

## **ELECTRONICS ENGINEERING (For Uttaranchal State)**

<h3 style="margin: 0;"><b>VARIOUS SUBJECTS IN <u>THIRD YEAR</u></b></h3>
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## 5.1 CONSUMER ELECTRONICS

L T P  
3 - 3

### RATIONALE

Consumer Electronics includes cooking, cooling and cleaning appliances. The objective of teaching this subject is to give students to introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, CD systems. TV, VCR and other items like digital clocks, calculators, microwave ovens, Photostat machines etc. Which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

### DETAILED CONTENTS

- |    |   |          |
|----|---|----------|
| a) | Audio System  | (10 hrs) |
|    | 1.1 Microphones: construction, working principles and applications of microphones, their types viz: a) Carbon b) moving coil, c) velocity, d) crystal, e) condenser, e) cordless etc.   |          |
|    | 1.2 Loud Speaker: Direct radiating, horn loaded woofer, tweeter, mid range, multi-speaker system, baffles and enclosures.   |          |
|    | 1.3 Sound recording on magnetic tape, its principles, block diagram, and tape transport mechanism   |          |
|    | 1.4 Digital sound recording on tape and disc  |          |
|    | 1.5 VCD, DVD and Video Camera   |          |
|    | Principle of video recording on CDs and DVDs. Recordable and Rewritable CDs. Study of VCD and DVD Systems. Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers Introduction of functioning of digital movie and still camera   |          |
| b) | Television  | (16 hrs) |
|    | 2.1 Monochrome TV Communication:  |          |
|    | <ul style="list-style-type: none"> <li>- Elements of TV communication system.</li> <li>- Scanning- its need for picture transmission.</li> <li>- Need for synchronizing and blanking pulses.</li> <li>- Progressive scanning- Gross structure filters, interlaced scanning, resolution and band width requirement, tonal gradation.</li> <li>- Composite Video signal (CVS) at the end of even and odd fields.</li> </ul> |          |

- equalizing pulses and their need
  - Monochrome picture tube – construction and working, comparison of magnetic and electric deflection of beam
  - Construction and working of camera tube: vidicon and plumbicon, Block diagram of TV camera and the transmitter chain.
  - Block diagram of a TV receiver: function of each block and waveform at the input and output of each block.
- c) Colour TV (14 hrs)
- Primary colours, tristimulus values, trichromatic coefficients, concepts of additive and subtracting mixing of colours, concepts of luminance, Hue and Saturation, Representation of a colour in colour triangle, non spectral colour, visibility curve
  - Compatibility of colour TV system with monochrome system. Block diagram of colour TV camera, Basic colour TV system-NTSC, SECAM, and PAL their advantages and disadvantages.
  - Need for luminance signal and band sharing by colour signals, sub-carriers frequency, colour difference signal and its need, synchronous quadratic modulation and representation of a colour by a vector, burst signal and its need, chrominance signal.
- d) Working Principle and operation of microwave oven, washing machines, refrigerator cordless telephone, electronic ignition of automobile. (04 hrs)
- e) Cable Television (04 hrs)
- Block diagram and principles of working principle of cable TV and DTH, cable TV using internet

### LIST OF PRACTICALS

1. To plot the directivity pattern and frequency response of a microphone
2. To plot the directivity pattern and frequency response of a loud speaker
3. Demonstration of a tape-transport mechanism of a tape-recorder
4. Trouble shooting of tape-recorder system
5. Different sections of B/W TV receiver
6. To observe the wave forms and voltage B/W and Colour T.V receiver.

7. Tracing in colour TV receiver
8. Demonstration of C.D./ DVD Player.
9. Demonstration and study to VCD especially its transport mechanism.
10. Study of a TV cable network system through internet
11. Demonstration and study of microwave ovens, washing machines and refrigerator and video camera, Photostat machine.

