TERM V

MICROCONTROLLER

L	T	P
3	1	2

Total Contact Hours	: 90 Hrs
Theory	: 45 Hrs
Tutorial	: 15 Hrs
Practical	: 30 Hrs
Pre Requisite	**: ECE 501**
Credit	**: 5**

Total Marks: 150

Curri. Ref. No.: ECE 502

Theory	
End Term Exam	: 75
Progressive Assessment	: 25
Practical	
End Term Exam	: 25
Progressive Assessment	: 25

Rationale

This course is an introduction to the fundamentals of architecture and implementation of embedded microcontrollers. The architecture covers the arithmetic/logic unit, instructions, registers, memory, and input/output the implementation covers parallel input/output, serial communication, timers, interrupt control, and feedback control. An introduction is also provided to PC-based editors, assemblers, linkers, and communication. The micro controller used is the ROM less version of the Intel 8051 (8031).

DETAILED COURSE CONTENTS:

Unit	Topic / Sub Topic	Hours
1.	**Introduction to Microcontroller:** 1.1 History of microcontroller 1.2 Embedded System 1.3 Microcontroller vs Microprocessor 1.4 Applications of micro controller	**5**

2.	**8051 Architecture:**
	
	2.1 Block diagram of 8051 micro controller
	2.2 Oscillator and Clock
	2.3 Program Counter and Data Pointer
	2.4 A and B register
	2.5 Flags and PSW
	2.6 Internal Memory
	2.7 Internal RAM organization
	  a) General Purpose Ram
	  b) Bit Addressable
	  c) Working Registers
	2.8 Stack and Stack Pointer
	2.9 Special Function Register
	2.10 Internal ROM
	2.11 Pin diagram of 8051
		8

3.	**Timer**	4
	3.1 Counter and Timer	
	3.2 Timer Modes of Operation: TCON, TMOD	
4.	**Serial Data Input/output and Interrupts:**	5
	4.1 Serial Data Interrupts, SCON. PCON	
	4.2 Serial Data Transmission and Reception	
	4.3 Interrupts, Timer Flag Interrupts, Serial Port Interrupts, External Interrupts.	
	4.4 Interrupts Enable (IE) SFR, Interrupts Priority(IP) SFR	
	4.5 Reset, Interrupts Control	
5.	**8051 Instruction and Addressing Modes:**	7
	5.1Addressing Mode: Immediate, Register, Direct & Indirect Addressing Mode	
	5.1.1. Usage of Pointers in Program	
	5.2 Instruction for Moving Data	
	5.2.1External Data Move	
	5.2.2Data Exchange	
	5.3Instruction for Logical Operation	
	5.3.1-Byte and Bit Level logical operation	
	5.3.2Rotate and Swap	
	5.4 Instruction for Arithmetic Operation	
	5.4.1Incrementing and Decrementing	
	5.4.2Addition and Subtraction	
	5.4.3Multiplication and Division	
	5.5Jumps and Call Instructions	
6.	**Basic Programming Model and Concept**	3
	6.1 Assembly language Programming concept	
	6.2 Flow chart	
7.	**8051 Example Problems:**	8
	7.1 Addition, Subtraction, Multiplication etc	
	7.2 Data Move/transfer	
	7.3 Comparisons	
	7.4 Use of subroutine/Loop	
8.	**Stack and Subroutines:**	5
	8.1 Stack usage, implementation of PUSH and POP	
	8.2 Subroutine usage, implementation of CALL and RET	

LIST OF EXPERIMENTS:

(1) Study the Microcontroller Training kit and identify the following

(a) Central processing Unit with Crystal

(b) Memory (b1) RAM (b2) ROM areas

(c) Power back up terminals

(d) Keyboard

(e) Display

(f) USART chip

(g) I/O port

(h) Programmable interval timer

(i) Serial communication support

(j) Keyboard/ Display interface

(3) Write Assembly language program of addition of two signed numbers

(4) Write Assembly language program of subtraction of two signed numbers

(5) Write Assembly language program of multiplication of two signed number.

(6) Write Assembly language program of two signed numbers

(7) Write Assembly language programs by using conditional and unconditional jump instructions .

(8) Write Assembly language program by using the call and return subroutine instructions

(9) Write Assembly language programs to find the square of a number using Look-up table

(10) Write and execute a program by using delay subroutine

(11) Write and execute a program for A to D converter and D to A converter

(12) Study the 8051 micro controller based DC motor/ Stepper motor speed control system

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	The 8051 Microcontroller Architecture, Programming and Applications	Kenneth J. Ayala, McGraw Hill, New York, 1997
2	Microprocessor & Microcontrollers	Singh, B.P., Latest
3	The 8051 Microcontroller and Embedded Systems	Muhammad Ali Mazidi
4	8085 Microcontroller & Embedded Systems	Kapadia, Rajiv, Jai Co Publishing Home
5	Microcontrollers Architecture, Programming, Interfacing and System Design	Raj Kamal, Pearson Education
6	Handbook of Microcomputer	Khandpur, R.S.; Tata-McGraw Hill, New Delhi, 1988
7	Introduction to Programmable Logic	By Dunning, Gary; Delmar, Thomson Learning, Singapore,
8	Microprocessor	Gaonkar; Wiley Eastern, New Delhi, 1st 1993
9	Introduction to Microprocessors	Mathur, Aditya; Tata-McGraw Hill, New Delhi, 1998

POWER ELECTRONICS

L	T	P			**Curri. Ref. No.: ECE410**	
3	1	0				
Total Contact Hours		**: 60 Hrs**	**Total Marks: 100**		**Theory**	
Theory		: 45 Hrs			End Term Exam	: 75
Tutorial		: 15 Hrs				
Practical		: Nil			Progressive Assessment	: 25
Pre Requisite		**: ECE401**			**Practical**	
					End Term Exam	: 0
Credit		**: 4**			Progressive Assessment	: 0

Rationale:

Power Electronics is an interdisciplinary area using the members of Thyristor family, control electronics to control the switch ON and switch OFF processes of the devices and principles of control theory. The field of control electronics also had a great change from discrete and analog system to the digital integrated and microprocessor control. The area power electronics had a two sided development (a) the semiconductor devices of improved performance (b) control circuit of these devices. Thus the care has been taken to include the study of the characteristics of the power devices which are being used and also their control circuits starting from their rudimentary level to the block diagram study of the sophisticated computer control system.

DETAILED COURSE CONTENT:

Unit	Topic/Sub Topic	Total Hours
I	1. **Power Devices:** 1.1 Power diode & Power Transistor 1.2 Monolithic Darlington, SCR, MOSFET, GTO, IGBT, Construction, Working Principle and Characteristics	6
II	2. **Triggering Devices:** 2.1 Unijunction transistor, construction, characteristics and application as pulse generator 2.2 Pulse transformer: construction procedure, basic principles and design, precautions regarding construction and application	5
III	3. **D.C. Regulated Power Supply:** 3.1 Linear mode of operation; series, shunt, combination of two, op-amp controlled, chip version using 78XX, 79XX, LM317, LM337. 3.2 Switching mode of operation; boost, buck, and combination of boost buck forward converter and fly-back converter	8
IV	4. **Power Regulation by SCR and Triac:** 4.1 Half wave phase shift control of D.C. load 4.2 Full wave phase shift control of D.C. load 4.3 Control of D.C. shunt motor by SCR and Diac 4.4 Combination with back EMF as feedback element	7
V	5. **Industrial Opto-electronic Devices** 1.1 Industrial Light Sources, 1.2 Photoconductive Cells, Photodiodes, Phototransistors, 1.3 Opto-isolators, Opto-couplers,	6

		1.4 Interrupter Modules,	
		1.5 Industrial applications of light sensors, Bar Code and Bar Code Readers	
VI	**6.**	**Electronic Heating: Basic Principle**	6
		6.1 Induction heating: frequency and voltage selection according to thickness and type of material, standard formulae, circuit for power supply	
		6.2 Dielectric heating: Basic principle, frequency and voltage selection according to job,	
		6.3 Circuit of power supply, precautionary measure	
		6.4 Electric resistance,	
		6.5 Welding:	
		6.6 Basic principle, voltage and current selection,	
		6.7 Sequence of operation, standard circuit for sequential operation	
VII	**7.**	**Application of Power Electronics**	7
		7.1 AC voltage regulator	
		7.2 Single Phase & three Phase (analysis of resistive loads only)	
		7.3 Choppers – step down, step up, Buck-boost	
		7.4 Inverter Types	
		7.5 Single phase and three phase bridge (line commutation and forced commutation speed control of motors)	

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Power Electronics	Md. H.Rashid (PHI)
2	Power Electronics	Vdedam Subrahmanium (New Age International Publisher)
3	Power Electronics	P.C. Sen (T.M.H.)

Control System

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L	T	P			Curri. Ref. No.: ECE411
3	1	2			
Total Contact Hours		: 75 Hrs	**Total Marks: 150**	**Theory**	
Theory		: 45 Hrs		End Term Exam : 75	
Tutorial		: 15 Hrs			
Practical		: 30 Hrs		Progressive Assessment : 25	
Pre Requisite		**: NA**		**Practical**	
				End Term Exam : 25	
Credit		**: 5**		Progressive Assessment : 25	

Rationale

It is pre-requisite for the students to know the various total plants control in the process industry. An automatic control systems saves manpower, reduces cost of production, increases the accuracy of the finished product and helps in mass production so that the knowledge of this subject is required to have deeper grasp of the control environment/ techniques as need to be studied in the subjects e.g. process control.

