

TEACHING AND EVALUATION SCHEME

DISPLINE: ELECTRONICS & TELECOMMUNICATION ENGINEERING

SEMESTER : V

Subject		Evolution Scheme							
Theory& Practical				Theory			Practical		
Sl. No.	Theory	Lecturer	Practical	End Exam	Class Test	Assignment	End Exam	Sessional	Total Marks
1.	Power Electronics & Industrial Control	5	-	80	15	5	-	-	100
2.	Microwave Engineering	4	-	80	15	5	-	-	100
3.	Computer Networks & Mobile Technology	5	-	80	15	5	-	-	100
4.	Audio, Video & TV Engineering	5	-	80	15	5	-	-	100
5.	Advanced Microprocessor & VLSI	4	-	80	15	5	-	-	100
Practical									
1.	Power Electronics Lab	-	4	-	-	-	25	25	50
2.	Microwave Engineering Lab	-	3	-	-	-	25	25	50
3.	Audio, Video & TV Engineering Lab	-	3	-	-	-	25	25	50
4.	Advanced Microprocessor & VLSI Lab		3	-	-	-	25	25	50
5.	Information Search ,Analysis & Presentation (ISAP)		3	-	-	-	25	25	50
	Total	23	16	400	75	25	125	125	750

POWER ELECTRONICS & INDUSTRIAL CONTROL
FIFTH SEMESTER

Theory : 5 P/W
Total Theory: 75 P

Examination: 3Hr
Total Marks: 100
Theory: 80
I.A.: 15+5

A: RATIONALE :

The concept of power electronics & industrial Control to give broad base Knowledge of power Electronics and industrial application. It encompasses the topics like power Semiconductor devices, SCR control Mechanism , Controlled rectifier, chopper, Inverter & Cycloconverter. The industrial application will enable the students to gather knowledge of Industries & automation.

B: OBJECTIVES :

On Completion of the course the student will able to

1. Know the principle of operation, Characteristics and applications of power semiconductor devices
2. Understand turn-on and turn-off methods for SCR.
3. Know the operation of controlled rectifier
4. Know the operation of chopper
5. Know the operation of inverter
6. Know the operation of Cyclo-converter.
7. Understand ratings, specifications, protection, selection and reliability of SCR
8. Know the operation of power supplies, stabilizers and generator voltage regulator.
9. Know the temperature control circuit and various applications.

C: TOPIC WISE DISTRIBUTION OF PERIODS :

Sl.No.	Topics	Periods
1.	POWER SEMICONDUCTOR DEVICES	15
2.	SCR CONTROL CIRCUITS	08
3.	CONTROLLED RECTIFIERS	08
4.	CHOPPERS	06
5.	INVERTERS	05
6.	CYCLOCONVERTERS	05
7.	PROTECTION,RATINGS & FAILURE OF POWER ELECTRONICS DEVICES	05
8.	INDUSTRIAL ELECTRONICS	15
9.	APPLICATIONS	08
	Total	75

D: COURSE CONTENTS(In Terms of Specific Objectives)**1 Power Semiconductor devices****1.1 Power Diode**

1.1.1 Explain the operation, construction & application of Power Diode

1.1.2 Explain V-I characteristics curve of Power Diode

1.2 SCR

1.2.1 Draw the layer diagram of SCR and explain the operation & construction of SCR.

1.2.2 Explain the two transistor analogy of SCR

1.2.3 Explain the Static V-I characteristics & Dynamic characteristics of SCR.

1.2.4 List applications of SCR

1.3 DIAC

1.3.1 Explain the operation, construction of DIAC and draw V-I characteristics curve

1.3.2 List applications of DIAC

1.4 TRIAC

- 1.4.1 Explain the operation, construction of TRIAC and draw V-I characteristics curve
- 1.4.2 List the modes of operation of TRIAC and mention the preferred modes
- 1.4.3 List applications of TRIAC (Phase control using TRIAC)

1.5 Power BJT

- 1.5.1 Describe the operation, construction of an NPN POWER Transistor as a switch
- 1.5.2 List the applications of BJT in Power switching applications

1.6 Power MOSFET

- 1.6.1 Explain the operation, construction of Power MOSFET and draw its characteristics curve
- 1.6.2 List applications of MOSFET

1.7 GTO

- 1.7.1 Explain the operation, construction of GTO and draw its V-I characteristics
- 1.7.2 List application of GTO

1.8 IGBT

- 1.8.1 Explain the operation, construction of IGBT and draw its characteristics curve
- 1.8.2 List applications of IGBT

2 SCR control circuits

2.1 Turn On Methods

- 2.1.1 Describe briefly different methods of TURN ON of an SCR
- 2.1.2 List two general functions to be fulfilled by gate control circuits

2.2 Firing Circuits

- 2.2.1 Draw the general layout diagram of firing circuit and explain the same
- 2.2.2 Draw R firing circuits and explain the same
- 2.2.3 Draw R-C firing circuit and explain the same
- 2.2.4 Draw UJT pulse trigger circuit and explain the same
- 2.2.5 Explain Synchronous triggering (Ramp Triggering)

2.3 Turn-off methods (Communication Schemes)

- 2.3.1 Define commutation
- 2.3.2 List different types of communication methods
- 2.3.3 Explain the following communications with circuit diagram and waveforms
 - a) Line communication
 - b) Auxiliary voltage communication
 - c) Resonant communication

3 Controlled Rectifiers

- 3.1 Explain controlled rectifiers Techniques(Phase Angle, Extinction Angle control & PWM)
- 3.2 Explain single quadrant semi converter, two quadrant full converter and dual converter
- 3.3 Explain the principle of phase control and define firing angle (α) and Conduction angle (β) with the help of schematic and waveforms for half wave controlled rectifier
- 3.4 Explain Integral Cycle Control (ICC)
- 3.6 Explain with schematic diagram and waveforms the operation of single phase fully controlled bridge converter with Resistive load only (with & with out FD)
- 3.7 Explain with circuit diagram and waveforms the operation of fully controlled three phase bridge converter with Restive load (with & with out FD)

4 Choppers

- 4.1 Define chopper & give its applications.
- 4.2 Explain Principle of operation of
 - Step down chopper (Buck converts)
 - Step down chopper (Boost converts)
 - Step up & Down chopper (Buck Boost converts)
- 4.3 Define control Strategies of chopper (TRC & Current unit)

- 4.4 Give the different chopper configuration (Single quadrant class A and class B, Two quadrant class C and class D & Four quadrant class E)

5. Inverters

- 5.1 Define inverter & its classification.
- 5.2 Draw the schematic diagram of single phase half bridge voltage source inverter (without communication circuit) and explain its operation.
- 5.3 Draw the schematic diagram of single phase full bridge inverter (without communication circuit) and explain its operation.
- 5.4 Draw the schematic diagram of three phase bridge inverter (without communication circuit) and explain its operation.
- 5.5 Write the applications of Inverter.

