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:

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						EVALUATION SCHEME						

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

B). End Semester Examination: Marks-70   (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   C) **Teacher's Assessment: Marks- 10**

B). End Semester Examination: Marks-70   (i) Marks on Attendance

                                                                            (ii) Assignments & Interaction

Group	Unit	Objective questions			Total Marks
		Note: 10 multiple choice and 5 short answer type questions			
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2,3	5			
B	4,5,6	5	Any ten	1	10 X 1 = 10
C	7,8	5			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	3			
B	4,5,6	4	Any 5	2	5x2= 10

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)		5 X 10 = 50
B	4,5,6	3		10	
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   C)   **Teacher's Assessment: Marks- 10**

B). End Semester Examination: Marks-70   (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			
B	4,5,6	5	Any ten	1	10 X 1 = 10
C	7,8	3			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	3			
B	4,5, 6	4	Any five	2	5x2=10

C	7,8	3			

Group	Unit	Subjective Questions		Marks per question	Total Marks
		To be set (Ten questions)	To be answered		
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   C) **Teacher's Assessment: Marks- 5**

B) End Semester Examination: Marks-35

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

B). End Semester Examination: Marks-35   (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		

	1.3.3 Frequency sampling structures		
	1.3.4 Parallel Form structures		
	1.3.5 Lattice & 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   C) **Teacher's Assessment: Marks- 10**

B). End Semester Examination: Marks-70   (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   C) **Teacher's Assessment: Marks- 5**

B). End Semester Examination: Marks-35   (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**

Name of the course: **General Viva Voce**	
Course Code: ETCE/ GVV/ S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	**Examination Scheme**
	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.
Credit: 2 (Two)	

Course   Content

The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.

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.