Unit	Topic/Sub Topic	Total Hours
1	**Introduction** 1.1 Basic elements of control system, open loop control system, 1.2 Closed loop control system & control system terminology, 1.3 Manually controlled & automatic controlled closed loop systems, 1.3 Basic elements of a servo mechanism. 1.5 Principle of automatic control systems 1.6 Liner systems, non-liner systems 1.7 Control systems examples from chemical systems. Mechanical systems, electrical systems 1.8 Introduction to Laplace transform.	8
2	**Control system representation** 2.1 Transfer function, 2.2 Block diagram & reduction of block diagram 2.3 Problems on block diagram, 2.4 Mason's formula 2.5 Signal flow graph	8
3	**Time response Analysis** 1.1 Standard test signals, 1.2 Time response of first and second-order system,	9

	1.3 Time constant, time response of second order system, 1.4 Time response specifications. 1.5 Steady- state errors and error constants, 3.6 Problems in first and second order system		
4	**Transfer Function Analysis** 4.1 Analysis of AC and DC servomotors, synchros, Stepper motor, 4.2 AC position control system 4.3 Magnetic amplifiers	10
5	**Stability Analysis:** 5.1Routh Hurwitz Criterion, 5.2 Root Locus plot, 5.3 Bode Plot 5.4 Nyquist Plot	10

LIST OF PRACTICALS
1. Study of characteristics of servomotor
2. Study of Characteristics and speed control of a stepper motor
3. Study of synchro characteristics and use a synchro pair error detector
4. Study of Characteristics of a potentiometer
5. Study of speed control of motor with tachometric feedback.
6. Design of a DC speed control system
7. Simulation of a position control system with PC
8. Study of ON-OFF controller

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Control System	Nagrath and Gopal, New Age International Pvt Ltd
2	Control System	Kuo, Prentice Hall
3	Control System	Ogata, Prentice Hall

Testing and Maintenance of Electronic Equipment

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L	T	P			
0	2	2		**Curri. Ref. No.: ECE 503**	
Total Contact Hours	: 60 Hrs.		**Total Marks: 50**	**Theory**	
Tutorial	: 30 Hrs.			End Term Exam	:
Practical	: 30 Hrs			Progressive Assessment	:
Pre Requisite	: NA			**Practical**	
				End Term Exam	: 25
Credit	: 3			Progressive Assessment	: 25

RATIONALE

The course provides the students with necessary knowledge and competency to diagnose the faults for trouble shooting and for systematic repair and maintenance of electronic equipment and testing of components.

DETAILED CONTENTS

There are no separate theory classes to be taught. The relevant concept as detailed below has to be discussed before students during tutorial classes so that the students can perform the practical during practical sessions.

1. Repair, Servicing and Maintenance Concepts (04 hrs)
Introduction, Modern electronic equipment, Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy, preventive maintenance, corrective maintenance.
 a) Study of basic procedure of service and maintenance
 b) Circuit tracing techniques
 c) Concepts of shielding, grounding and power supply considerations in instruments.

2. Fundamental Trouble Shooting Procedures (04 hrs)
i) Fault location
 ii) Fault finding aids
 - Service manuals
 - Test and measuring instruments
 - Special tools
 iii) Trouble Shooting Techniques
 - Functional Areas Approach
 - Split half method
 - Divergent, convergent and feedback path circuit analysis
 - Measurement techniques

3. Passive Components (02 hr)

Test procedures for checking passive components, resistors, capacitors, inductors, chokes and transformers.

4. Semiconductor Devices(03 hrs)

Diodes, Rectifier and Zener diodes. Bipolar transistors. Field effect transistors JFET and MOSFET. Thyristors, uni-junction transistors, Photo cells, Transistor equivalents. Data Books on transistors

5. Trouble-Shooting Digital Systems (02 hrs)

Typical faults in digital circuits. Use of Logic clip, logic probe, logic pulsar,
IC tester

LIST OF PRACTICALS

1. Selection, demonstration and correct use of tools and accessories: pliers, wire cutter, wire stripper, tweezers, soldering iron, desoldering tools, neon tester, screw driver.
 - Accessories : insulating tapes, solders, solder tips, fluxes, desoldering wick, solder cleaning fluids, sleeves, tags, identifiers
2. Develop skill in assembly of components, wiring, soldering and desoldering methods
3. Selection and use of commonly used passive components and accessories
4. Testing of active and passive components
5. Testing of linear integrated circuits
6. Use of digital tools for troubleshooting digital components

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Repair Manuals	
2	Specifications of Equipment supplied by the manufacturer	
3	Modern Electronic Equipment Trouble shooting, Repair and Maintenance	R S Khandpur, Tata McGraw Hill Publishing House, New Delhi

Professional Practices –IV

L	T	P			
0	0	2		**Curri. Ref. No.: ECE 513**	
Total Contact Hours		: 30 Hrs		**Theory**	
Theory		: 0 Hrs		End Term Exam	: Nil
Practical		: 30 Hrs	**Total Marks: 50**	Progressive Assessment	: Nil
Pre Requisite		: NA		**Practical**	
				End Term Exam	: Nil
Credit		: 1		Progressive Assessment	: 50

Aim :- The course aims to equip students with basic knowledge and skills about Computer networking, data communication and troubleshooting of common problems.	
Objective: - On completion of this course, the Student will be able to:	
• Install different types of software • Perform System maintenance & trouble shooting • Communicate between PC and other related device	
Suggested List of activities to be done:	
• Installation of Operating system and other software • Installation of Open source software application • Installation of database (SQL/MySQL) • System maintenance and troubleshooting • Communication between PC and other devices like mobile or palmtop through Bluetooth or other technologies.	
Suggested learning resources	
1. Computer Troubleshooting – by K. MacRae, G. Marshal, Haynes Publishing. 2. Handbook of Computer Troubleshooting – by M. Byrd, J. Pearson, R.A. Saigh, The Glen Lake Publishing Company.	

Structured industrial visits to local industries and factories and report for the same should be submitted by individual students as part of term work.

3.   **Group discussions**
Students in groups of 4/5 should discuss a specified topic and write a brief report on the same as part of term work. Topic of discussions may be selected by faculty members.

EXAMINATION SCHEME (SESSIONAL)

1. Continuous internal assessment of 50 marks is to be carried out by the teachers throughout the semester. Distribution of marks: Information search = 10, Seminar = 10, Group discussion = 5, field visit = 10, guest lecture attendance and report = 15.

Data Communication and Computer Network

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L	T	P		Curri. Ref. No.: ECE505
3	1	2		

Total Contact Hours	: 90Hrs.		Theory	
Theory	: 45 Hrs		End Term Exam	: 75
Tutorial	: 15 Hrs.			
Practical	: 30 Hrs		Progressive Assessment	: 25
Pre Requisite	: NA		Practical	
			End Term Exam	: 25
Credit	: 5		Progressive Assessment	: 25

Total Marks: 150

Rationale

The modern concept of data communication deals with computer networking by various inter connection techniques. This subject covers various type of Networking and their methodology. The cable and equipment installation have also been discussed in details.

DETAILED COURSE CONTENTS:

Unit	Topic Sub-Topic	Hours
I	**1. Introduction- Basic communication concept:** 1.1 Mode of communication 1.2 Analog, Digital Signal 1.3 Modulation : FM, AM 1.4 Bit rate, Baud rate 1.5 Parallel and Serial 1.6 Half, simplex, full duplex communication system 1.7 Synchronous & Asynchronous communication 1.8 Multiplexing	3

II	**2. Introduction to Networking and Transmission:**
	
	2.1 LAN, WAN, MAN
	    a. LAN Topologies
	2.2 Ethernet
	    a. Ethernet Cabling System, Fast Ethernet, Switch Ethernet, Gigabit Ethernet
	2.3 Transmission Media
	    a. Guided and Unguided
		7

III	**3. Network Protocols and Framing:** 3.1 Design Issue for Layers 3.2 Protocol Hierarchies 3.3 ISO, TCP/IP model 3.4 Brief Explanation of Packet, Frames, Datagram, TCP, FTP,	8

		TELNET, DNS	

IV		4. **CommunicationConcept:**
		 4.1 Flow control
		     a. Stop and Wait flow control,
		     b. Sliding windows Flow control
		 4.2 Error Control and Need for error control
		 4.3 Error Detection and Correction
		     a. Parity Checks, Cyclic redundancy Check
		     b. Stop and Wait ARQ, Go-Back N-ARQ, Piggy Backing technique
			8

V		5. **Networking Traffic Control:** 5.1 Bridge, Router, Switch, Hub 5.2 Repeater, Gateways, Modem	5
VI		6. **IP Addressing:** 6.1 IP address Class 6.2 IP V4, IPV6	6

VII		7. **Medium Access Control:**
		 7.1 Bluetooth
		     a. Architecture, Applications
		 7.2 Wireless LAN
		 7.3 Multiple Access Protocols
		     a. ALOHA
		     b. CSMA, CSMA/CD
			8

LIST OF EXPERIMENTS

1. Case studies of LAN, MAN, WAN- topology, media and protocols
2. Study and describe client, server, peers, (identify from given specification)
3. Study network services-remote login, telnet,
4. Determine how a specific network service is affected, given a network architecture (centralized and distributed)
5. Demonstrate different transmission media e.g. twisted pair, co-axial cable, Wireless, identify advantages and disadvantages.
6. Identify, describe-network connectivity devices like media connectors, Interface boards, modems, repeaters, Herbs, switches, bridges, Multiplexer, routers.
7. Study main protocols through window in details; (TCP/IP,SLIP,PPP,FDDI,X25,ISDN,ATM)
8. Laboratory setting up of Ethernet, installation of Ethernet card and testing
9. Design LAN;
10. Configure network server (Window NT, Server installation, network printing network application, client server)
11. Configure Network clients.
12. Preventing problems in Network
13. Trouble shooting: Isolating a problem, recover from Disaster, study of Tools, terminators, cable, protocol analysis.