6 Cycloconverters

- 6.1 Define Cycloconverter and mention its types (step up and step down) & its application
- 6.2 State the advantages and disadvantages of Cycloconverter
- 6.3 Draw the diagram of a single phase to single phase Cycloconverter with pure Resistive load and explain.

7 Protection, Ratings & failure of Power Electronics Devices

- 7.1 Give specification, ratings and nomenclature of Thyristors
- 7.2 Describe how SCR can be protected against Over voltage and over current
- 7.3 Describe dv/dt and di/dt protection of SCR
- 7.4 Define Snubber Circuit & Design Snubber Circuit
- 7.5 Describe the process involved in selecting an SCR for a particular application
- 7.6 Define reliability of SCR and mean time between failures (MTBF)
- 7.7 Explain the three failures of an SCR (Mechanical, Electrical and Thermal)

8 Industrial Electronics

- 8.1 Define Power Supplies, Stabilizers and Generation voltage regulators
- 8.2 Draw a schematic diagram of linear power supply that provides + or – 5V and or -15V & Explain its operation
- 8.3 Draw a schematic diagram of switched mode power supply (SMPS) and explain its operation & application
- 8.4 Compare linear power supply with SMPS
- 8.5 Draw a schematic diagram of SCR battery charger and explain
- 8.6 Draw a schematic diagram of power supply using SCR for electrolytic process in industries and explain
- 8.7 Define online UPS system and offline UPS system
- 8.8 Draw a block diagram of UPS system and explain its operation & application
- 8.9 Draw the diagram of AC servo voltage transformer (CVT) type & AC voltage stabilizer and explain its operation
- 8.10 Explain Timer (ON & OFF delay) Circuit using IC 555 & define Duty cycle.

9. Applications

- 9.1 Draw a temperature controlled circuit with thermistor and TRIAC and explain
- 9.2 Draw SCR burglar alarm circuit and explain its operation
- 9.3 Draw fire alarm circuit and explain
- 9.4 Draw smoke detector circuit and explain operation
- 9.5 Draw proximity alarm circuit
- 9.6 Draw flame failure device (flame out monitor circuit) and explain
- 9.7 Draw side / edge resistor control circuit and explain
- 9.8 Give basic Opto-coupler device construction and explain its operation.
- 9.9 Draw circuit diagram of Solid State Relay (SSR) and explain its operation.

RECOMMENDED BOOKS:

a) Text Book:

1. Power Electronics by Mohon H. Rasit.

2. Power Electronics by Singh & Khanchandhni, TMH.
3. Power Electronics by Ram Babu,

b) REFERENCE BOOK:

1. Power Electronics by P.C.Sen., TMH
2. Industrial Electronics by M.Ram.Murty.
3. The Encyclopedia of electronic circuit by Rudolf. F. Graf
4. Practical SCR / Triac projects by M.C Sharama
5. Power Electronics by Dr. P.S.Bhimbra

V/SEM/ETC/TH-2

MICROWAVE ENGINEERING
FIFTH SEMESTER

Theory & Tutorial – 4P/W
Total Theory & Tutorial: 60P

Examination: 3Hr
Total Marks : 100
Theory: 80
I.A: 15+5

A: RATIONALE:

This course is designed to impart knowledge of Microwave Engineering. This course includes idea of Electromagnetic waves, Microwave components, Microwave Tables, Microwave Measurements, Transmission lines System topic is intended to create awareness of space science in the students.

B: OBJECTIVES:

At the end of the course the students should be able to :

1. Describe EM Wave and its effects of environment.
2. Explain the concept of Wave propagation and antenna.
3. Explain the propagation of signal through transmission lines.
4. Explain the transmission of waves through rectangular wave-guide.
5. Discuss the losses, SWR & Impedance matching of transmission line.
6. Discuss the principal of working and application of gun diode, tunnel diode.

C: Topic wise distribution of periods:

Sl.No.	Topics	Periods
01	Electromagnetic Waves	06
02	Wave Propagation & Antenna	10
03	Transmission Lines	10
04	Microwave Engineering	25
	Total	60

D: COURSE CONTENTS IN TERM OF SPECIFIC OBJECTIVES:

1. ELECTROMAGNAETIC WAVES

- 1.1 Study the basic concept of electromagnetic waves.
- 1.2 Discuss the effects of environments such as reflection, refraction, interference, diffraction, absorption and attenuation.

2. WAVE PROPAGATION & ANTENNA.

- 2.1 Explain wave radiation in space.
- 2.2 Describe propagation of waves.
- 2.3 Describe radiation mechanism of an antenna.
- 2.4 State and explain the following terms.
 - 2.4.1 Antenna gains, Directive gain, Directivity.
 - 2.4.2 Radiator resistance, Bandwidth, Beam width.
 - 2.4.3 Efficiency, Polarization.
- 2.5 Explain the operation of following antenna with advantage & applications.
 - a) Directional high frequency antenna (Yagi & Rohmbus)
 - b) UHF Microwave antenna.
 - c) Dish antenna (with parabolic reflector)
- 2.6 Define Antenna array and explain the Mention their application.

3. TRANSMISSION LINES.

- 3.1 State & explain X-mission line and mentioned their application.
- 3.2 Classify types of X-mission line (such as Power lines, RF Lines, Telephone Line Twin Wire, Co-axial)
- 3.3 Derive equation for primary & secondary constant of X-mission line.
- 3.4 Discuss different losses in Transmission line.
- 3.5 Define incident, reflected wave & Standing wave.
- 3.6 Explain characteristics impedance, reflection co-efficient & standing wave ratio(SWR)
- 3.7 Describe impedance matching in transmission lines.
- 3.8 Explain the concept of stab match lines.
- 3.9 Plot standing wave Patter on (Single, Double & Quarter Wave)
 - a) Short Circuited Line.
 - b) Open Circuited Line.

