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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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.	Communication Engineering –II	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.	Elective-I (Select any one) Computer Network-I Medical Electronics-I Digital Signal Processing-I Computer Hardware Maintenance-I	2	2	-	-	5	10	15	35	-	-	50
6.	Communication Engineering -II 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	2	1	-	2	-	-	-	-	-	50	50
12.	Professional Practice – III	2	-	-	3	-	-	-	-	-	50	50
	Total	25	15	2	16	40	80	120	280	350	100	850
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: Attendance & surprise quizzes = 6 marks, Assignment & group discussion = 4 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: **Communication Engg. II**	
Course Code: ETCE/ CEII /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:	

This course is continuation of the one titled 'COMMUNICATION ENGINEERING – I', 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 techniqes, ASK, PSK, FSK

➢ Acquire knowledge on propagation of EM waves

➢ Learn different microwave amplifiers and their applications

➢ 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(including MINI PROJECT)			
	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   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	5	Any ten	1	10 X 1 = 10
C	6,7	3			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	3			
B	4,5	4	Any five	2	5x2=10
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)		
B	4,5	3		10	10 X 5 = 50
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.	Ganesh Babu	Communication Theory	SCITECH
4.	Wayne Tomasi	Electronic communication system	Pearsons Eduction
5.	Simon Heykin	Digital Communication system	Wiley
6.	Sanjay Sharma	Analog and digital Communication	S.K. Kataria
7.	KK Sharma	Fundamental of Microwave & Radar Engg.	S Chand
8.	P Ramakrishna Rao	Communication systems	Tata McGraw Hill
9.	B.P. Lathi	Analog and Digital communication	OXFORD
10.	Grabano	Error control codes	OXFORD
11.	John C Bellamy	Digital telephony	Wiley India
12.	K.Rekha	Digital Communication	SCITECH
13.	Roddy Coolen	Electronic Communication	Prentice Hall of India, N. Delhi
14.	VK Khanna	Digital Communication	S Chand
15.	Anokh Singh, AK Chabaria	Principles of communication Engg.	S Chand
16.	Taub & schilling	Analog and digital communication	Tata MCGraw-Hill
17.	Frenzel	Electronics Communication	Tata McGraw-Hill
18.	Couch	Digital & Analog Communication System	Pearson
19.	K Sam & Shanmugam	Digital & Analog Communication	Wiley
20.	Sunder Rajan	Antenna Theory & Wave Propagation	SCITECH
21.	Dr. K.T. Mathew	Microwave Engg	Wiley India
22.	Gottapu Sashibhushana Rao	Electromagnetic Field Theory and Transmission Lines	Wiley India
23.	R.G. Kaduskar	Principles of Electromagnetics	Wiley India
24.	JD Kraus	ANTENNAS	TMH
25.	Gautam	Microwaves and Radar Engg.	SK Kataria& Sons
26.	Balanis	Antenna	Wiley
27.	Sadique	Electromagnetic Theory	OXFORD
28.	Cherukhu	Microwave Engineering	SCITECH
29.	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: Communication Engg. Laboratory-II   **Full Marks-75**

Subject Code: ETCE/ CEII/S5

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: **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.		
	2.5 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**   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	4,5,6,7	5	Any ten	1	10 X 1 = 10
C	8,9,10	3			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2,3	3			
B	4,5, 6,7	4	Any five	2	5x2=10
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 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: **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 2 **Power diode and Power Transistor**	8	
1.1 Power diode: Important constructional feature, Switching characteristics , specifications, series and parallel operation of diodes		
1.2 Power BJT : Structure of vertical power transistor, Principle of operation, its VI and switching characteristics, Safe operating area.		
1.3 Base drive circuits and Darlington configuration.		
1.4 Construction operating principle and Switching characteristics of power MOSFET and IGBT.		
1.5 Study of Losses in power semiconductor devices- calculation of loss in power BJT		
1.6 Concept of thermal resistance, thermal equivalent circuit and heat sink		
1.7 Describe different mounting techniques of power semiconductor devices		
Group – B		
Unit 3 **Thyristor**	10	
2.1 Switching characteristics & Two transistors method of SCR, Ratings of SCR.		
2.2 Triggering circuits of SCR.		
2.3 Need for series and parallel methods of SCR. Reasons of unequal voltage and current distribution and equalization networks.		
2.4 Layer diagram, Characteristics, operating principle and application of thyristor family devices - Photo sensitive SCR, GTO, SCS, TRIAC & DIAC.		
2.5 Protection by RC networks, MOV and snubber circuits. Transient voltage suppressors dV/dT and dI/dT protection of SCR, Circuit Breaker, optoisolator		
2.6 Commutation circuits of SCR – natural and forced commutation – class A, B, C, D & E		
Unit 3 **Single phase & polyphase controlled rectifier**	8	
3.1 Single phase half wave and full wave control rectifier circuit – Principle of operation with resistive and inductive load – Use of free wheel diode.		
3.2 Three phase half wave and full wave control rectifier – Operation with inductive and resistive load – Use of free wheel diode.		
3.3 Calculation of Vdc, Vrms, ripple factor, PIV and efficiency of single phase & three phase control rectifier.		
3.4 Concept of full control and half control rectifier.		
3.5 TYPES OF SPEED CONTROL OF DC MOTOR**:** Armature Volt – Field Current Control.		
3.6 DRIVE SYSTEM**:** Controlled Rectifier Drive – Reversible Drive – Quadrant Drive – Dual Converter		
Unit 4 **SWITCH MODE POWER SUPPLY**	6	
4.1 Switching Regulator (SMPS) principle of operation, Block and circuit diagram and PWM control circuit consideration of switching regulator.		
4.2 Principle of operation of buck converter, boost converter and buck-boost CONVERTER.		
4.3 Review of Linear Regulators.		
4.4 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
8.	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.
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   C) **Teacher's Assessment: Marks- 5**