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Computer Network	A.S. Tanenbum (PHI)
2	Data communications and networking	Behrouz A. Forouzan (TMGH)
3	Introduction to LAN	Peter Hodson, BPB Publications
4	Data communication &Computer Networks	W. Stalings.

FIBER OPTICS

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L	T	P			
3	1	0		**Curri. Ref. No.: ECE504**	

Total Contact Hours	: 60 Hrs		Theory	
Theory	: 45 Hrs	**Total Marks: 100**	End Term Exam	: 75
Tutorial	: 15 Hrs		Progressive Assessment	: 25
Pre Requisite	**: NA**		**Practical**	
			End Term Exam	: 0
Credit	**: 4**		Progressive Assessment	: 0

RATIONALE:

Optical Fiber Communication Systems have moved very rapidly from research laboratory into commercial application. When the attenuation inherent in the optical fiber was reduced, that made optical fiber economically attractive for long – haul communications, sources and detectors are ready and available for commercial applications. The optical fiber, lasers and photo detector were made possible for communication at very high data rates over increasing long distances. As optical fiber communication system technologies have improved, an increasing variety of applications has become technically feasible and economically attractive. This course is designed to prepare students to entire these fascinating, dynamic and very important emerging new field of communication.

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours

1	**INTRODUCTION**
	    1.1 Generation of fiber optics.
	    1.2 Components used in a fiber optic communication channel.
	    1.3 Electromagnetic spectrum, optical region and wavelength.
		3

2	**PHYSICS OF LIGHT**
	    2.1 Laws of reflection and refraction, diffraction, polarization.
	    2.2 Refractive index, total internal reflection, critical angle.
	    2.3 Snell's law for calculating wavelength and frequency.
	    2.4 Photons, energy of photon, energy gap, energy level diagram
		5

3	**LIGHT TRANSMISSION IN FIBRES**
	    3.1 Nature of glass for light transmission.
	    3.2 Principles of light radiation through (a) semiconductor (b) PN junction.
		5

	3.3	Construction of optical fibers [SI, GI, (SM and MM)].	
	3.4	Launching of light in fibers.	
	3.5	Numerical aperture, Acceptance cone (basic formula and their related problems).	
	3.6	Evanescent wave.	
4	**OPTICAL SOURCES/TRANSMITTERS**		**6**
	4.1	LED, construction, operating principle, operating characteristics, types, applications.	
	4.2	LASER, properties, processes, principles, types, applications, safety considerations.	
	4.3	Transmitter circuits (Block diagram & brief description of each block).	
5	**OPTICAL DETECTORS/RECEIVERS**		**6**
	5.1	Principles of light detection, types of light detectors, Characteristics.	
	5.2	PN photo detector, principle of operation.	
	5.3	PIN diode, operating principle, characteristics, and types.	
	5.4	APD, operating principle, advantages, applications.	
	5.5	Receiver circuits (Block diagram & brief description of each block)	
6	**OPTICAL COMPONENTS**		**7**
	6.1	Connectors, elements of fiber connector, construction, means of attaching, types, properties.	
	6.2	Splices, definition, procedure, types.	
	6.3	Couplers, construction, FBT, advantages of FBT, types.	
	6.4	Switches, principle, types, applications.	
	6.5	Principle of Attenuators, isolators.	
7	**PROPAGATION MODES IN FIBRES**		**3**
	7.1	Propagation modes, leaky modes	
	7.2	Modal dispersion, Intramodal, Intermodal dispersion.	
8	**LOSSES IN FIBRES**		**4**
	8.1	Chromatic dispersion, absorption losses, scatter losses, bending loss, radiation loss, loss due to connectors.	
	8.2	Optical noise, Interference.	

9	**OPTICAL SYSTEM**	4
	9.1 Typical fibre optic communication system using TDM & WDM 9.2 Power budget of an optical communication system. 9.3 Define bandwidth, bit rate.	

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	Fibre Optics and Optoelectronics	K. Hare, Oxford
2	Optical Fiber communication System	William D., Jones Jr.
3	Optical fiber Communication, Principles and Practice	John M. Senior
4	Fiber Optic Systems for Telecommunications	Roger L. Freeman

CAD for Electronics Circuit

L	T	P			
1	0	4		**Curri. Ref. No.: ECE507**	
Total Contact Hours		**: 75 Hrs**		**Theory**	
Theory		: 15 Hrs	**Total Marks: 50**	End Term Exam	: NIL
Practical		: 60 Hrs		Progressive Assessment	: NIL
Pre Requisite		**: ETC401**		**Practical**	
				End Term Exam	: 25
Credit		**: 3**		Progressive Assessment	: 25

RATIONALE:

The student through a series of lectures and practical applications will develop the basic skills for electronic drafting, including printed circuit board (PCB) layout, schematic diagram development and mechanical assembly detail using an AutoCAD electronic workstation. Sets of drawings are prepared where the assigned project is built, tested and completely documented.

DETAIL TUTORIAL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1	**Project schematic diagram** Familiarity with the library of electrical and electronics components such as switches, circuit breaker, ICs, discrete components of different values, creation of simple circuits using blocks, attributes etc.	5
2	**Printed circuits, board artwork to manufacture the PCB's.** Familiarity with symbol library for electronic circuits for designing printed circuit boards, designing of circuits for printed circuit boards.	4
3	**Component layout drawing of the PCBs** Familiarity with the Component layout drawing of the PCBs and 3D-view of mechanical assembly drawing of the overall project including an artwork of the front panel.	6

List of practical Exercises:

S. No.	Practical Exercises
1	Draw electrical and electronic symbols using CAD and take print out
2	Draw D.C. and A.C machine parts using CAD and take print out
3	Draw winding diagram for given DC machine using CAD and take print out of (a)Lap winding and (b)Wave winding
4	Draw different types of rectifier circuit using CAD and take print out of : (a)Single phase half wave (b)Single phase full wave (c)Bridge rectifier
5	Draw R-C couple amplifier circuit using CAD and take print out
6	Draw the following oscillator circuit using CAD and take print of (a)Hartley oscillator (b)Colpitt oscillator (c) Phase-Shift Oscillator
7	Simulate three resistances in series circuit and find out voltage and current in each resistance .
8	Simulate the following circuits and find out voltage and current in each resistance. (a)Two resistances in parallel (b)Resistance and inductor in parallel
09	Simulate R-L series circuit and observe voltage wave forms across each component.
10	Simulate R-C series circuit and observe voltage wave forms across each component.
11	Simulate R-L-C series circuit and observe voltage wave forms across each component.

REFERENCES

S. No.	Title	Author/ Publisher/ Edition/Year
1	AutoCAD 2013 for Engineers and Designers.	Sham Tickoo, Dream tech press, New Delhi, Latest edition
2	Mastering AutoCAD 2013 and AutoCAD LT 2013	George Omura , Sybex, New Delhi, Latest edition
3	Mastering electronics workbench: Version 5 and Multisim Version 6	John Adams, McGraw-Hill, New Delhi, Latest edition
4	Introduction to PSpice Using OrCAD For	Muhammad H. Rashid, PHI Learning, New

S. No.	Title	Author/ Publisher/ Edition/Year
	Circuits And Electronics	Delhi, Latest edition

List of Software/Learning Websites

i. Open Source Softwares preferred.
ii. AutoCAD
iii. Work bench
iv. PSIM
v. SPICE (Simulation Program with Integrated Circuit Emphasis)
vi. Orcad for pcb design
vii. Circuit maker
viii. Multi-Sim

TERM VI
CONSUMER ELECTRONICS
(Specialized course)

L	T	P			Curri. Ref. No.: ECE506	
0	2	4				
Total Contact Hours		**: 90 Hrs**	**Total Marks: 75**		**Theory**	
Tutorial		: 30 Hrs			End Term Exam	: Nil
Practical		: 60 Hrs			Progressive Assessment	: Nil
Pre Requisite		**:NA**			**Practical**	
					End Term Exam	: 25
Credit		**: 4**			Progressive Assessment	: 50

RATIONALE:

This course is designed to provide required knowledge and skills in the communication systems such as microphone and loudspeakers. The students will also be acquainted with the systems like tape recorder, audio CD player, B/W TV, colour TV, VCR, VCP etc. Also this area covers some of the home appliances like washing machine, electronic cooker etc. There is no separate theory classes but student should be familiarwith the related concept in thetutorial classes.

Detail course content to be delivered in Tutorial/ Pre-practical sessions

Unit	Topic/Sub Topic	
1	**Microphones** 　　1.1Construction, working principle and frequency response of**:** 1.1.1Carbon Microphone 1.1.2 Variable Reactance Microphone 1.1.3 Capacitance Microphone 　1.1.4Piezo-Electric Microphone 1.1.4 Moving Coil Microphone	
2	**Loudspeakers** 2.1 Frequency ranges of musical instruments 2.1Intensity and Dynamic Range 2.3 Construction and working principles of Moving Coil Loudspeaker 2.4Impedance and Power Level of loudspeaker	

3	**Tape Recorders**	
	4.1 Principle of magnetic recording and playback	
	4.2 Requirement of bias	
	4.3 Working principle with block schematic diagram of a tape recorder system	

4	**Stereos**
	     4.1 Details of stereo components**:** Tone, Bass, Treble, Balance & Control
	     4.2 Crossover Networks
	     4.3 Noise Reduction Techniques	

5	**Black and White TV System**
	
	     5.1 Working principle with block diagram of TV transmitter and receiver
	     5.2 Circuit diagram: TV Tuner, Video IF stage, Sound stage, Picture tube & its associated circuit	

6	**Colour TV System** 6.1 RGB drivers of a colour picture tube 6.2 Colour picture tube & its associated circuits. 6.3 Basics of PLASMA and LCD Television system, LED TV.	
7	**CD Player** 7.1 Working principle of CD recording and CD playing	