4. MICROWAVE ENGINEERING.

- 4.1 Define Microwave Region & Band designation and application of various band.
- 4.2 What are the advantages of Microwave & its application?
- 4.3 Microwave Wave Guides.
 - 4.3.1 Explain the operation of rectangular wave gives and its advantage.
 - 4.3.2 Discuss propagation of EM wave through wave guide with TE&TM modes.
 - 4.3.3 Explain circular wave guide.
- 4.4 Microwave resonators & components.
 - 4.4.1 Discuss the operational Cavity resonator.
 - 4.4.2 Discuss the operational of Directional coupler.
 - 4.4.3 Discuss the operational of Isolators & Circulator.
- 4.5 Microwave tubes & circuit.
 - 4.5.1 Discuss the principle of operational of two Cavity Klystron.
 - 4.5.2 Discuss the principle of Magnetron.
 - 4.5.3 Discuss the principle of Travelling Wave Guides
- 4.6 MICROWAVE MEASUREMENT:
 - 4.6.1 Explain Measurement of power by Bolometer method, Calorimeter method.
 - 4.6.2 Explain frequency and Wave length measurement.
 - 4.6.3 Explain Attenuation Measurement.
 - 4.6.4 Explain VSWR Measurement.
- 4.7 Microwave solid state devices.
 - 4.7.1 Explain transmitter high frequency Limitation.
 - 4.7.2 Discuss the Principle, Construction, Operation and application of Varactor diode.
 - 4.7.3 Explain Gunn effect.
 - 4.7.4 Explain principle of working, construction and application of Gun Diode, Tunnel Diode, PIN Diode & IMPACT Diode.
 - 4.7.5 What are fundamental of Maser.& LASER & its applications.

RECOMMENDED BOOKS:

a) Text Books:

1. Electronic Communication by G.Kennedy.
2. Microwave & Radio Engg. by M.Kulkani- Ummesh Publication.

b) Reference Books:

1. Radio Engineering by M.L. Gupta.
2. Microwave Engineering by Dharma Ray Cherulu.
3. Microwave & Radar Engineering – M.L Sisodia, Vijay Laxmi Gupta & J.P Agarwal.
4. Fundamental Of Microwave And Radar Engg. By Er K.K. Sharma

V/SEM/ETC/TH-3

**COMPUTER NETWORKS & MOBILE TECHNOLOGY
FIFTH SEMESTER**

Period / Week: 5 P/W

End Exam.: 3Hrs.

Total Contact hrs:75 P

Total Marks: 100

Theory : 80

I.A. : 15+5

A: RATIONALE:

This course is providing the study of basic principle of Networking of computers, Network Model, Protocol, Topology & Classification, Data Communication Circuit, and Components of LANs & Internet. This Course also contains the wireless communication including basic technology and 3G wireless networks.

B: OBJECTIVS:

At the end of the course the students should be able to :

1. Know the Network Components, Classification, Topology & its Functions.
2. Know the different types of Protocols.
3. Know the different types of Network Circuit.
4. Know the Broadband Technology & Internet.
5. Concept of LAN.
6. Know the Technology of Cell Phone & generations.

C: TOPIC WISE DISTRIBUTION OF PERIODS:

Sl.no.	Topics	Periods
1.	NETWORK COMPONENTS, FUNCTIONS AND FEATURES	08
2.	NETWORK TOPOLOGY & CLASSIFICATION	05
3.	DATA COMMUNICATION CIRCUITS	05
4.	SWITCHING	05
5.	PROTOCOLS	05
6.	LOCAL AREA NETWORK (LAN)	06
7.	NETWORK ELEMENTS	06
8.	INTERNET	15
9.	WIRELESS COMMUNICATION	15
	TOTAL	75

D: COURSE CONTENTS IN TERM OF SPECIFIC OBJECTIVES:

1. Network Components, Functions and Features :

- 1.1 Define Networking & what is a network criterion.
- 1.2 What are the Advantages of Networking?
- 1.3 Explain Networking Models.(Server, Client)
- 1.4 Explain Transmission Media & Shared Data, Share Peripherals,
- 1.5 Explain NIC & Card & its applications.
- 1.6 Explain Local Operating System,
- 1.7 Explain Networking Operating System.

2. Network Topology & Classification

- 2.1 Define the Network Topology.
- 2.2 Describe various Network Topology.(Star, Bus, Ring, Mesh.)
- 2.3 State the different classification of Networks
- 2.4 Explain the different Networks model. (LAN, WAN, MAN)
- 2.5 Explain interconnection of Network.

3. Data Communication Circuits

- 3.1 Explain different Data Communication Circuit.
 - i. Serial & Parallel Transmission.
 - ii. Synchronous & Asynchronous Transmission.
 - iii. Simplex, Half Duplex, Full Duplex.

4. Switching

- 4.1 Define Switching.

4.2 Explain the Features of circuit switching and packet switching (Data gram approach & Virtual circuit approach) and its comparison.

4.3 Explain the features of cell switching.

5. Protocols

5.1 Define Data Communication Protocols.

5.2 Discuss the 7 layers of OSI model.

6. Local Area Network (LAN)

6.1. Name different types of LAN Components

6.2 Explain Hardware & Software

6.3 Describe Transmission Channel.

6.4 Explain Network Interface Card.

6.5 Explain briefly LAN operating system.

6.6 Describe Wireless LAN.

7. Network Elements

7.1 Explain the following terms –
Hub, Bridge, Router, Gateway Modem, Dial in Remote Access.

8. Internet:

8.1 Explain Internet Protocols, TCP/IP: IP address and its format, TCP/IP Based Package and its standards.

8.2 Explain World Wide Web(WWW), WWW Browsers, Servers, HTTP Universal Recourses Locator (URL), Search Engines and Hypertext.

8.3 Define Browser. Customization of browser, Saving and printing of Web page, internet Explorer.

8.4 Explain Types of Internet Connection and common name structure of three security protocols.

8.4.1 Discuss the type of Internet Connection (Dial Up, SLIP, PPP, ISDN, Cable Modem, DSL (ADSL & SDSL), Direct Connection(Leased Connection, Satellite Connection))

8.4.2 Define Broadband Access Technology:

8.4.2.1 Discuss the various Broadband Access Technology & Wire line Technology

8.4.2.2 Explain DSL on copper loop, Optical Fiber Technology, Cable TV network

8.4.3 Explain Wireless Technology:

8.4.3.1 Explain Bluetooth Technology.

8.4.3.2 Explain the concept of WiMax, WiFi Technology.

8.4.3.3 Explain the concept of Network Architecture (i.e, ASN, CSN)

8.4.3.4 Explain handover processes.

9. WIRELESS COMMUNICATION:

CELL PHONE :

9.1 Explain the concept of frequency reuse channel assignment strategic handoff co-channel Interference and system capacity of a Cellular Radio systems.

