sixth semester they have to execute the project. A tentative Schedule is proposed below:

Proposed Schedule:	**Weeks**
Procuring components, component testing and circuit testing	02
PCB making and onboard testing	05
Trouble shooting and cabinet making	04
Documentation	04

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using modern software wherever necessary.

G E N E R A L G U I D E L I N E

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

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T HE P R O J E C T

The students should be made aware of the factors influencing the selection of a particular product and its available design, viz. selection of components for assembling, harnessing, testing and quality control of the same. They should also be aware of the workability of the product. Each group will take at least one project in a semester.

PROJECT REPORT

Each project work should be accompanied by a 'Project Report' which should cover the following**:**—

(a) General description;

(b) Product specification;
(c) Hardware description;
(d) Operating instruction;
(e) Installation requirement, if any;
(f) Circuit diagrams;
(g) Layout diagrams;
(h) List of components;
(i) Costing;
(j) Study of marketability;
(k) Scope for future development;
(l) A brief outline of the maintenance procedure may also be included in the report (if possible).

SUGGESTED LIST OF PROJECT WORKS

The project works are generally selected depending upon the objective of the course and the infrastructural facilities available at a particular institution. Some of the popular items are listed below as guideline for selection**:**—

(i) regulated power supply;
(ii) AC voltage stabilizer;
(iii) inverter;
(iv) battery charger;
(v) FM receiver;
(vi) bar level indicator;
(vii) digital thermometer;
(viii) field strength meter;
(ix) digital clock;
(x) solid state relay;
(xi) stereo amplifier;
(xii) Solar appliances like solar lantern, solar inverter, solar mobile/battery charger etc.
(xiii) programmable interval time;
(xiv) analog trainer kit;
(xv) digital trainer kit;
(xvi) circuit theory trainer kit;
(xvii) microprocessor trainer kit;
(xviii) telephone line / status monitor;
(xix) MICROPROCESSOR BASED APPLICATIONS**:** (a) temperature controller, (b) alarm, (c) moving display, (d) speed control of motor, (e) programmable logic controller etc.;
(xx) one project on computer application ;
(xxi) one project on any one of the elective subjects;
(xxii) a report on a short visit to a local electronic industry / organization may be regarded as one of the projects;
(xxiii) a particular project may be a part of a bigger project depending upon the complexity.
(xxiv) Any other suitable project referred from relevant books/ journals or emerging areas of electronics and communication technology after thorough review of the literature from internet

References:

Books/Magazines:

Sr. No.	Name of the Magazines
1.	Industrial Automation
2.	Electronics for You
3.	Electronics Projects
4.	Computer World
5.	Chip
6.	Any Journal Related to Electronics/Computer/Information Technology

Website:

Using any search engine, such as http://www.google.co.in/ the relevant information can be searched on the Internet.

Name of the course: Professional Practice-III	
Course Code: ETCE/PP-IV/S6	Semester: Sixth
Duration: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	**Examination Scheme :**
Theory:	Internal Teachers' Assessment: 50 Marks
Tutorial:	
Practical: 3 contact hours/ week	End Semester Examination: Nil
Credit: 2	
Rationale:	

In addition to 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 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 Open Source Software- "LATex" Technical Report writing writing software.
7. Understand application of technologies in industry scenario.

Module 1	**Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work.** Following are the suggested type of Industries/ Fields –(Any three visits) i) Satellite Earth Station. ii) Radar Establishment. iii) MTSO. iv) Large Scale Industries where Robot is used v) Industries where Automation is in use vi) Industry where solar energy related production under process. vii) Any other relevant area.	**10**

8. Prepare a report on industrial visit, expert lecture.

Module 2	***The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs), minimum 3 nos. (Topics at Sl. No. B is compulsory and chose any 2 from the following or alike topics). Students should submit a brief report on the guest lecture as part of Term Work*** a. Mobile communication. **b. Open Source Software " LaTex"- a technical report writing software** • Introduction and Installation Of LaTeX and Compilation • Letter Writing, Report Writing in LaTeX • Maths, Equations, Tables and Figures in LaTeX documentation • References and Beamer LaTeX documentation c. Digital Literacy d. Software debugging. e. EMI/EMC f. Fuzzy logic and neural network. g. Image processing h. PLC and its application i. Electronics Packaging j. Carrier guidance and interviewing techniques. k. Self-employment. l. Blue tooth technology. m. Any other relevant topic	**9**
03	**Information Search ,data collection and writing a report on the topic** a) Wireless Communication- 3G/4G b) GPS c) Cloud Computing d) SCADA e) Manufacturing process of ICs f) WLL Technology	**8**
04	**Group Discussion:** The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are – a. Advance technology Boon or Curse. b. Any other topic.	**8**
05	**Seminar :** Seminar topic should be related to the subjects of fifth semester Each student shall submit a report of 5 to10 pages and deliver a seminar (Presentation time – 10 minutes)	**10**
	Total	**45**

<table>
<tr><td colspan="2">Name of the course: General Viva Voce</td></tr>
<tr><td>Course Code: ETCE/ GVV/ S6</td><td>Semester: Sixth</td></tr>
<tr><td>Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)</td><td>Maximum Marks: 100 Marks</td></tr>
<tr><td>Teaching Scheme:</td><td>Examination Scheme</td></tr>
<tr><td></td><td>The Final Viva-Voce Examination shall take place at the end of the Part – III Second Semester. It is to be taken by one External and one Internal Examiner. The External Examiner is to be from industry / engineering college / university / government organisation and he / she should give credit out of 50 marks; whereas, the Internal Examiner should normally be the Head of the Department and he / she should give credit of 50 marks. In the absence of the Head of the Department the senior most lecturers will act as the Internal Examiner.</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Credit: 2 (Two)</td><td></td></tr>
<tr><td colspan="2">Course Content
The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.</td></tr>
<tr><td colspan="2">Objectives:
The student will be able to:
1. Solve any technical problem from the knowledge acquired from the entire course.
2. Able to face any technical interviews in future for placement in various industries.</td></tr>
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