8	**Cable TV System**
	
	     1.1 Channel and cable type of cable TV system
	
	     1.2 Trunk & cable distribution system with block diagram	

9	**Home Appliances** 9.1 Basics of maintenance aspect of PHOTO-COPYING machines	

| | 9.2 Basics of maintenance aspect of Mobile telephone handset

9.3 Ideas of commonly used appliances like washing machine, electronic oven, electronic heater and watches with block diagram | |

LIST OF EXPERIMENTS:

1. Identify various active and passive components and their applications.
2. Handle different types of Electronic measuring Instruments
3. Identify different types of faults in electronics equipment.
4. Identify and repair different computer hardware components
5. Identify and repair SMPS, UPS, Inverter, solar power system and various analog and digital circuits.
6. Identify and repair electronics communication equipment and fiber optics.
7. Identify and apply various transducer, sensor.
8. Identify and repair different microcontroller based systems.
9. Identify and repair LED/ LCD TV, Cell phone (Mobile).
10. Identify and repair Consumer electronics equipment like Washing
Machine, Mixer Grinder, water purifiers, Vacuum cleaner, Microwave oven,
Immersion heater, etc.
11. Identify and repair of various types of printers.
12. Identify and repair components of CD player, CCTV camera, Mobile telephone Handset

REFERENCES:

S. No.	Title	Author/ Publisher/ Edition/Year
1	Audio and Video Systems	R. G. Gupta, Tata McGraw-Hill
2	Monochrome and Colour TV	Gulati, New Age International
3	VCR-Principle Maintenance and Repair	S. P. Sharma, Tata McGraw-Hill
4	Cable TV Technology and Operation	Bartlett, Tata McGraw-Hill
5	Electronic Instruments and Systems	R.G. Gupta, Tata McGraw-Hill
6	Electronic Communication	Ruddy and Co olen, Prentice Hall of India, N. Delhi.

MULTIMEDIA TECHNOLOGY

(Specialized course)

L	T	P			Curri. Ref. No.: ECE601
3	0	2			
Total Contact Hours		**: 75 Hrs**	**Total Marks: 150**	**Theory**	
Theory		: 45 Hrs		End Term Exam	:75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		**:NA**		**Practical**	
				End Term Exam	: 25
Credit		**: 4**		Progressive Assessment	: 25

RATIONALE

Multimedia technology is being widely used in web pages, motion pictures and interactive presentations, etc. This course intends to introduce and expose multimedia technology and various factors and features ofauthoring software. It will also help in making the internet application richer in content andpresentation.

DETAILED COURSE CONTENT

Unit	Topic/Sub Topic	Hours
1	**Introduction to Multimedia** 1.1 Need of Multimedia 1.2 Application of Multimedia 1.3 Multimedia Hardware 1.4 Storage for Multimedia.	7
2	**Sound** 2.1 Basic concept of Sound. 2.2 Types of Sound. 2.3 Capturing Sound 2.4 Digitizing Sound and Computer Representation of Sound. 2.5 Sound Formats and tools 2.6 MIDI Versus Digital Audio.	8
3	**Video** 3.1Analogue and Digital Video. 3.2 Recording Formats and Standards of Video. 3.3 Transmission of Video Signals. 3.4 Video Capturing. 3.5 Video Compression. 3.6 Video Application.	8
4	**Text** 4.1 Types of Text and ways to present Text. 4.2 Fonts and Faces 4.3 Font Manage 4.4 Hypertext 4.5 Aspects of Text Design.	7

5	**Images** 5.1 Image Representation. 5.2 Image Segmentation 5.3 Image File Format. 5.4 Image Color Scheme. 5.5 Bitmaps. 5.6 Vector Drawing. 5.7 Image Enhancement.	8
6	**Animation** 6.1 Principle of Animation 6.2 Animation File Formats 6.3 Texturing and Animation 6.4 Audio and Video mixing	7

LIST OF EXPERIMENTS

1. Familiarization with Multimedia Software and Hardware
2. Study of
   a. Various Features of Adobe Director
   b. Various Features of Flash
   c. Various Features of Photoshop
3. Making Multimedia Presentation using Various Multimedia Tools.
4. Installing and using of various multimedia Devices
   a. Scanner
   b. Digital Camera, Web Camera
   c. Mike and Speakers
   d. Touch Screen
   e. Plotters and Printers
   f. DVD
   g. Audio CD and Video CD
5. Transporting Audio and Video Files
6. Making Multimedia Presentations Combining Adobe Director, Flash, and Photoshop & Dream Weaver such as Department Profile, Lesson Presentation. Games and Project Presentation.

REFERENCES

S.No.	Title	Author, Publisher & Address
1.	Multimedia- Making It Work	Tay Vaughan, Tata McaGraw-Hill
2.	Multimedia An Introduction	Villam Casanova and Molina, Prentice Hall of India, NewDelhi
3.	Photo-shop for Windows Bible	Deke Maclelland, IDG Books India Pvt. Ltd., New Delhi
4.	Multimedia Technology and Application	Hillman, Galgotia Publications, New Delhi
5.	Flash 5 Bible	Rein Hardit, IDG Books India Pvt. Ltd.
6.	Flash 5 in easy steps	Vandome, IDG Books India Pvt. Ltd.
7.	Introduction to Networking and Data Communications	Andrew S. Tanenbaum
8.	Computer Networks	Andrew S,Tanenbaum, Prentice Hall of India, New Delhi.

COMPUTER HARDWARE & MAINTENANCE

_____

L	T	P			Curri. Ref. No.: ECE 602	
3	0	2				
Total Contact Hours		**: 75 Hrs**	**Total Marks: 150**		**Theory**	
Theory		: 45 Hrs			End Term Exam	:75
Practical		: 30 Hrs			Progressive Assessment	: 25
Pre Requisite		**:NA**			**Practical**	
					End Term Exam	: 25
Credit		**: 4**			Progressive Assessment	: 25

RATIONALE:

This course is intended to make the student to be aware of the different parts of computer system, their functions, common faults in computers and develop troubleshooting skills of a typical computer systems.

DETAIL COURSE CONTENT:

Unit	Topic/Sub Topic	Hours
1	**Elements of Computer Systems** 1.1 Motherboard, memory, Add-on cards, Disk drives, Input devices, Output devices	1
2	**Input Output Devices** 2.1 Types of keyboard – layout, multimedia keyboard 2.2 Mouse – working principle of mouse, mechanical mouse, optical mouse and remote mouse 2.3 Function of Joystick, Trackball, Light pen, Microphone, Web camera, and Touch screen 2.4 Types of VDU and specifications 2.5 Printer – working principle of Dot matrix, DeskJet & Laser printers 2.6 Consumables- ribbons, ink cartridge, paper, toner Working principle of plotters 2.7 Types of Scanners - specifications and working principle 2.8 Installation and preventive maintenance of Input; output devices	5
3	**General Troubleshooting** 1.1 Definition: Troubleshooting, Diagnosis 1.2 Classification of faults 1.3 Hardware faults: Static faults, Dynamic faults 1.4 Software faults: System software fault, Application software faults	7

	1.5 General Troubleshooting Rules 1.6 Study of abnormal behavior of PC system for faultfinding. 1.7 Steps of Troubleshooting Success	

4	**Motherboard**
	    4.1 CPUs from Duron and Cyrix: Intel P–III, P-4, Celeron; AMD -Athlon
	    4.2 Motherboard – ISA, EISA, PCI, USB & SCSI,
	    4.3 Components on Motherboard – CPU, CPU slots, Chipset, RTC, CMOS RAM
	    4.4 CMOS battery, ROM, BIOS, Cache memory, Upgrade sockets
	    4.5 Different connectors, I/ O ports such as Com-1, Com-2, LPT-1, USB port, Memory sockets, Bus slots
	    4.6 Classification of buses – System bus, Local bus, I/O bus
	    4.7 Concept of IRQ, memory addresses & DMA
	    4.8 Memories – RAM-SIMMs and DIMMS, ROM, BIOS,
		7

5	**Daughter Boards**
	    5.1 Display Cards – Types – VGA, SVGA, Video Accelerator card, AGP slot, TV tuner card, Specifications of display cards, installation of display card, Video accelerator card, T.V. tuner card; Diagnosis of common faults in display card and VDU
	    5.2 Troubleshooting a monitor
		5

6	**Disk Drives**
	    1.1 Floppy disk drives – 3.5" FDD, working principle, installation, sensors and motors
	    1.2 Hard disk drives - IDE, SCSI, Jumper setting, configuration as primary; slave
	    1.3 Installation, partitioning and formatting
	    1.4 CD writers: - Specifications, working principle
		5

7	**Installation and Configuration**
	    7.1 Assembly steps for complete computer systems with input/ output devices and multimedia
	    7.2 System configuration – Jumper setting, Hard disc drive partitioning
	    7.3 Installation of Operating system, Configuring Desktop
		5

8	**UPS and CVT**
	    8.1 Need, types, functional block diagram of UPS and CVT
	    8.2 Installation, power rating calculations, battery specification of UPS and CVT
	    8.3 Simple faults of UPS and CVT
		3

9	**Servicing Techniques**	3

	9.1 Preventive maintenance of computer system-need, schedule and procedure 9.2 Software debugging techniques – Diagnostic software and utilities 9.3 Compression utilities, Data recovery software 9.4 Hardware debugging Techniques – common symptoms and step-by-step procedure for hardware debugging	

10	**Viruses**
	  10.1 Types of viruses
	  10.2 Command processor infection
	  10.3 Boot sector infection
	  10.4 Executable file infection
	  10.5 File-specific infection
	  10.6 Memory resident infection
	  10.7 Macro viruses
	  10.8 Protecting the PC from viruses
		4

LIST OF EXPERIMENTS:

1. Identify different elements of computer system.
2. Identify different beep codes and error codes.
3. Identify different motherboards & CPU's .
4. Configure slot 1 motherboard for setting up of a Pentium III processor.
5. Troubleshoot symptom failures in motherboard.
6. Troubleshoot symptom failures in FDD.
7. Install memory modules (SIMMs, DIMMs); CMOS battery and-on cards.
8. Install & configure a display card (PCI –SVGA).
9. Install & configure Video Accelerator card (2D ; 3D) in AGP slot.
10. Install & configure a sound blaster card, sound and video mixing.
11. Install Deskjet, laser printer & printer consumables.
12. Install Video Display Unit (VDU).
13. Install Scanners.
14. Partition and format a hard disk using FDISK ; disk manager.
15. Install and configure a IDE: SCSI CD-ROM drive.
16. Install and configure a DVD drive.
17. Assemble, install, configure and troubleshoot complete computer system along with input output devices and UPS.
18. Install operating system.
19. Install application software like MS-Office 2000 and Star Office.
20. Install of antivirus software.
21. Debug computer system.