9.2 Define Cell & Explain the improving coverage and capacity in cellular system (Cell Splitting, Sectoring)

9.3 Explain Wireless Systems and its Standards.

9.4 Discuss the GSM (Global System for Mobile) service and features.

9.5 Discuss the architecture of GSM system & GSM mobile station.

9.6 Discuss radio sub system and channel types of GSM system.

9.7 Discuss the frequency and channel specifications of CDMA system.

9.8 Explain the working of forward and reveres CDMA channel.

9.9 Discuss the architecture and features of GPRS.

9.10 Discuss the mobile TCP, IP protocol.

9.11 Discuss the operation of Wireless Application Protocol (WAP).

9.12 Discuss the architecture and features of SMS.

- 9.13 Discuss the architecture and features of MMS.
- 9.14 Discuss the features of EDGE system.
- 9.15 Discuss the features of 2G, 2.5G & 3G Wireless network.
- 9.16 What is Smart Phone and discuss its features.
- 9.17 Name the different operating systems (Software) required for mobile and what is the function of mobile operating system.
- 9.18 Discuss the Principle of WLL.& PCS System.
- 9.19 Discuss Mobile Radio Propagation (Path Loss, Distraction, Scattering)

RECOMMENDED BOOKS:

A: TEXT BOOKS

- 1. Advance Communication Engineering by Tomasi, EEE.
- 2. Data Communication and Networking by B.A.Forouzan
- 3. Mobile Communication By G.K.Behera & Lopamudra Das .

B: REFERENCE BOOKS

- 1.Data Communication & Computer Networks-ISR D group
- 2.Mobile Communication- G.K.Beher & Lopamudra Das-S.Chand.
- 3. Introduction to wirles Telecommunication Systems & Networks-Mullett.
- 4. Mobile Computing by Dr.N.N.Jani & N.Kannabar-S.Chand.
- 5.Wireless Communications by T.L.Singal

V/SEM/ETC/TH-4

AUDIO, VIDEO & TV ENGINEERING
FIFTH SEMESTER

Theory : 5 P/W
Total Theory: 75 P

Examination: 3Hr
Total Marks: 100
Theory: 80
I.A.: 15+5

A: RATIONALE:

This course is aimed at providing study of basic principle of Audio, Video, & TV System and its components including microphone, Loudspeaker. The course content consists of study of basic principle of TV System including the generation & receiving System. The recent developments in TV Technology has also in corporate.

B: OBJECTIVES

At the end of the course the students should be able to develop knowledge and skills in the following topics:

- 1. Discuss the wave motion Sound Waves, Audio Frequency Waves.
- 2. Discuss the characteristics of sound waves.
- 3. Discuss the different types of Microphones & the applications.
- 4. Discuss the different types of Loud speaker & the applications.
- 5. Discuss the principle of operation of Hi-Fi & Stereo Phonic System.
- 6. Explain the fundamental principle of TV transmission and reception.
- 7. Explain the principle of working of TV camera. (CCTV)
- 8. Explain the principle of colour TV system.
- 9. Discuss the principle of working of different display device.
- 10. Discuss the comparison of NTSC,PAL, and SECAM system.
- 11. Discuss the principle of Digital TV.
- 12. Discuss the principle of HDTV.
- 13. Discuss the principle of CCTV & remote control.

C:TOPIC WISE DISTRIBUTION OF PERIODS.

Sl.No.	Topics	Periods
1	Sound Waves	04
2	Microphone	10
3	Loudspeaker	10
4	(Hi-Fi) audio and stereo sound system	09
5	Television Principle	15
6	Colour TV	15
7	Advanced TV System	12
	TOTAL	75

D : COURSE CONTENTS IN TERM OF SPECIFIC OBJECTIVES:

1. SOUND WAVES

- 1.1 Define Wave motion, Sound waves, Audio Frequency Waves, Discuss the Characterise of sound (Pitch, Intensity & Loudness). Define Reverberation & Acoustics.

2. MICROPHONE

- 2.1 Discuss the characteristics of Microphones (Sensitivity, Frequency Response, Output Impedance, Distortion, Directivity):
- 2.2 Discuss the Principle of operation, construction of moving coil microphone, piezo electric. (Advantages & disadvantages)
- 2.3 Discuss the application of special type microphones. Cardioid Microphone, Tie Clip Microphone, Wireless Microphone, Lavalier Microphone & Differential Microphone.

3. LOUDSPEAKER

- 3.1 Features of Loudspeaker Sensitivity, Frequency Response, Input Impedance, Distortion, Directivity)
- 3.2 Discuss the construction and working principle of loudspeaker.(Moving Coil Loudspeaker).
- 3.3 Discuss the working & utility of Baffles and enclosure, Colum Loudspeaker. Woofers and Tweeters and Cross over circuit.

4. High fidelity (Hi-Fi) audio system and Stereo sound system

- 4.1 Discuss the basic features of High fidelity
- 4.2 Discuss the a signal to Noise ratio, Non-linear Distortion, Frequency Response, Intensity of Sound, Good Environment.
- 4.3 Discuss the Equalisation and tone control.
- 4.4 Explain the concept of monophonic & stereo phonic sound system.
- 4.5 Discuss the purpose of stereo controls, loudness control, Blend control, Balanced Control, master Gain control & Graphic Equalizer system.

5. TELEVISION ENGINEERING.

- 5.1 Discuss the basic idea of television system.
- 5.1.1 State and explain the following terms.
- 5.1.1.1 Aspect ratio, Rectangular Switching.
- 5.1.1.2 Flicker.
- 5.1.1.3 Resolution.
- 5.1.1.4 Video bandwidth.
- 5.1.1.5 Interlaced scanning.
- 5.1.1.6 Composite video signal, discuss horizontal & vertical sync. Detail.
- 5.1.1.7 Television broadcast standards.

- 5.2 Describe principle of operation of CCD cameras.

- 5.3 Draw the block diagram of Monochrome TV transmitter and explain the function of each block.

- 5.4 Draw the block diagram of Monochrome TV receiver & explain the function of each block.

- 5.5 Draw a black diagram of SMPS of TV and explain its working principle.

6. Colour TV.

6.1 Discuss the colour TV signals (Luminance Signal & Chrominance Signal,(I & Q,U & V Signals). Bandwidth of Chrominance Signal.