### RECOMMENDED BOOKS

1. Colour Television-principles & practice R.R Gulati by Wiley Eastern Limited, New Delhi
2. Complete Satellite & cable Television R.R Gulati New age International Publisher
3. Colour Television Servicing by RC Vijay BPB Publication, New Delhi
4. Colour Television & Video Technology by A.K. Maini CSB Publishers
5. VCR-principles, maintenance & repair by S.P. Sharma, Tata Mc Graw Hill, New Delhi
6. Colour TV by A.Dhake
7. Service Manuals, BPB Publication, New Delhi
8. Audio-video Systems by RG Gupta

### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Audio System	10	20
2.	Television	16	30
3.	Colour Television	14	25
4.	Working Principle and operation of microwave oven, washing machines, refrigerator etc.	04	10
5.	Cable Television	04	5
<b>Total</b>		<b>48</b>	<b>100</b>

## 5.2 ELECTRONIC INSTRUMENTS AND MEASUREMENT(EIM)

L T P

4 - 3

### RATIONALE

In the real world of work the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. the study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

### DETAILED CONTENTS

1. Basics of Measurements (06 hrs)

Measurement, method of measurement, types of instruments

Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors loading effect, requirements, importance and applications of standards, calibration

2. Multimeter (06 hrs)

Principles of measurement of DC voltage, DC current, AC voltage, AC current, moving coil and moving iron type instruments (voltmeter and Ammeter)

Block diagram of multimeter and measurement of voltage, current and resistance using multimeter

Specifications of multimeter and their applications

Limitations with regard to frequency and input impedance

3. Electronic Voltmeter (08 hrs)

Advantages over conventional multimeter for volt measurement with respect to input impedance and sensitivity

Principles of voltage, current and resistance measurement (block diagram only)  
 Specifications of electronics voltmeter

4. AC Milli Voltmeter (04 hrs)

Types of AC milli voltmeters and their block diagram description  
 Typical specifications and their significance

5. Cathode Ray Oscilloscope (10 hrs)

Construction and working of different blocks used in CRT  
 Time base operation and need for blanking during flyback, synchronization  
 Block diagram description of a basic CRO and triggered sweep oscilloscope, front panel controls  
 Specifications of CRO and their explanation  
 Measurement of current, voltage, frequency, time period and phase using CRO  
 CRO probes, special features of dual beam, dual trace, delay sweep  
 Digital storage oscilloscope: block diagram and working principle

6. Signal Generators and Analysis Instruments (08 hrs)

Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator  
 Distortion factor meter; wave analyser and spectrum analyser

7. Impedance Bridges and Q Meters (08 hrs)

Wheat stone bridge  
 AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge, Schering bridge and Anderson bridge  
 Block diagram description of laboratory type RLC bridge, specifications of RLC bridge  
 Block diagram, working principle and use of Q meters.

8. Digital Instruments (08 hrs)

Comparison of analog and digital instruments

Working principle of ramp, dual slope and integration type digital voltmeter

Block diagram and working of a digital multimeter

Measurement of time interval, time period and frequency using universal counter/frequency counter

Working principle of logic probe, logic pulser, logic analyzer, logic comparator, signature analyzer and logic analyzer

9. Calibration of Instruments (6 hrs)

Calibration of instruments for voltage, current, time, frequency, impedance, and other applications

### LIST OF PRACTICALS

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
2. Measurement of voltage, frequency, time period and phase using CRO by Lissaguos Pattern
3. Measurement of rise time and fall time using CRO
4. Measurement of Q of a coil and its dependence on frequency using Q meter
5. Measurement of voltage, frequency, time and phase using Digital Storage Oscilloscope( DSO)
6. Measurement of resistance and inductance of coil using RLC meter
7. Measurement of distortion of RF signal generator using distortion factor meter
8. Use of logic pulser and logic probe
9. Measurement of time period, frequency, average period using universal counter/ frequency counter
10. Study of operation and features of a logic analyser

### RECOMMENDED BOOKS

1. Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai & Sons, Delhi
2. Electronics Instrumentation by Cooper, Prentice Hall of India
3. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
4. Electronics Instrumentation by JB Gupta, Satya Prakashan, New Delhi

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER**

<b>Topic No.</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allocation</b>
1.	Basics of Measurements	06	10
2.	Multimeter	06	10
3.	Electronic Voltmeter	08	15
4.	AC Milli Voltmeter	04	5
5.	Cathode Ray Oscilloscope	10	15
6.	Signal Generators and Analysis Instruments	08	15
7.	Impedance Bridges and Q Meters	08	15
8.	Digital Instruments	08	10
9.	Calibration of Instruments	06	5
<b>Total</b>		<b>64</b>	<b>100</b>

## 5.3 TROUBLE SHOOTING OF ELECTRONIC EQUIPMENT

L T P  
2 - 4

### 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

1. Repair, Servicing and Maintenance Concepts (06 hrs)
 

Introduction, Modern electronic equipment, Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy, potential problems, 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 (06 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 (02hrs)
 

Test procedures for checking passive components, resistors, capacitors, inductors, chokes and transformers.
  