REFERENCES:

S.No.	Title	Author/ Publisher/Edition/ Year
1.	Troubleshooting, Maintaining & repairing PCs	Bigelow, Stephen J.; Tata McGraw-Hill, Ltd. New Delhi, 2nd , 1999
2.	How multimedia computer works	BPB Publication; New Delhi, 7th , 1998
3.	IBM PC and C.K. Jones	B. Govindrajalu; Tata McGraw-Hill, Ltd. New Delhi, 7th, 2000
4.	Assemble Your Own Computer	G.K. Gupta; G.T. Publication, Jaipur, 1st , 1996
5.	The Complete PC upgrade & Maintenance guide	Jain, Manish; BPB; New Delhi, 7th , 1997
6.	Modern -All About Monitors	Lotia , Nair; BPB Publication; New Delhi, 2nd , 1999
7.	All about Keyboard and mouse	Lotia; BPB Publication; New Delhi, 2nd , 1992
8.	Complete PC upgrade & Maintenance guide	Minasi Mark; BPB Publication; New Delhi, 7th , 1997
9.	Upgrading and repairing PCs	Mueller, Scott; Prentice-Hall of India, New Delhi, 8th , 1998
10.	A Complete Guide to SMPS for PC	Upadhyay; BPB Publication; New Delhi, 1st , 1996

PROJECT WORK

L	T	P		
0	0	10		**Curri. Ref. No.: EEE 508**

Total Contact Hours	:		Theory	
Theory	:	**Total Marks: 100**	End Term Exam	:
Practical	: 150		Progressive Assessment	:
Pre Requisite	:		**Practical**	
			End Term Exam	: 50
Credit	: 5		Progressive Assessment	: 50

RATIONAL:

Project work aims at developing skills in the students whereby they apply in totality the knowledge and skills gained through the course in the solution of a practical problem undertaken as a project work. The students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective departments may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. The students should identify themselves or be given project assignment at least two to three months in advance. The project work identified in collaboration with industry/field organization should be preferred. After completion of the course, students will be able to:

- Selecting a suitable topic
- Designing of the job
- Scheduling the job
- Indenting
- Procuring of material
- Maintaining good relation amongst peer group (Team Work)
- Developing leadership quality
- Developing cost awareness
- Effective utilization of time

Suggested List of Laboratory Experiments :-	
S.No	**Laboratory Experiments**
1	Collect proper requirements from the client (both in-house or Industry sponsored).
2	Should provide the project planning sheet. A: Duration of project (Starting and Ending Date). B: Intermediate dates showing the status of project at every stage.
3	Synopsis: Brief note showing what actually the project is supposed to do.
4	Block Diagram of the project.

5	Circuit Diagram of each and every block.
6	Bill of materials.
7	Bread board testing of each and every block.
8	Making of PCB a: Track Layout (top & bottom). b: Component Layout (legend). c: Pad Master (Solder masking)
9	Chassis Design Diagram.
10	Wiring Details. (Optional w.r.t project)
11	Software Flow Chart.
12	Software with proper documentation.
13	Features of Project a: Operating voltage/current b: Inputs and outputs and other added features of project.
14	Future Up-gradation.
15	Operating Manual.
16	Technical Manual

Reference Books:
1. Projects in Electrical, Electronics, instrumentation and Computer Engineering by S Chatterjee&S K Bhattacharya, S. Chand Publishing

PROFESSIONAL PRACTICES –V

L	T	P	Total Marks: 50	Curri. Ref. No.: ETC 514
0	0	4		

Total Contact Hours	: 30 Hrs		Theory	
Theory	: 0 Hrs		End Term Exam	: Nil
Practical	: 60 Hrs		Progressive Assessment	: Nil
Pre Requisite	: Nil		**Practical**	
			End Term Exam	: Nil
Credit	: 2		Progressive Assessment	: 50

Aim :

To familiarize and expose students more extensively with the methodology of their own subject.

Objective:

On completion of this course, the Student will be able to:

- Increase their understanding of ideas as presented by the work at hand.
- Be actively involved in their own learning
- Speak more articulately
- Listen better
- Read more thoroughly
- Learn to justify/ qualify opinions
- Prepare a report on the seminar presentation topic

Suggested List of activities to be done:		
	1. Arrangement of expert talks and attending those talks	
	2. Each student will be assign a suitable topic related to the subjects being taught in the respective semester on which they have to self-study, prepared a small report (5-10 pages)	
	3. Develop (10-15 minutes) presentation (power point presentation preferably with animation) and deliver it as seminar.	
	4. Presentation follows by group discussion	
	5. Arrangement of Industrial visits	

Soft core - II

ENGINEERING ECONOMICS AND ACCOUNTANCY

L   T   P   **Curri. Ref. No.: G303**
3   0   0

Total Contact hrs.:   **Total marks: 100**   **Theory:**
Theory: 45   End Term Exam: 75
Tutorial: 0   P.A.: 25
Practical: 0
Credit: 3

RATIONALE

The knowledge of Engineering Economics and Accountancy is needed by personnel dealing with the cost of products of any kind related to quality and standards of production including its financial control. Engineers / Technicians, in general, need to know the cost of the final products for marketing purposes. The knowledge of Economics as well as Accountancy is required by all people dealing in any business or enterprise.

This particular subjects deals in basic concepts of economics, production of commodities, different types of industries, market forms, objective of economic planning, concept of value of money, causes of unemployment, industrial policy, business transaction and accountancy, maintenance of cash and balances, receipt and expenditures and final accounts.

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 INTRODUCTION	**1**
1.1 Introduction to Economics and its Utility of study	
1.2 Importance of the study of Economics	
2.0 BASIC CONCEPTS OF ECONOMICS	**3**
2.1 Definition of Utility, Consumption, Want, Value, Price, Goods, National Income.	
2.2 Classification of goods, characteristics and classification of wealth.	
2.3 Basic Laws of demand and supply.	
2.4 Concept and Measurement of Elasticity of demand	
3.0 PRODUCTION	**3**

3.1   Meaning and factors of production.

3.2   Land, Labour, Capital and Organisation

3.3   Formation of Capital, Break even chart-its uses.

4.0   SCALE OF INDUSTRIES   **2**

4.1   Definition, advantages and disadvantages of small, medium and large scale production

4.2   Internal and External Economies

5.0   MARKET FORMS   **3**

5.1   Definition and types of Markets in respect of present trends.

5.2   Features of Perfect, Imperfect and monopoly markets.

5.3   Price determination under perfect competition and monopoly

6.0   ECONOMIC PLANNING   **3**

6.1   Features of Under-developed and Developing Countries.

6.2   Meaning, objectives and needs of planning.

6.3   Introduction to industrial development in India during the five year plans.

7.0   MONEY   **3**

7.1   Meaning and functions of Money

7.2   Introduction to the concept of the value of money

7.3   Meaning of Inflation, Deflation, Stagnation.

8.0   UNEMPLOYMENT   **2**

8.1   Meaning, types and causes of Unemployment

8.2   Unemployment problems in India

9.0   INDUSTRIAL POLICY   **3**

9.1   Current Industrial Policy

9.2   Industrial licensing Policy, De-licensing

9.3   Monopolistic and Restricted Trade practices (MRTP)
       Foreign Exchange Regulation Act (FERA).

11. 0   BUSINESS TRANSACTIONS AND ACCOUNTANCY   5

10.1   Transactions and classifications, need and
        objectives of proper records including
        double entry system.

10.2   Classification of Accounts and its description

        (in respect of real accounts, personal accounts
        and nominal accounts)

10.3   Debit and credit concept; golden rules of debit
        and credit.

10.4   Objectives and principles of double entry
        book-keeping.

11.0   BOOKS OF ACCOUNTS   2

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

11.2   Balancing of Accounts

12.0   CASH BOOK   2

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

12.2   Single column, double column and triple
        column cash book

12.3   Imprest system of Petty Cash Book.

13.0   TRIAL BALANCE   2

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

14.0 FINAL ACCOUNTS   **5**

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

14.2   Revenue and Depreciation adjustment

14.2   Introduction to balance sheet

15.0 CAPITAL AND REVENUE EXPENDITURE   **3**
DISTRIBUTION

15.1   Receipts and payments

15.2   Income and Expenditure differences

16.0 MEANING AND PURPOSE OF COSTING   **2**

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

16.2   Cost Control – Prime cost, Overhead cost,
and Indirect materials and tools.

17.0 ELECTRONICS COMMERCE – MEANING – SCOPE   **1**

17.1   Accounting Software – Tally latest version

SUGGESTED LEARNING RESOURCES:

Reference Books :

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

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

ENTREPRENEURSHIP DEVELOPMENT

L	T	P		Curri. Ref. No.: G304
3	0	0		

Total Contact hrs.:	Total marks: 100	Theory:
Theory: 45		End Term Exam: 75
Tutorial :0		P.A.: 25
Practical: 0		
Credit: 3		

RATIONALE

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

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.