6.2 Discuss the Modulation of Chrominance Signal, Colour sub carrier frequency & colour burst.

6.3 Explain the working principle of PAL Encoder and Decoder.

6.4 Discuss the comparison about NTSC, SECAM and PAL system.

6.5 Discuss the principle of operation. of

- Shadow mask
- Trinitron picture tube.
- Flat panel Display
- Plasma Display
- LCD display,
- Large Screen Display.

6..6 Comparison between Flat panel Display, Plasma Display, LCD display, Large Screen.

7. ADVANCED TV SYSTEM

7.1 Digital TV technology: Discuss the merits of digital TV techniques, Merit & Demerits.

7.2 Explain (Digital TV Signals, Transmission of digital TV signals & Digital TV receivers Video programme processor unit.

7.3 Explain the principle of HDTV system, Standard & Compatibility.

7.4 Describe the working principle of remote control of TV Receiver.

7.5 Describe the working of CCTV.

7.6 Describe the working of Direct Broadcast Satellite.

7.7 Explain briefly about CAMCORDERS & Video Disk System.

RECOMMENDED BOOKS:

A.Text Book:

1. Television & Video Engineering by A.M.Dhake, Tata Mc Graw Hill.
2. Consumer Electronics by B.R.Gupta, S K Kataria & Sons.

B.Reference Books:

1. Radio Engineering by M.L.Gupta.
2. Monochrome & colour T.V-R.R. Gulati.

ADVANCED MICROPROCESSOR & VLSI
FIFTH SEMESTER

Theory : 4 P/W
Total Theory: 60 P

Examination: 3Hr
Total Marks: 100
Theory: 80
I.A.: 15+5

A: RATIONALE :

This course gives the basic understanding of microprocessor (Advanced) & VLSI System. Now a days it has been included every where for day today life. This includes features of Microprocessors and its Standars. The VLSI design is to helps the idea about Logic design including testing & simulation.

B: OBJECTIVES :

On Completion of the course the student will able to

- Know the advanced Microprocessor & its standards.
- Know the VLSI design.
- Know the concept of MOS, Transistor & Invertors.
- Know the combinational & sequential logic circuit.
- Know the system design methods.

C: TOPIC WISE TISTRUBUTION OF PERIODS :

Sl.No.	Topics	Periods
1	ADVANCED MICROPROCESSORS AND STANDARDS	15
2	INTRODUCTION TO VLSI	08
3	FABRICATION OF MOSFET	08
4	MOS TRANSISTOR	05
5	MOS INVERTERS	05
6	COMBINATIONAL, SEQUENTIAL & DYNAMICS LOGIC CIRCUITS	12
7	SYSTEM DESIGN METHOD & TESTING	11
	TOTAL	60

D: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES**1. ADVANCED MICROPROCESSORS AND STANDARDS**

- 1.1 Explain the block diagram of advanced microprocessor, bus interface unit- Microprocessor cache super scalar issue of instructions, integer unit-floating point unit-MMU.
- 1.2 Explain Memory Hierarchy – Register file –cache-address mapping- virtual memory and paging segmentation.
- 1.3 Discuss Pipe lining – pipe line hazards Instruction level parallelism, RISC versus CISC.
- 1.4 Basic features and compare between 80486 & Pentium IV processor.
- 1.5 Bus Standards:
Explain Parallel Centronics – Serial RS 232 – I²C – USB - IrDA

2. Introduction to VLSI –

- 2.1 Define Historical perspective.
- 2.2 Explain VLSI Design methodologies & VLSI Design Flow.
- 2.3 Explain Design Hierarchy, Design Styles & CAD Technology.

3. Fabrication of MOSFET

- 3.1 Explain Fabrication processes (NMOS Fabrication, CMOS n-well process)
- 3.2 Explain Layout Design rules.
- 3.3. Explain Stick Diagrams.
- 3.4 Explain Full Custom Mark layout Design.

5. MOS Transistor

- 4.1 Explain structure and operation of MOSFET (n-MOS enhancement type)& COMS
- 4.2 Explain MOSFET V-I characteristics
- 4.3 Explain MOSFET scaling and small geometry effects.

4.4 Explain MOSFET capacitances.

4.5 Explain Modeling of MOS Transistors including Basic concept the SPICE level-1 models, the level-2 and level-3 model.

6. **MOS Inverter**

5.1 Explain Basic NMOS inverters, characteristics,

5.2 Describe inverters with resistive load and with n-type & MOSFET load

5.3 Explain CMOS inverter and characteristics and interconnect effects: Delay time definitions

5.4 Explain inverter design with delay constraints.

5.5 Explain estimation of parasitics switching power dissipation of CMOS inverters.

7. **Combinational, Sequential & Dynamics logic circuits**

6.1 Define MOS logic circuits & CMOS logic circuits. state style, complex logic circuits, pass transistor logic.

6.2 Explain SR latch, clocked latch & flip-flop circuits.

6.3 Explain Dynamic logic & basic principles.

6.4 Define high performance dynamics CMOS circuits.

6.5 Define Dynamic Ram, SRAM, flash memory.

8. **System Design method & Testing**

7.1 Describe Design strategies & concept of FPGA with standard cell based design.

7.2 Explain design capture tools, hardware definition languages such as VHDL and packages. Xilinx (introduction)

7.3 Explain introduction to IRSIM and GOSPL (open source packages).

7.4 Explain design verification and testing, simulation at various levels including timing verification, faults models.

7.5 Design strategies for testing chip level and system level test techniques.

Text Books :

1. Advanced Microprocessor & Peripherals- A. K. Ray & K.M. Bhurchandi

2. COMS Digital integrated Circuits –Analysis & Design –Sung Mo-Kang & Yussuf Leblebici, TMH.

3. VHDL Programming by example – Perry TMH.

Reference Books :

1. Digital Integrated Circuits : A Design Perspective – Rabey et.al. Person Education.

2. VLSI design Techniques for analog and digital circuits – R. L. Geiger ,Allen & N.R.Strader (McGraw Hill.)

3. Principle of VLSI Design by S.Sumathi

V/SEM/ETC/PR-1

POWER ELECTRONICS LAB
FIFTH SEMESTER

Period / Week: 4 P/W
Total Contact hrs:60P

End Exam.: 25
Sessional: 25
Exam. Time: 4 Hours

A: RATIONALE :

On completion of this Lab. The students will be familiar with power electronics devices, different triggering circuits and applications of SCR and other industrial applications.