4. Semiconductor Devices (From testing procedure point of view) (04hrs)
 

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 (06 hrs)

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

6. Typical Examples of Trouble Shooting (06 hrs)

**Any two groups can be chosen for trouble shooting**

Group-I	Group-II	Group-III	Group-IV	Group-V	Group-VI
Inverters	Telephone Handset	T.V (Coloured and black and white), Video Games	Computer and peripherals	Various instruments such as CRO etc	Medical equipment like X-Ray M/cs,
Stabilizers	Cordless Phone	VCRs / VCPs	Printers Laser	Power supplies, Function-generators etc	ECG. M/c, EEG M/cs,
UPS	Fax Machine	Audio System/ Stereo Amplifiers/ TapeRecorders	Printers Inkjet		Scanning M/cs
Emerging Lights	Mobile Phone	CD/VCD/DVD Players			Other Equipment

1. Log Book and History Sheet (02 hrs)

Introduction, preparation and significance of log book and History sheet.

### LIST OF PRACTICALS

- 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
- Develop skill in assembly of components, wiring, soldering and desoldering methods
- Selection and use of commonly used passive components and accessories
- Testing of active and passive components
- Testing of linear integrated circuits
- Use of digital tools for troubleshooting digital components

### LIST OF RECOMMENDED BOOKS

- Repair Manuals

2. Specifications of Equipment supplied by the manufacturer
3. Introduction to Biomedical Equipment Technology – Joseph J. Carr and John M Brown.
4. Principles of Biomedical Instrumentation and measurement – Richard Aston.
5. Introduction to Biomedical Equipment Technology by Carr and Brown, Regents and Prentice Hall of India, New Delhi
6. Principles of Bio-medical Instrumentation and Measurements by Leslie Cromwell, Fred J Weibell, Erich A Pfeiffer Prentice Hall of India, New Delhi
7. Handbook of Biomedical Engineering- R.S. Khandpur.
8. Modern Electronic Equipment Trouble shooting, Repair and Maintenance by RS Khandpur, Tata McGraw Hill Publishing House, New Delhi
9. Bio-medical Instrumentation by M Arumugam, Anuradha agencies Publishers, Vidayakaruppur, Kumbakonam RMS

## 5.4 COMMUNICATION ENGINEERING -II

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3 - 2

### RATIONALE

This subject includes an exposure to microwaves engineering, radar systems, fibre optics and satellite communication. In microwaves industry, job opportunities are available in of assembly, production, installation, repair and maintenance of microwave transmitters and receivers. The knowledge of radar systems allows opportunities with civil and defence organizations dealing with aircraft and shipping. Fibre optics is the latest thrust area in communication with vast opportunities in the private sector.

### DETAILED CONTENTS

1. Introduction to Microwaves (04 hrs)
 

Introduction to microwaves and its applications, Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, SUB, mm)
2. Microwave Devices (06 hrs)
 

Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment)

  - Multi cavity klystron
  - Reflex klystron
  - Multi-cavity magnetron
  - Traveling wave tube
  - Gunn diode and
  - Impatt diode
3. Wave guides (06 hrs)
 

Rectangular and circular wave guides and their applications. Mode of wave guide; Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide. Field configuration of  $TE_{10}$ ,  $TE_{20}$  and  $TM_{11}$  modes.
4. Microwave Components (06 hrs)
 

Constructional features, characteristics and application of tees, bends, matched termination, twists, detector, mount, slotted section, directional coupler, fixed and variable attenuator, isolator, circulator and duplex, coaxial to wave guide adapter.

5. Microwave antennas (04 hrs)  
Structure characteristics and typical applications of Horn and Dish antennas
6. Microwave Communication systems (04 hrs)
- Block diagram and working principles of microwave communication link.
  - Troposcatter Communication: Troposphere and its properties, Tropospheric duct formation and propagation, troposcatter propagation.
7. Radar Systems (10 hrs)
- Introduction to radar, its various applications, radar range equation (no derivation) and its applications.
- Block diagram and operating principles of basic pulse radar. Concepts of ambiguous range, radar area of cross-section and its dependence on frequency.
  - Block diagram and operating principles of CW (Doppler) and FMCW radars, and their applications.
  - Block diagram and operating principles of MTI radar.
  - Radar display- PPI
8. Satellite Communications (08 hrs)
- Basic idea of passive and active satellites. Meaning of the terms orbit , apogee, perigee
  - Geo-stationary satellite and its need. Block diagram and explanation of a satellite communication link. Link losses etc.
  - Transponders multiple access techniques, VSAT and its features