1.0   INTRODUCTION   10

     1.1   Definition and functions of Entrepreneur, entrepreneurship
            quality, entrepreneurial spirit, need for entrepreneurship.
     1.2   Individual and social aspects of business – achievement motivation theory
     1.3   Social responsibilities of Entrepreneurs

2.0   FORMS OF BUSINESS ORGANISATION   4

     2.1   Types of company
     2.2   Merits and demerits of different types
     2.2   Registration of small scale industries
     2.4   Conglomeration.

3.0   SMALL SCALE AND ANCILLARY INDUSTRIES   8

     3.1   Definition – scope with special reference to self employment.
     3.2   Procedure to start small scale and Ancillary industries
     3.3   Pattern on which the Scheme/Project may be prepared
     3.4   Sources of finance - Bank, govt., and other financial institutions.
     3.5   Selection of site for factory
     3.6   Factors of selection
     3.7   N.O.C. from different authorities, e.g., Pollution Control Board,
            Factories Directorate etc.
     3.8   Trade License.

4.0   SYSTEM OF DISTRIBUTION   1

    4.1   Wholesale Trade
    4.2   Retail trade

5.0   SALES ORGANISATION   3

    5.1   Market survey, marketing trends, knowledge of
          competitors, product selection & its basis .
    5.2   Sales promotion
    5.3   Advertisement
    5.4   Public relations and selling skills

6.0   PRICING THE PRODUCT   1

    6.1   Basic guidelines

7.0   INTRODUCTION TO IMPORT AND EXPORT   6

    7.1   Procedures for export
    7.2   Procedures for import
    7.3   Technical collaboration – international trade
    7.4   Business insurance
    7.5   Rail and road transport
    7.6   Forwarding formalities, FOR, FOB, CIF, etc.

8.0   BUSINESS ENQUIRIES   4

    8.1   Enquiries: From SISI, DIC, SFC Dept. of Industrial
          Development Banks.
    8.2   Offers and Quotations
    8.3   Orders

9.0   PROJECT REPORT   6

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

10.0   ENVIRONMENT LEGISLATION   2

    10.1   Air Pollution Act
    10.2   Water Pollution Act
    10.3   Smoke Nuisance Control Act
    10.4   ISO: 14000, OSHA

SUGGESTED LEARNING RESOURCES:

Reference Books:

1.   Entrepreneurship Development

        Prepared by CTSCManila Publishers by Tata Mc Graw Hill Publishing Co. Ltd.

2.   Small Enterprise Management Published by ISTE, Mysore

3.   Motivation Published by ISTE, Mysore

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

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

6.   Essence of TQM by John Bank

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

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

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

10.   Nagarazan, R.S. and A.A. Arivalagar, TQM New Delhi : New Age International Publishers, 2005

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

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

PRINCIPLES OF MANAGEMENT

L	T	P		**Curri. Ref. No. G305**
3	0	0		

Total Contact hrs.:	**Total marks: 100**	**Theory:**
Theory: 45		End Term Exam: 75
Tutorial :0		P.A.: 25
Practical : 0		
Credit: 3		

RATIONALE

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

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
FRAMEWORK OF MANAGEMENT 8	
1.1 Nature of management	
1.2 Development of management thoughts	
1.3 Management and process skills	
2.0 PLANNING	9
2.1 Fundamentals of planning	
2.2 Planning premises and forecasting	
2.3 Decision making	
2.4 Mission and objective	
3.0 ORGANIZING	10

3.1 Fundamentals of organizing

3.2 Design of organization structure

3.3 Forms of organization structure

3.4 Power and authority

3.5 Authority relationship

4.0 STAFFING   8

4.1 Fundamentals of staffing

4.2 HR planning

4.3 Recruitment and selection

4.4 Training and development

4.5 Performance appraisal

5.0 DIRECTING   6

5.1 Fundamentals of directing

5.2 Operational control techniques

5.3 Overall control technique

6.0 TOTAL QUALITY MANAGEMENT   4

6.1 Concepts and definitions

6.2 Sages of quality gurus and their contributions

6.3 Basic tools of TQM

SUGGESTED LEARNING RESOURCES:

Reference books:

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

3. Management by: S. P. Robins

4. Management principles by: Anil Bhat and Arya Kumar

5. Principles and practice of management by LM Prasad

6. Principles of management by LM Prasad

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

ORGANIZATIONAL BEHAVIOUR

L	T	P	**Curri. Ref. No.:G306**
3	0	0	

Total Contact hrs.:	**Total marks: 100**	**Theory:**
Theory: 45		End Term Exam: 75
Tutorial :0		P.A.: 25
Practical: 0		
Credit: 3		

RATIONALE

Knowledge in behavioural principles in an organization is an important requirement because concepts such as work motivation, behavioural patterns of individuals as also those of group of individuals etc are intimately related to it. Organizational Behavioural principles, its scopes, applicability etc. are therefore important to know by the students irrespective of the branch of specialization. Based of the above facts following content details of the subject on Organizational Behaviour has been suggested.

DETAIL COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 ORGANIZATION:	**8**
Concept and Definition	
Structures (line, staff, functional divisional, matrix)	
2.0 MOTIVATION :	**10**
Principles of Motivation	
Aspects of Motivation	
Job motivation	
Theories of motivation (Maslow, Herzberg, Theory of X&Y of Mc. Gregar)	
3.0 DEVELOPING GOOD WORK HABITS:	**10**
Principles of habit formation	
Attitude and values	
Personality-	

- Concepts

- Theories

- Personality and Behaviour

4.0 ORGANIZATIONAL CULTURE: **8**

Concepts and its importance

Determinants of organizational culture

Rules & regulations

5.0 TEAMBUILDING: **9**

Concepts
Team and Group

Formation of Team building

SUGGESTED LEARNING RESOURCES:

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

ENVIRONMENTAL EDUCATION

L	T	P		**Curri. Ref. No. G307**
3	0	0		

Total Contact hrs.:   **Total marks: 100**   **Theory:**
Theory: 45   End Term Exam: 75
Tutorial : 0   P.A.: 25
Practical : 0
Credit: 3

RATIONALE

Management of Environmental Degradation as also its control using innovative technologies is of prime importance in the times we are living in. Since the days of the famed Rio Summit (1992) awareness about degradation of environment we live in an its management through participation of one and all has literally blossomed into a full fledged movement of universal importance. Technically qualified people, such as the Diploma Engineers, should not only be aware about new technologies to combat environmental degradation at their disposal but also various aspects of environment, ecology, bio-diversity, management, and legislation so that they can perform their jobs with a wider perspective and informed citizens. This course can be taken by all diploma students irrespective of their specializations.

DETAILED COURSE CONTENT

THEORY:

UNIT TOPIC / SUB-TOPIC	Lecture Hrs.
1.0 INTRODUCTION	**2**
1.1 Introduction 1.2 Environment and its components 1.3 Environment in India 1.4 Public Awareness	
2.0 ECOLOGICAL ASPECTS OF ENVIRONMENT	**8**
2.1 Ecology • Eco-system • Factors affecting Eco-system 2.2 Bio-geochemical cycles • Hydrological cycle • Carbon cycle • Oxygen cycle • Nitrogen cycle • Phosphorous cycle • Sulphur cycle 2.3 Bio-diversity	

2.4 Bio-diversity Index

3.0 NATURAL RESOURCES 5

3.1 Definition of Natural Resources
3.2 Types of Natural Resources
3.3 Quality of life
3.4 Population & Environment
3.5 Water Resources
- Sources of Water
3.6 Water Demand
3.7 Forest as Natural Resource
- Forest and Environment
- Deforestation
- Afforestation
- Forest Conservation, its methods
3.8 Land
- Uses and abuses of waste and wet land

4.0 GLOBAL ENVIRONMENTAL ISSUES 9

4.1 Introduction
4.2 Major Global Environmental Problems
4.3 Acid Rain
- Effects of Acid Rain
4.4 Depletion of Ozone Layer
- Effects of Ozone Layer Depletion
4.5 Measures against Global Warming
4.6 Green House Effect

5.0 ENVIRONMENTAL POLLUTION 9

5.1 Introduction
5.2 Water Pollution
- Characteristics of domestic waste water
- Principles of water treatment
- Water treatment plant (for few industries only- unit operations & unit processes - names only)
5.3 Air Pollution
- Types of air pollutants
- Sources of Air Pollution
- Effects of Air Pollutants
5.4 Noise Pollution
- Places of noise pollution
- Effect of noise pollution

6.0 CLEAN TECHNOLOGY 6

6.1 Introduction to Clean Technologies

6.2 Types of Energy Sources
- Conventional Energy sources
- Non-conventional sources of Energy

6.3 Types of Pesticides

6.4 Integrated Pest Management

7.0   ENVIRONMENTAL LEGISLATION   3

7.1 Introduction to Environmental Legislation

7.2 Introduction to Environmental Laws

8.0   ENVIRONMENTAL IMPACT ASSESSMENT   3

8.1 Introduction to Environmental Impact Assessment

8.2 Environmental Management (elements of ISO 14001)

8.3 Environmental ethics

SUGGESTED IMPLEMENTATION STRATEGIES:

The teachers are expected to teach the students as per the prescribed subject content. This subject does not have any practical but will have only demonstration and field visit as stated. The students will have to prepare report of the site visit.

SUGGESTED LEARNING RESOURCES:

(a)   Reference Books:

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

S. No.	Title	Author, Publisher, Edition & Year
		Delhi
9.	Environmental Chemistry	Samir K. Banerji, Prentice Hall of India, New Delhi

(b)   Others:

1. Text book mentioned in the references
2. Lab Manuals
3. OHP Transparencies
4. Video film on Environment

SUGGESTED LIST OF DEMONSTRATIONS/FIELD VISIT

- pH value of water sample.
- Hardness of water
- Calcium hardness
- Total Hardness
- Residual Chlorine to a given sample of water
- Turbidity
- B.O.D.
- C.O.D.