B: OBJECTIVES :

After undergoing this course, the student will be able to,

1. Know the characteristics and applications of SCR, DIAC and TRIAC.
2. Understand circuits and equipments used for control of temperature, level and illumination.
3. Understand electronic speed control of motors and voltage regulation.
4. Know the operation of relays and timers.

C: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES:

1. To plot V-I characteristics and test whether the device is good or defective
 - a) SCR
 - b) DIAC
 - c) TRIAC
 - d) GTO
 - f) IGBT
2. To construct and test
 - a) UJT relaxation oscillator
 - b) SCR triggered by UJT relaxation oscillator, half wave and full wave
3. To construct and test using SCR
 - a) R firing circuit
 - b) RC firing circuit
 - c) UJT Triggering
4. SCR used as DC Circuit breaker.
5. To construct and study temperature controller using TRIAC
6. To construct and study lamp dimmer using TRIAC
7. Optocoupler-its application as an SCR

8. To construct and test fan motor speed control circuit using TRIAC.
9. Study speed control circuit of DC motor
10. To construct and study simple timers using ICs and SCR
11. To construct and study time delays
12. To construct and study
 - a) Proximity switch
 - b) Burglar alarm
 - c) Fire Alarm
 - d) Smoke Detector
13. Study of sequence control circuits
14. Study of UPS Unit
15. Study of servo type voltage AC stabilizer

Reference books

1. SCR manual-GE company
2. Power electronics-RS Ramshaw
3. Thyristors and their applications- M Rammoorthy
4. Industrial Electronics Test lab manual – Paul B Zbar
5. Instructional manual supplied by manufacturers

V/SEM/ETC/PR-2

MICROWAVE ENGINEERING LAB
FIFTH SEMESTER

Period / Week: 3 P/W
Total Contact hrs:45 P

End Exam.: 25
Sessional: 25
Exam. Time: 4 Hours

A: RATIONALE :

On Completion of this Lab. the student get knowledge of Microwave Engineering such as Microwave components tubes & semiconductor devices. This also include transmission line trainer & antenna trainer.

B: OBJECTIVES :

After undergoing this course, the student will be able to,

- Know Microwave Trainer.
- Transmission Line Trainer.
- Wave Propagation Trainer.

C: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES:

1. To study different types of Microwave components.
2. Study of V-I Characteristics of Gun Diode.
3. Determine the frequency & wave length of rectangular wave guide.
4. Measure VSWR of different types of load (Matched, Open, Shorted)using Microwave test bench.
5. To measure the attenuation of a given attenuator.
6. Study PC to PC communication.
7. Observe the Wave forms in transmission Line.
8. Find the Standing Wave ratio (Open & Short Circuit).
9. Find the different losses in Transmission line.
10. Study the different type of antenna & find its gain.
11. Find the characteristics of antenna.
12. Study & visit the Microwave Station & prepare a project report.
13. Study mobile Trainer Kit
14. Draw the waveform of different lobe of different Antennas using antenna trainer

AUDIO, VIDEO AND TV ENGINEERING LAB
FIFTH SEMESTER

Period / Week: 3 P/W
Total Contact hrs:45P

End Exam.: 25
Sessional: 25
Exam. Time: 4 Hours

A: RATIONALE :

This Lab. has been designed for basic principle of Audio, Video & TV Engineering which includes the study of Colour TV receiver, CC TV & different section including fault finding

B: OBJECTIVES :

After undergoing this course, the student will be able to,

- Study the different section of colour TV.
- Study the section of CC TV
- Concept of Audio recording

C: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES:

1. To study various types of Microphone & Loudspeaker and connect in P.A. system and determine the frequency response, speakers directional characterises (Microphone).
2. Study of Woofer & Tweeter.
3. Study of stereo-ponic control, loudness control, Gain control & graphic equaliser control of Hi-Fi System.
4. Study the Block diagram of colour TV receiver and draw the circuit.
5. Study the Operation of Electronic Tuner.
6. Observe the waveform of composite video signal, sync pulses and sound section.
7. Study the SMPS section and find out load & line regulation.
8. Study the various faults in colour TV.
9. Connect the cable TV & CCTV using Digital camera & Colour TV & observe the output.
10. Study the Principle of Digital TV & HDTV System.
11. Study basic principle of Flat screen picture tubes, LCD & Plasma.
12. Identify different section and parts & voltage measurement and waveform analogies of above systems.
13. Audio Video recording formats MP3, JPEG & MPEG, Media-Tapes & compacts disks and prepare ring tone for mobile using mobile Software.
14. Mini Project on above.

ADVANCED MICROPROCESSOR & VLSI LAB
FIFTH SEMESTER

Period / Week: 3P/W
Total Contact hrs:45 P

End Exam.: 25
Sessional: 25
Exam. Time: 4 Hours

A: RATIONALE :

This Lab. Will enable the students gather knowledge in microprocessor (Advanced) & VLSI Lab.

B: OBJECTIVES :

After undergoing this course, the student will be able to,

- Understand about Advances Microprocessor.
- Understand VDHL code for different application.
- Implement FPGA kit.

C: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES:

1. Write simple VHDL Codes for
 - a. Addition. b. Subtraction. C. Multiplication.
 - b. Division and implement on FPGA kit.
2. Write a VHDL Code for
 - a. 8 Bit Digital output using LEDs. b. 8 Bit Digital inputs using.
3. Write VHDL Code for 4 x 4 matrix keypad interface.
4. Write a VHDL Code for
 - a. Relay interface b. Buzzer Interface
5. Write a VHDL code for 7 segment LED display interface.
6. Write a VHDL code for Stepper motor interface.
7. Write a VHDL code for Traffic light control.
8. Write a VHDL code for 4 bit binary counter an study all using simulation software.
9. Write a VHDL code for LCD display to display a text message.
10. Write a VHDL code to generator PW M signals for DC Motor control.
11. Write a VHDL code & implement of FPGA kit for MUX & DEMUX.
12. Write a VHDL Program & implement of FPGA kit for Encoder, Decoder & Shift Register.
13. Study of Advanced microprocessor such as 32Bit, 64Bit, etc.
14. Generate music using PC Hardware.
15. Communicate between Microprocessor & Computer.

EQUIPMENT REQUIRED:

1. VDHL Simulator Software.
2. Synthesis Software.
3. FPGA / CPLD training Kit.
4. Experiment boards in which programmed FPGA / CPLD can be used.

RECOMONDED BOOKS:

1. VHDL Primer by J.Bhasker.
2. VHDL by Douglas Perry.

SUBJECT :INFORMATION SEARCH, ANALYSIS AND PRESENTATION Lab.