### LIST OF PRACTICALS

- To study, familiarize and measurement using Microwave Training Kits.
- Study of Waveguide Components-Klystron Mount, Attenuator, Slotted Section, Frequency Meters, Isolator, circulator, Detector Mount, Directional Couplers, Magic Tee, Probes, Shorts etc.
- To Study Characteristics and measure electronic and mechanical tuning range of a reflex klystron.
- To measure VSWR and reflection coefficient of a given load.
- To measure the frequency and wave length in a waveguide working in TE<sub>10</sub> mode.

6. To measure an unknown impedance using the smith chart.
7. To measure the directivity and coupling of a directional coupler.
8. To plot radiation pattern of a horn antenna in horizontal and vertical planes.
9. To verify the properties of magic tee.
10. To study installation of a dish antenna.
11. To measure the polar pattern and the gain of a wave guide Horn Antenna.
12. To calibrate phase shifter.
13. Study and Measurement of Dielectric Constant.
14. Study and Measurement using Gunn Oscillator and Pin Diode.

**NOTE:**

Visit to the appropriate sites of microwave industries, radar installations and communication stations should be made to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

**RECOMMENDED BOOKS**

1. Microwave Devices and Components by Sylio, Prentice Hall of India, New Delhi
2. Electronics Communication by Reddy and Coolen
3. Electronics Communication System by KS Jamwal, Dhanpat Rai & Sons, Delhi

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER**

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Introduction to Microwaves	04	10
2.	Microwave Devices	06	15
3.	Wave Guides	06	15
4.	Microwave Components	06	15
5.	Microwave antennas	04	5
6.	Microwave communication systems	04	10
7.	Radar Systems	10	15
8.	Satellite Communication	08	15
<b>Total</b>		<b>64</b>	<b>100</b>

(Elective-I)

**5.5(a) MAINTENANCE AND REPAIR OF COMPUTER SYSTEM**L T P  
3 - 2**RATIONALE**

The personal computer (PC) is the tool that defines today's current age and culture. A right understanding about any tool is required to use it effectively. There has been a complete revolution in this area, because of rapid advancements in the field of electronics. The PC is the most logical of modern machines and is no more difficult to understand its function, to know what is inside it and thus master its working. It is very important to learn the various components of a PC, and how these parts work together. All technically trained individuals must understand the general nature of PC, operation of memory, I/O techniques, interfacing applications etc. Looking at the importance and usefulness, this subject has been included in the curriculum.

**DETAILED CONTENTS**

1. Introduction: (8 hrs)
  - a) Origin of PC
  - b) Hardware and software
  - c) Operating system
  - d) Programming Languages
  
2. Hardware Peripherals and Components (20 hrs)
  - a) Motherboard: Introduction to different type of mother boards – Single Based System, Block diagram – of mother board. Installation of computer system .
  - b) CRT Display Device: Block diagram, Principle of operation of computer monitor, Difference between TV and Computer Monitor, Video display Adapters.
  - c) Microprocessors and coprocessors
  - d) Memory – ROM, RAM and Cache
  - e) Chipsets and support circuits
    - Function
    - System control, peripheral control and memory control
  - f) Bus architecture
    - Bus functions
    - Different types of Buses PCI, ISA,EISA, VESA, PCI, SCSI and Ports COM1, COM2, LPT1, USB.

- g) Mass storage Devices  
Hard disks, Floppy disks, Compact disks. Pen drives, common faults with hard disk drive and floppy disk drive
  - h) Input – Output Devices
    - Keyboards, Mouse, keyboards faults, Common faults with mouse
    - Display system, Principle of operation of computer monitor, Difference between TV and Computer Monitor, Video adapters, Audio, Printers, Modems
    - Serial and parallel ports- IEEE 1284, RS 232- C
  - i) Introduction to Scanner, digitizer
  - j) General information about computer viruses and anti viruses.
3. Interfacing Components and Techniques (8 hrs)
- a) Interface systems and standards
  - b) Programmable Peripheral Interface (PPI) chips – 8255 and 8155
  - c) Their pin diagrams and programming
4. Local Area Networking (10 hrs)  
Networking technologies, standards, cabling, configuration, IEEE standards for LANs Brief Introduction and working of following – HUBs, Routers, Bridges, Switches LANs, WANs
5. Concept of Internet (6 hrs)
- a) Internet protocols, HTTP
  - b) Simple Network Management Protocol (SNMP)
  - c) Domain Name Systems (DNS)
  - d) Security
  - e) Electronic Mail
  - f) World Wide Web
  - g) Concept of ATM networks