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

- Water Treatment Plant
- Sewage Treatment Plant
- Maintenance work of water supply mains and sewage   system

ELECTIVE COURSES

Microwave
(Specialized course)

L	T	P
3	0	2

Total Contact Hours	: 75 Hrs
Theory & tutorial	: 45 Hrs
Practical	: 30 Hrs
Pre Requisite	**: Nil**
Credit	**: 4**

Total Marks: 150

Curri. Ref. No.: ECE 603

Theory	
End Term Exam	: 75
Progressive Assessment	: 25
Practical	
End Term Exam	: 25
Progressive Assessment	: 25

RATIONALE:

The application of Microwave is increasing rapidly. This is not only used in communication system, but also it is applied in Industry and household appliances. So the study of this subject both in the Electronics and Electrical Engineering has become inevitable. Starting from the definition of Microwave, the topics on its working principles and field of applications have been included in this subject.

DETAILED COURSE CONTENT:

Unit	Topic / Sub Topic	Hours
I	**1. Introduction :** 1.1 EM Theory, 1.2 Wave Equation, 1.3 Energy and Power, 1.4 Transmission Line Theory, 1.5 Fields in Media & Boundary Condition.	9
II	**2. Transmission Structure and Resonators** 2.1 Smith Chart 2.2 Waveguides 2.3 Resonators 2.4 Electromagnetic spectrum, 2.5 TEM Waves, 2.6 Isolator and attenuator, 2.7 Directional coupler and circulator.	4
III	**3. Microwave Generation** 3.1 Method Generation of Microwave in different method (Klystron, Magnetrons, Travelling Wave Tubes) 3.2 Bipolar transistor, 3.3 Gunn oscillator, Avalanche diode oscillator.	4
IV	**4. Microwave Measurement** 4.1 Principle of Microwave detection 4.2 Method of Microwave Power Measurement	5

		4.3 Method of Microwave Impedance Measurement	
		4.4 Method of Microwave Frequency Measurement	
V	5.	**Microwave Radio Link** 5.1 Definition of (a) microwave link (b) receiver power 5.2 Receiver power in terms of (a) Waveguide and antenna losses. (b) Transmitter antenna gain (c) Path loss (d) Receiver antenna gain (e) Receiver waveguide and antenna losses	5
VI	6.	**RADAR** 6.1 Definition of RADAR 6.2 RADAR equation 6.3 Description of (a) Pulse RADAR (b) FMCWRADAR (c) Doppler RADAR 6.4 Block diagram of RADAR system 6.5 Application of RADAR in (a) Ship and Ship Position Control (b) Air Traffic Control (c) Position fixing (d) Distance Measurement (e) Speed detector (f) Burglar detection	9
VII	7.	**Application of Microwave** Application of Microwave in a) Radio Astronomy b) Infrared heat detection c) Imaging (Laud and human) d) Military sensing (arms control verification) e) Monitoring agriculture	9

LIST OF EXPERIMENTS:

1. Measurement of wavelength, guide wavelength and frequency using X-band waveguide test bench. Calculation of broad wall dimension of a X-band waveguide.
2. Determination of phase and group velocity plot
3. Determination of basic parameters of a directional coupler using calibrated attenuator.
4. Klystron characteristics using X-band waveguide test-bench.
5. Study of Gunn Oscillator characteristics using X-band waveguide test-bench.
6. Measurement of reflection coefficient using two directional couplers and one calibrated attenuator.
7. Measurement of phase shift of a microwave phase shifter/Scattering matrix of a magic tee / E-plane tee / H-plane tee using waveguide test bench at X-band.
8. Measuring of dielectric constant of a material using waveguide test bench at X-band.
9. Measurement of Conduction EMI using LISN and spectrum analyzer

REFERENCES

S.No.	Title	Author, Publisher & Address
1.	Microwave	K.C. Gupta, New Age International Publishers
2.	Microwaves Techniques	A Kumar, New Age International Publishers
3.	Microwaves and Optional Transmission	A. David Olver, John Willey and sons
4.	Microwaves and Optional Transmission	A. David Olver, John Willey and sons

VLSI & EMBEDDED SYSTEM
(Specialized course)

L	T	P			Curri. Ref. No.: ECE 604	
3	0	2				
Total Contact Hours		**: 75 Hrs**	**Total Marks: 150**		**Theory**	
Theory & tutorial		: 45 Hrs			End Term Exam	: 75
Practical		: 30 Hrs			Progressive Assessment	: 25
Pre Requisite		**:ECE 402**			**Practical**	
					End Term Exam	: 25
Credit		**: 4**			Progressive Assessment	: 25

RATIONALE:

The increasing number of available transistors on a diode has enabled the emergence of a new class of computing systems that can be included on a single chip multiple computing elements. The functionality of those computing elements can be configured or tailored to specific functions, in some cases even at run-time. Contemporary Field-Programmable Gate-Arrays (FPGAs) devices and modern Multi-Core Processors are extreme examples of this trend in the industry. Reconfiguration techniques are also seen as a way to mitigate, or even eliminate potential issues with reliability and intermittent faults in large VLSI systems. Learning this subject the students will get introduction on modern embedded systems.

Detail Course Content:

Unit	Topic/Sub Topic	Hours
1	**Introduction:** 1.1 Introduction to VLSI technology 1.2 A Circuit Design Example on VLSI 1.3 Overview of VLSI Design Methodologies 1.4 VLSI Design Flow 1.5 Design Hierarchy 1.6 Concepts of Regularity, Modularity and Locality 1.7 Packaging Technology	3
2	**Fabrication of MOSFETs :** 2.1 Fabrication Process Flow : Basic Steps 2.2 Layout Design Rules	5
3	**MOS Transistor:** 3.1 Structure and Operation of MOS Transistor (MOSFET) 3.2 MOSFET Current Voltage Characteristics (Formula only) 3.3 MOSFET Capacitances (Concept only)	5
4	**MOS Inverters : Static Characteristics :** 4.1 Resistive – Load Inverter 4.2 Inverters with n-Type MOSFET Load	4

	4.3 CMOS Inverter	

5	**MOS Inverters : Switching Characteristics and Interconnect Effects**
	      5.1 Delay - Time Definitions
	      5.2 Calculation of Delay Times
	      5.3 Estimation of Interconnect Parasitics
		4

6	**Combinational MOS Logic Circuits** :
	      6.1 MOS Logic Circuits with Depletion nMOS Loads (Circuit diagram only)
	      6.2 CMOS Logic Circuits (Circuit diagram only)
	      6.3 Complex Logic Circuits (Circuit diagram only)
	      6.4 CMOS Transmission Gates (Concept only)
		5

7	**Sequential MOS Logic Circuits** :
	      7.1 SR Latch Circuit (Circuit diagram only)
	      7.2 Flip-Flop Circuit (Circuit diagram only)
		4

8	**Semiconductor Memories** :
	      8.1 Dynamic Random Access Memory (DRAM)
	      8.2 Static Random Access Memory (SRAM)
		4

9	**Concept of Embedded System** :
	      9.1 What is an Embedded System?
	      9.2 Embedded Systems Design
	      9.3 An introduction to Embedded System Architecture
	 9.4 Whyis the Architecture of an Embedded system important?
	      9.5 The Embedded System Model
		6

10	**Embedded Hardware**
	      10.1 The Embedded Board and the von Neumann Model
	      10.2 Basic Hardware Materials :Conductors , Insulators and Semiconductors
	      10.3 Powering the hardware
	      10.4 Common Passive Components on Boards and in Chips : Resistors , Capacitors and Inductors
	      10.5 Semiconductors and the Active Building Blocks of Processors and Memory
		5

LIST OF PRACTICAL EXPERIMENT:

1. Design NMOS device using VLSI software
2. Design PMOS device using VLSI software
3. Design transmission gate using NMOS and PMOS devices

4. Design CMOS inverter circuit
5. Design Universal Gate in VLSI platform.
6. Design the following Combinational Logic circuits in VLSI platform
   a .Half adder
   b Full adder
   c.Subtracter
   d Comparator

7. Design RS latch in VLSI software
   8. Design JK flip flop in VLSI software

Lists of Software Required
1. Microwind and DSCH (VLSI design software)
2. Tanner software

REFERENCES

S.No.	Title	Author, Publisher & Address
1.	CMOS Digital Integrated Circuits	Sung-Mo Kang and Yusuf Leblebici, TMH
2.	Basic VLSI Design	D A Puckneli and K Eshraghian, Prentice Hall of India, New Delhi.
3.	VLSI Design: Analytical Perspective	Niel H E Weste and E Kamraw, Peason Asia
4.	An Embedded Software Primer	David E. Simon, Pearson Education Asia.
5.	Embedded Systems Architecture	Tammy Noergaard

DIGITAL SIGNAL PROCESSING
(Specialized course)

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L	T	P			
3	0	2		**Curri. Ref. No.: ECE 605**	

Total Contact Hours	**: 75 Hrs**		**Theory**	
Theory	: 45 Hrs	**Total Marks: 150**	End Term Exam	: 75
Practical	: 30 Hrs		Progressive Assessment	: 25
Pre Requisite	**: Nil**		**Practical**	
			End Term Exam	: 25
Credit	**: 4**		Progressive Assessment	: 25

RATIONALE:

Digital signal processing is a technology driven field which dates its growth when Computers and Digital Circuitry became fast enough to process large amount of data efficiently. This subject deals with processing of discrete – time signal or data sequences and covers the background and fundamental materials on discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.