FIFTH SEMESTER

Period / Week: 3
Total Contact hrs:45

End Exam.: 25
Sessional: 25
Exam. Time: 4 Hours

1. TOPIC ANALYSIS:

PART ONE: WRITTEN COMMUNICATION (15 Hrs)

A] WRITE RESEARCH PAPERS AND ARTICLES(OR PPT)

B] OTHER WRITTEN COMMUNICATION ACTIVITIES

1. Reports
 - a) Formal Reports
 - b) Progress Reports
 - c) Feasibility Reports
 - d) Laboratory Reports
2. Technical Proposals
3. E-mail
4. Instructions and User Manual
5. Job-Hunting Materials
 - a) Resumes
 - b) Letters for Job Hunting
6. Business Letters
7. Memo, Notices, Agenda and Minutes

PART TWO: ORAL COMMUNICATION (15 Hrs)

A] TRANSPARENCY – BASED PRESENTATION OR (PPT)

B] OTHER ORAL COMMUNICATION ACTIVITIES

1. Dyadic Communication (Interaction between two persons example Telephone Conversation)
2. Meetings
3. The Job Interview
4. Group Discussion
5. Debates
6. Case Study

NOTE:

1. Both Written Communication and Oral Communication activities are to take place concurrently. That is every week 3 Hrs (Periods)of Written Communication / 3 Hrs (Periods)of Oral Communication activity has to take place.
2. Topic selected for part one 'A' and part two 'A' are to be separate and it is left to the student's choice.
3. The output of part one 'A' activity is a well documented written report, which will be evaluated at the time of examination.
4. The out put part two 'A' activity is the production of transparencies which the student will use at the time of presentation in the examination.
5. It may not be possible to do maintain a log of activities shown under part one 'B' and part two 'B'. However student has to do as much activity as possible.
6. Every student has to maintain a log of activity file, as per the Performa shown below.

The concerned staff members has to sign on each day and principle has to certify on the last page in the end. Maintain separate sheets for part one and part two.

Sl. No	Date & Time	Activity	Brief Description	Signature of Staff
1.				
2.				

Activity under part one 'B' and part two 'B' will be evaluated on the basis of his log of activity file.

2. INTRODUCTION:

The average engineer walking out of education institution is surprised by the amount of non-technical work he or she faces in the world (by the amount of personal contact, the number of phone calls, meetings, reports and presentations etc).

Further many cannot find appropriate jobs, because employer's complain that students lack these key skills.

This course attempts to provide a slice of that kind of practical training in a form that may be used in a classroom setting.

This course is NOT a course that is taught to the students in the manner that conventional courses are taught. In this course the emphasis will shift from **teacher – oriented – methods to students – oriented – methods**. While the **information – skills** acquired by all students will be the same, the actual methods and techniques used by each student will vary according to his or her initiative, and various other parameters – individual / group projects allotted, effort put in, enthusiasm shown, discussion held, and so on.

3. OBJECTIVE:

1. Some education researchers in U.S.A. found that 17-year olds, in a single academic year, learn about 200 to 300 new words, in a university environment.

However, during the same period, at their informal home and play environment, they acquire around 4000 words! Strangely enough, learning seems to be higher in an informal environment, than in an academic one, designed specifically for this purpose.

This, they found was because, in an informal home and play environment, the student's learning is self motivated – the student learns because he or she wants to, and needs to **fit-in**. The objective of this course is to simulate an informal learning environment.

2. This course provides an ideal opportunity to acquire skills in **learning – to – learn** which is very essential for his professional growth later on.
3. To inculcate information skills into students i.e., to let the students acquire information skills on their own initiative and grow with age.
4. Another main objective of this course is to develop written communication skills in students.

NOTE: Information skill – Awareness of an idea, details of an idea and where to look for.

4. ACTIVITIES:

PART ONE: WRITTEN COMMUNICATION (15 Hrs)

RESEARCH – Source of Information

- a) People
- b) Print Media
 - News Paper
 - Magazines
 - Journals
 - Vendors Catalogues
- c) Electronic Information
 - CD-ROM
 - The Internet
 - Usenet Newsgroups
 - Connecting to other computers
 - The World Wide Web

Student project can be done individually or in groups of not more than five depending on the theme (or main) subject.

Sample Projects:

1. Research the anti-lock braking system used in cars and describe the principle of its operation.

2. Research the mechanism of Laser Printer and describe the principles of its operation.
3. Research the Control Area Network (CAN) protocol used with cars.(Ref. for 1, 2 and Mechatronics by W.Bolton)
4. Research the configuration, price and features of a typical 10/100 Mbs Ethernet Network Interface Card (NIC). Consider features such as media support, transmission distance for a 10/100 BASE-T operation and driver support.
5. Research the price, size and capabilities of a nominally 24 port 10/100 Mbs Ethernet Hub that is applicable for use in a medium size enterprise LAN. Consider features such as transceiver options for support of different media, auto sensing capability, how many units can be stacked and status monitoring.
6. Research the price and features of some typical print and Ethernet LAN Servers. Consider features such as the number of ports, memory size and protocols supported.
7. Research the characteristics of some commercially available multimode optical fibres, connectors, transmitters and receivers for LAN use. Assume LAN data rates are 10 and 100 Mbps and transmission distance could range upto 500m.
8. Examine the trade literature to find recent applications of 10-Gigabit Ethernet. Were these applications for local, metropolitan or wide area networks? What was the purpose of these implementations? Who was using these systems? Why was 10-Gigabit Ethernet chosen versus another technology?
9. Research the characteristics and functions of at least two Bluetooth P.C. adapter cards that are commercially available. Consider parameters such as support of the operating system, device interfaces, size and power consumption.
10. Research what Internet Service providers are available in your area. Describe some of the features that an ISP might provide. For example, consider questions such as: What connection options do they offer? What is the highest connection rate that is available? What equipment do you need to access the Internet at these speeds?
11. Describe the capabilities of at least two commercially available LAN protocol analysers. Consider parameters such as data rates that it supports, what protocols it support, error detection features and recording options.
12. Compare the LAN-monitoring capabilities of HP Open View, CISCO LAN Management Solution, Novell Manage Wise. Consider factors such as support of RMON, device-discovery capabilities, report generation and fault tolerance capabilities.
13. Using web based resources, describe the capabilities of two different commercially available data encryption devices.
14. Using the web resources or the literature compare the advantages and limitations of at least three biometric devices for authentication purpose. For example, the technologies might be based on fingerprints, palm prints, retinal patterns or voice recognition.