### LIST OF PRACTICALS

1. Familiarization of complete PC hardware
2. Operation, Maintenance, Installation and Testing of the following devices:
  - a) Key Board
  - b) Mouse
  - c) Monitors
  - d) FDD
  - e) HDD

- f) DOT Matrix Printers
  - g) Laser Printers
  - h) CD – ROM
  - i) Mother Board
  - j) CD- Writer
  - k) DVD Drive
3. Connectors and Cables
  4. Familiarization of the serial and parallel ports and other peripherals of a PC
  5. Interconnections of the various peripherals and energizing the PC
  6. Installation of various software on a PC.
  7. Familiarization of standard anti-virus such as Norton, Dr. Solomon, McAfee etc, their installation and application for removal of viruses
  8. Faultfinding and trouble shooting of PC and its peripherals.
  9. Experimental setup for a LAN in a laboratory.

### INSTRUCTIONAL STRATEGY

This being a highly practice oriented course, students must be provided with ample opportunity to work on personal computers and practice on all the concepts and procedures learnt in the class

### RECOMMENDED BOOKS

1. Hardware Bible ; Winn. L. Rosch, Techmedia
2. The complete PC upgrade and maintenance guide, Mark Minasi, BPB Publications
3. Computer Networks, A. Tanenbaum, PHI Ltd., New Delhi
4. PC organization by S. Chaudhary, Dhanpat Rai & Sons Ltd., Delhi
5. PC organization by S. Chaudhary, Dhanpat Rai & Sons Ltd., Delhi

### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Introduction	8	15
2.	Hardware Components	20	40
3.	Interfacing Components and Techniques	8	20
4.	Local Area Network	6	15
5.	Concept of Internet	6	10
<b>Total</b>		<b>48</b>	<b>100</b>

## 5.5(b) DIGITAL AND DATA COMMUNICATION

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3 - 2

### RATIONALE

This course deals with the advanced digital and data communication techniques. It involves the use of modems in synchronous and asynchronous data transmission. It encompasses the modern communication network and integrated services like ISDN and radio paging along with cellular mobile telephones, FAX, electronic exchanges etc. The students should understand the advantages and limitations of various analog and digital modulation systems on a comparative scale and relate to them while studying practical communication systems.

### DETAILED CONTENTS

- |    |  |          |
|----|--|----------|
| 1. | Introduction   | (04 hrs) |
|    | Basic block diagram of digital and data communication systems, Their comparison with analog communication system. Synchronous and Asynchronous communication system.   |          |
| 2. | Digital Communication  | (12 hrs) |
|    | Basic scheme of PCM system sampling theorem, quantization error companding, block diagram of TDM-PCM communication system and function of each block Advantages of PCM system, concept of differential PCM (DPCM) system   |          |
| 3. | Data Communication Hardware  | (12 hrs) |
|    | UART, USART, their need in communication. Need and function of modems. Mode of modems operation (low speed, medium speed and high speed modems). Modem interconnection, Modem data transmission speed. Modem modulation methods, Modem interfacing (RS 232 interface other interfaces) |          |
| 4. | Network and Control Considerations   | (20 hrs) |
|    | Protocols and their functions<br>Data communication network organization. Basic idea of various modes of digital switching Circuit switching, message switching, packet switching.   |          |
|    | a) Basic concept of integrated services.   |          |
|    | b) Digital Network (ISDN) its need in modern communication, brief idea of ISDN interfaces  |          |
|    | c) Basic idea of local area Network (LAN), and its various topologies, LAN interconnection, Ethernet   |          |
|    | d) Introduction to EPABX   |          |

**LIST OF PRACTICALS**

1. Observe wave forms at pulse code modulation and demodulation
2. Practicals on USART.
3. Practicals on RS232.
4. To study the different cables- cross cable, straight cable etc.
5. To study the working of a LAN system.