DETAIL COURSE CONTENT:

Unit	Topic / Sub Topic	Hours
I	**1.Introduction** 1.1 Concept of Signal & Systems 1.2 Concept of Signal processing 1.3 Concept of Frequency domain Analysis of Time Domain Signal: for Continuous time & Discrete-time signal. 1.4Applications of Digital Signal Processing	5
II	**2.Signal** 2.1 Definition and classification : Continuous, Discrete & Digital 2.2 Elementary signals : Unit Step Signal, Impulse, Ramp & Sinusoidal Signal 2.3 Representation of Discrete - time signals. 2.3.1 Graphical representation 2.3.2. Tabular representation 2.3.3 Sequence representation 2.4 Classification of Discrete-time-signals 2.4.1 Energy & Power Signal 2.4.2 Causal & Non Causal Signal 2.5 Operations on signals. 2.5.1 Shifting 2.5.2 Time reversal 2.5.3 Time Scaling	8

	2.5.4 Addition operation	

III	**3. System**
	    3.1 Definition, Classification of Discrete-time Systems
	        3.1.1 Static & Dynamic System
	        3.1.2 Causal & Non-Linear System
	        3.1.3 Time-variant & Time invariant system
	    3.2 Representation of Arbitrary Sequence : Convolution technique
		7

IV	**4. Frequency Analysis of Discrete time Signals**
	    4.1 Discrete – time Fourier Series
	    4.2 Discrete – time Fourier Transform.
		5

V	**5. Z – Transform**
	    5.1 Definition of Z-Transform and ROC (Region of Convergence)
	    5.2 Z-Transform Finite – Impulse Sequence & Infinite – Impulse Sequence.
	    5.3 Properties of Z-transform
	        5.4.1 Long division Method.
	        5.4.2 Partial fraction expansion method.
	        5.4.3 Convolution method.
		6

VI	6. **Fourier Transform** : (Concept & F 7. ormula only)	2

VII	**8. Design of Digital Filters.**
	    8.1 IIR filter design techniques.
	        8.1.1 Butterworth Filter design
	        8.1.2 Chebysheve Filter design
	    8.2 Realization of Digital filters.
		6

IX	**9. FIR Filter design**
	    9.1 Rectangular window
	    9.2 Hanning window
	    9.3 Hamming window
	    9.4 Bartlett window
		6

LIST OF EXPERIMENTS:
   Write programs on the following areas
   (Through SIMULATION USING MATLAB/ SCILAB)

1) To represent basic signals like:Unit Impulse, Ramp, Unit Step, Exponential.
2) To generate discrete sine and cosine signals with given sampling frequency.
3) To determine impulse and step response of two vectors using MATLAB.
4) To perform convolution between two vectors using MATLAB.
5) To perform cross correlation between two vectors using MATLAB.
6) To compute DFT and IDFT of a given sequence using MATLAB.
7) To perform linear convolution of two sequence using DFT using MATLAB.

8) To determine z-transform from the given transfer function and its ROC using MATLAB.
9) To determine rational z-transform from the given poles and zeros using MATLAB.
10) To determine partial fraction expansion of rational z-transform using MATLAB.
11) To design a Type 1 Chebyshev IIR highpass filter using MATLAB.
12) To design an IIR Butterworth bandpass filter using MATLAB.
13) To design low pass filter using the Kaiser window using MATLAB.

REFERENCES

S.No.	Title	Author, Publisher & Address
1.	A Practical Approach to Digital Signal Processing	K. Padmanabhan, S. Ananthi, R. Vijayarajeswaran, New Age International Publications.
2.	Signals and Systems.	M. J. Roberts, Tata McGraw-Hill
3.	Digital Signal Processing	Sanjit K Mitra, Tata McGraw-Hill.
4.	Signal processing and Linear Systems	Lathi, B., Carmichael, CA, Berkley-Cambridge.
5.	Linear Systems and Digital signal Processing.	Young, T., Englewood Cliffs, NJ, Prentice Hall

<div align="center">

CELLULAR TECHNOLOGY
(Specialized course)

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L	T	P			
3	0	2		**Curri. Ref. No.: ETC606**	
Total Contact Hours		**: 75 Hrs**		**Theory**	
Theory		: 45 Hrs	**Total Marks: 150**	End Term Exam	: 75
Practical		: 30 Hrs		Progressive Assessment	: 25
Pre Requisite		**: Nil**		**Practical**	
				End Term Exam	: 25
Credit		**: 4**		Progressive Assessment	: 25

RATIONALE:

The student willbe introduced to the basic concepts behind the frequency re-use technology used in cellular radio, Personal Communications Systems and Trunked private systems. This leads to a study of the details of the two most common cellular standards in use, AMPS and TDMA (or NADC). This course provides die background for the course in Personal Communications Systems.

DETAILED COURSE CONTENTS:

Unit	Topic/Sub Topic	Hours
1	**1.0 The Cellular Concept – System Design Fundamentals**	6
	1.1 Introduction	
	1.2 Frequency Reuse	
	1.3 Channel Assignment Strategies	
	1.4 Handoff Strategies	
	1.5 Prioritizing Handoffs	
	1.6 Practical Handoff Considerations	
	1.7 Interference and System Capacity	
	1.8 Co-channel Interference and System Capacity	
	1.9 Channel Planning for Wireless Systems	
	1.10 Adjacent Channel Interference	
	1.11 Power Control for Reducing Interference	
	1.12 Improving coverage & Capacity in Cellular Systems	
	1.13 Cell Splitting	
	1.14 Sectoring	
	1.15 Repeaters for Range Extension	
	1.16 A Microcell Zone Concept	

II	2.0	**Modern Wireless Communication Systems**	6
	2.1	Second Generation (2G) Cellular Networks	
	2.2	Evolution to 2.5G Wireless Networks	
	2.3	HSCSD for 2.5G GSM	
	2.4	GPRS for 2.5G GSM and IS-136	
	2.5	EDGE for 2.5G GSM and IS-136	
	2.6	IS- 95B for 2.5G CDMA	
	2.7	Third Generation (3G) Wireless Networks	
	2.8	3G W-CDMA (UMTS)	
	2.9	Bluetooth and Personal Area Networks (PANs), LAN, MAN, (Concept)	
III	3.0	**Mobile Radio Propagation : Small-Scale Fading and Multipath**	7
	3.1	Small-Scale Multipath Propagation	
		3.1.1 Factors Influencing Small Scale Fading	
		3.1.2 Doppler Shift	
	3.2	Impulse response model of a Multipath Channel	
		3.2.1 Relationship Between Bandwidth and Received Power	
	3.3	Parameters of Mobile Multipath Channels	
		3.3.1 Time Dispersion Parameters	
		3.3.2 Coherence Bandwidth	
		3.3.3 Doppler Spread and Coherence Time	
	3.4	Small-Scale Fading	
		3.4.1 Fading Effects Due to Multipath Time Delay Spread	
		3.4.2 Flat Fading	
		3.4.3 Frequency Selective Fading	
		3.4.4 Fading Effects Due to Doppler Spread	
IV	4.0	**Wireless Systems and Standards**	7
	4.1	AMPS and Small-Scale Multipath Propagation	
	4.2	Global System for Mobile (GSM)	
		4.2.1 GSM Services and Features	
		4.2.2 GSM system Architecture	
		4.2.3 GSM Radio Sub-system	
		4.2.4 GSM Channel Types	
		4.2.5 GSM Traffic channels (TCHs)	
		4.2.6 GSM Control Channels (CCH)	
	4.3	CDMA Digital Cellular Standard (IS-95)	
V	5.0	**Equalization, Diversity and Channel Coding**	8
	5.1	Fundamentals of Equalization	
	5.2	Training a Generic Adaptive Equalizer	
	5.3	RAKE Receiver	
	5.4	Interleaving	

	5.5	Fundamentals of Channel coding	
	5.6	Block Codes and Finite Fields	
	5.7	Examples of Block Codes	
	5.8	Convolutional Codes	
	5.9	Decoding of Convolutional Codes	
VI	**6.0**	**Speech Coding**	**5**
	6.1	Quantization Techniques	
	6.2	Uniform Quantization	
	6.3	Non-uniform Quantization	
	6.4	Adaptive Quantization	
	6.5	Adaptive Differential Pulse code Modulation (ADPCM)	
VII	**7.0**	**Multiple Access Techniques for Wireless Communications**	**6**
	7.1	Introduction to Multiple Access	
	7.2	Frequency Division Multiple Access (FDMA)	
	7.3	Time Division Multiple Access (TDMA)	
	7.4	Spread Spectrum Multiple Access	
	7.5	Frequency Hopped Multiple Access (FHMA)	
	7.6	Code Division Multiple Access (CDMA)	
	7.7	Packet Radio Protocols	
	7.8	Carrier Sense Multiple Access (CSMA) Protocols	
	7.9	Capacity of Cellular System	
	7.10	Capacity of Cellular CDMA	
	7.11	Capacity of CDMA with Multiple Cells	

LIST OF EXPERIMENTS:

1. Study the features, specification and working of cellular mobile
2. Signal strength measurement of various points from a transmitting antenna/cordless phone
3. Measurement of range for a cordless phone
4. Demonstration of Base Trans Receiver (BTS) with nearby cellular tower
5. Observing call processing of GSM trainer Kit.
6. Observing call processing of CDMA trainer Kit.
7. Practice of setting GPRS on Mobile phone, Repair of a (GSM) and a (CDMA) mobile phones,
8. Measurement of cell boundary and Data transfer using Bluetooth
9. Visit to local nearby telephone exchange.

REFERENCES

S.No.	Title	Author, Publisher & Address
1.	Wireless Communications: Principles and Practice	Theodore S. Rappaport, Pearson
2.	Wireless Communications and Networking's	Mak & Zhuang, TMH
3.	Wireless Communications	Stallings, TMH