Project No.14 – Group of 3 Students can do.

(Ref for 4 to 14: Local Area Networks by Gerd Keiser).

PART TWO – A: TRANSPARENCY (OR PPT) BASED PRESENTATION:

- 1.1 Preparation
 - 1.1.1 Audience Analysis
 - 1.1.2 Information Gathering
 - 1.1.3 Transparency Design using Power Point
 - 1.1.4 Producing the Transparency for O.H.P./P.P.T.

Sample Projects:

1. Prepare and deliver a brief transparency based presentation using one of the topics.
 - a) Technicians are properly appreciated in society.
 - b) Engineers do not know enough about non-technical topics.
 - c) Laypeople do not know enough about technical topics.

- d) India's products are not competitive in International Market because its quality is not good.
- e) India's Software Professionals are paid too much.
2. Prepare and deliver a brief transparency – based presentation for the opposite side of the issue you in Project-1 above.
3. Prepare and deliver a brief autobiographical presentation.
4. Prepare and deliver a brief biographical presentation of a person know to you.
5. Prepare and deliver a brief sales presentation for a product (example washing machine).
6. Prepare and deliver a brief sales presentation for a service (example Insurance Policy, Maintenance of equipment) with which you are familiar.
7. Prepare and deliver a brief sales presentation that pitches your potential as an employee to a potential employer.
8. Prepare and deliver a technically accurate presentation (for a lay audience) on a technical topic of your choosing.
One example of technical topic. Describe what an embedded system is and what its common characteristics are
9. Prepare and deliver a technical presentation (for an engineering audience) on a topic of your choosing.
Example of topic Microcontroller based digital panel meter – include
 - (a) Circuit description
 - (b) Program description
10. From a group with five members and choose one of the topics given below. In a brief planning session, divide the topic into subtopics (already done) for a group Presentation. Prepare and deliver the presentation.
 - 10.01.1 Select five India's top wealth creating companies and study their performance in the last five years? Can any lessons be learnt from their experience, any forecast be made?
 - 10.01.2 Company 1
 - 10.01.3 Company 2
 - 10.01.4 Company 3
 - 10.01.5 Company 4
 - 10.01.6 Company 5
 - 10.02 "Internet ushers in a new era in computing short and colourful history". Bill Gates predicates that with in a decade, Internet would become as mainstream as water or electricity. Study the Impact Internet could have on life and the way we do business, through the following 5 aspects:
 - 10.02.1 Publishing and Advertising
 - 10.02.2 Electronics Shopping
 - 10.02.3 Entertainment
 - 10.02.4 Education and Training
 - 10.02.5 Social Impact
 - 10.03 Asynchronous Transfer Mode (ATM) is claimed to be the communication technology that will allow total flexibility and efficiency need for high speed, multi-service multimedia networks. Many network experts predict that ATM will be the technology that finally enables high bandwidth time-critical applications to reach the desktop. Give a study on this, covering the following aspects:
 - 10.03.1 What is ATM?
 - 10.03.2 What new applications will be enabled by ATM ?
 - 10.03.3 How does ATM differ from exiting network technologies?
 - 10.03.4 How will application programs use A.T.M.?
 - 10.03.5 What products that support ATM are available in the market.
 - 10.03.6 Give brief description of five products or product sub-systems which could be Embedded systems, choosing examples from the following environment:
 - 10.03.7 Domestic

- 10.03.8 Automotive
- 10.03.9 Medical – Electronic
- 10.03.10 Industry
- 10.03.11 Office.

5. EXAMINATION:

1. Ten students per batch of 4 Hrs duration.
2. Marks allotment

Part One: Written Communication

- A. Research Paper and Articles – Report : 05Marks**
- B. Other Written Communication Activities : 05 Marks**

Part Two: Oral Communication

- A. Transparency based Presentation : 05 Marks**
- B. Other Oral Communication Activities : 10 Marks**

3. Evaluation:

- 3.1 For part one ‘A’ on the basis of the report submitted by the student.
- 3.2 For part two ‘A’ on the basis of the 10 minutes oral presentation by the student
- 3.3 For part one ‘B’ on the basis of log of activity file.

6. REFERENCE:

Books:

Sl. N.o	Title	Author	Publisher
1.	Life Skills and Leadership for Engineers	David.E.Goldberg	Tata McGraw - Hill
2.	Developing Communication Skills	Krishna Mohan Meera Banerji	Macmillan India Ltd.
3.	Power Speak	Dorothy Leeds	East-West Books Pvt.Ltd.
4.	Developing Presentation Skills	Dr.R.L.Bhatia	Wheeler Publishing
5.	Steps to Writing Well	Jean Wyrick	Thomson Learning
6.	Business Students Hand Book	Sheila Cameran	Pearson Education
7.	Information Search and Analysis Skills		NIIT
8.	A Beginner’s Guide to Technical Communication	Anne Eisenberg	McGraw Hill International
9.	A Guide to Technical Communication	James Sherlock	Ally and Bacon inc., USA
10.	Technical Writing	Sharon J Gerson Steven M. Gerson	Pearson Education
11.	Basic Communication Skills for Technology	Andrea J Rutherford	Pearson Education
12.	How to Write for the World of Work	Thomas E Pearsall Donald H Cunningham	Prism Book Pvt.Ltd.
13.	Technical Writing and Professional Communication	Thomas N Huckin Leslie A Olsen	McGraw Hill International
14.	Business Communication	Bovee Thill	Pearson Education
	Today	Schatzman	
15.	Business Communication	Mary Ellen Guffay	Thomson

16.	Critical Thinking	Greg Bassham etc.,	McGraw Hill
17.	Advanced Business Communication	Penrose / Rasberry / Myers	Thomson
18.	Strategies for Engineering Communication	Susan Stevenson / Steve Whitmore	Wiley

Journals:

1. Business World
2. Business Today
3. Business India
4. Voice and Data
5. Data Quest
6. it Information Technology
7. Electronics for you
8. Network Magazine
9. Network Computing
10. Developer IQ
11. Developer 2.0

Television:

1. BBC – Hard Talk
2. 24 x 7 NDTV – Big Fight

Web Sites:

1. ATM Forum <http://www.atmforum.com>
2. CISCO <http://www.cisco.com>
3. 3 Com <http://www.3com.com>
4. Extreme Network <http://www.extremenetworks.com>
5. Hewlett Packard <http://www.hp.com>
6. Novell <http://www.noveli.com>