B). End Semester Examination: Marks-35   (i) Marks on Attendance

                                          (ii) Assignments & Interaction

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

		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2,3	3		1	4x1=4
B	4,5, 6	3	Any four		
C	7,8	2			
Group	**Unit**	**Subjective Questions**			**Total**
		To be set (Ten questions)	To be answered	Marks per question	**Marks**
A	1,2,3	4	Any five (Taking at least one from each group)		
B	4,5, 6	3		5	5 X 5 = 25
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.	Gupta & Singhal	Power Electronics	SK Kataria & Sons
2.	Biswanath Pal	Industrial Electronics	PHI
3.	H Babu	Power Electronics	Scitech
4.	Moorthi	Power Electronics	OXFORD
5.	Khan & Chandani	Industrial Electronics	TMH
6.	SN Biswas	Industrial Electronics	Dhanpat Rai
7.	PC Sen	Modern Power Electronics	S Chand
8.	Chatterjee & Bhattacharya (TTTI)	Industrial Electronics	TMH
9.	Mohan	Power Electronics Converter Application and Design	Wiley
10.	M.C Sharama	Practical SCR / Triac projects	
11.	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 Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2. External Assessment of 50 marks shall be held at the end of the Third Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: **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.

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	**Microcontroller 8051 Architecture**	10	
	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**	18	
	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	**VHDL, RTOS & Interprocess Communication**	8	
	5.1 Basic idea on VHDL programming		
	5.2 Concepts of RTOS		
	5.3 Requirement, Need, Specification of RTOS in Embedded systems		
	5.4 Multitasking		
	5.5 Task synchronization & Mutual Exclusion		
	5.6 Starvation, Deadlock, Multiple Process		
	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)

Sl. No.	**Suggested List of Laboratory Experiments**
	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
5.	Embedded system: hands on exercise based on RTOS and VHDL programming.

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	4			
B	3	3	Any ten	1	10 X 1 = 10
C	4,5	5			
		To be set short answer type (Ten questions)	To be answered	Marks per question	
A	1,2	3			
B	3	3	Any five	2	5x2=10
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.	Senthil Kumar	Microprocessor & Microcontroller	OXFORD
2.	Shibu KV	Embedded	Tata Mc Graw Hill
3.	Krishna Kant	Microprocessors & Microcontrollers	PHI
4.	Bizu Azzez	Microprocessor & Microcontroler	SCITECH
5.	Rajkamal	Microcontroller	Pearson
6.	Frank Vahid, Tony Givargis	Embedded System Design	Wiley India
7.	Mazidi	The 8051 Microcontroller and Embedded Systems Using Assembly and C	Pearson
8.	Avilash V. pandiahkal	A Key to programme Microcontroller system	S Chand
9.	Chattopadhyay	Embedded system Design	PHI
10.	Dr. K.V.K.K. Prasad	Embedded/ Real-Time Systems concepts, design & programming	Dreamtech press/ Kogent Learning solutions
11.	Shah	Microcontroller	OXFORD
12.	Dr. SK Mandal	Microprocessor & Microcontroller	TMH
13.	Ayala	Microcontroller 8051	
14.	Ghosal	8051 Microcontroller : Internals, Instructions, Programming & Interfacing,	Pearson
15.	Subhasis maitra	Micrprocessor and Microcontroller	JBBL
16.	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 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: **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**	8	
	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**	10	
	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**	8	
	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**.**

List of Practical: Any EIGHT(including MINI PROJECT)

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

B). End Semester Examination: Marks-35   (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		
B	3, 4	4		1	4x1=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 Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2. External Assessment of 50 marks shall be held at the end of the Third Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: **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   C) Teacher's **Assessment: Marks- 05**

B). End Semester Examination: Marks-35   (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		
B	3, 4	4		1	4x1=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
30.	Handbook of Biomedical Instrumentation	R.S. Khandpur	Tata McGraw Hill
31.	Handbook of Biomedical Instrumentation and Measurement	H.E. Thomas	Prentice Hall of India
32.	Biomedical instrumentation and Measurement	L. Cromwell, F.J. Weibell & E.A. Peiffer	Prentice Hall of India
33.	Electronics for Biomedical Personnel	E.J.B. Buckstein	Taraporewala
34.	Biomedical Instrumentation	Can & Brown	
35.	X-ray techniques for students	M.O. Chasney	
36.	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 Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

4. **External Assessment of 50 marks** shall be held at the end of the Third Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: **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.			
		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:

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

Name of the course: **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.	

Content (Name of topic)	Periods	Marks
➢ Assemble the system.		
➢ Load the operating system and device drivers in the system		
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 : Mechanical, 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   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**
		To be set (Ten questions)	To be answered	Marks per question	**Marks**
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.	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 Third Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**

2. External Assessment of 50 marks shall be held at the end of the Third Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: **Industrial Project & Entrepreneurship Development**		
Course Code: ETCE/ IPED /S5	Semester: Sixth	
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50 Marks	
Teaching Scheme:	**Examination Scheme**	
Theory: 1Contact hrs./ week	Class Test (Internal Examination):	
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction):	
Practical: 2 contact hours/ week	Term Work: 50 Marks	
Credit: 2 (Two)		
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**		
		16	

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: Nil

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: Third
Duration: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	Examination Scheme :
Theory:	Internal Teachers' Assessment: 50 Marks
Tutorial:	

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**

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. 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. (Topics at Sl. No. A & B are compulsory and chose any one 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)**