NOTE:

**Visits to the sites of all types of telephone exchanges including mobile and rural exchanges be made with a view to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.**

**RECOMMENDED BOOKS**

1. Mobile and Wireless Communication by W.Stalling, Pearson Publishers
2. Electronics Communication System by KS Jamwal, Dhanpat Rai & Co., New Delhi
3. Computer Network by Tenenbaun Andrews, Prentice Hall of India, New Delhi
4. Data Communication and Networking by Foronzan TMH, New Delhi

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER**

<b>Topic No.</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allocation</b>
1.	Introduction	04	10
2.	Digital Communication	12	25
3.	Data Communication Hardware	12	25
4.	Network and Control Considerations	20	40
<b>Total</b>		<b>48</b>	<b>100</b>

## 5.5 Elective-II

### 5.5(c) SATELLITE COMMUNICATION

L T P  
3 - 2

#### RATIONALE

The objective of teaching this subject to the students to give an in-depth knowledge of various aspects of satellite communication such as its evolution, applications in communication and other fields.

#### DETAILED CONTENTS

1. Introduction (4hrs)
  - Evolution of satellite communication
  - Basic satellite system – space segment, ground segment, design considerations.
  - Geo-stationary satellites – Geometric considerations solar eclipses and solar interference launching of geo stationary satellite
  
2. Frequency and Propagation Considerations (8hrs)
  - Equitable use of radio spectrum
  - Propagation considerations – Tropospheric effects, Ionospheric effects, Mobile communication channel.
  - Antennas- basic characteristics
  - Noise considerations – Antenna noise Frequency dependant Attenuation system noise, interference.
  
3. Communication Satellites. (6hrs)
  - Design considerations – communication, environmental
  - Lifetime and reliability
  - Satellite communication subsystem – payload, Antenna, Bus, Attitude and Control System techniques, propulsion system, Telemetry, Tracking and command, Power subsystem.
  - Satellite link analysis – uplink, downlink, Direct Home TV Broadcasting Up-Down link analysis, satellite cross-links.
  
4. Satellite Transponder (6hrs)
  - Transponder Model
  - Satellite Front end – Noise, filters and wave forming
  - Satellite signal processing – RF-IF-RF Translation, IF Demodulation,

- Demodulation-modulation conversion
  - Transponder limitations
5. Earth Stations (8 hrs)
- International Regulations and Technical constraints
  - General configuration- Antenna System, Feed System, Tracking System, Low-noise amplifier, High-power amplifier.
  - Fixed satellite service earth station
    - a. Large earth stations- FM/FDM telephony and television, single channel per carries (SCPC), TDMA/DSI
    - b. Very small aperture terminal (VSAT)
  - Mobile satellite service earth stations – large mobile earth station, small mobile earth station.
  - Satellite television Receivers.

**NOTE :**

**There will be no practical as such we can use the time given for practicals for visits.**

**Visit to the sites of Earth Station should be made with a view to understand their working. A comprehensive report must be prepared by all the student on these visits, especially indicating the dates and locations of their visits.**

**RECOMMENDED BOOKS**

1. Satellite Communications Systems- Design Principles, By M. Richharia, Publisher Macmillan New Electronics.
2. Satellite Communication, By Reobert M. Gagliardi, Publishers, CBS Publishers and Distributors, New Delhi.
3. Digital Communication by Satellite By IT Spilker, Prentice Hall Inc Publishers, New Jersey.

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER**

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Introduction	8	15
2.	Frequency and Propagation Considerations	10	20
3.	Communication satellites	8	15
4.	Satellite Transponder	10	20
5.	Earth Station	12	30
<b>Total</b>		<b>48</b>	<b>100</b>

## 5.6 MICROPROCESSORS AND APPLICATIONS

L T P  
4 - 3

### RATIONALE

The study of microprocessor in terms of architecture, software, and interfacing techniques lead to the understanding of working of CPU in a computer. Also study of peripherals like PPT, PIT, PIC etc. enables understanding and designing of small process control systems.

### DETAILED CONTENTS

1. Introduction (04 hrs)  
Microprocessors – Evolution, Importance and Applications
2. Architecture of a Microprocessor – 8085 (16 hrs)
  - a) Concept of bus and bus organisation
  - b) Functional block diagram and function of each block
  - c) Pin details of 8085 and related signals
  - d) Demultiplexing of address/data bus and memory/IO read/write control signals
  - e) Memory mapping and extention
3. Introduction Set for Intel 8085 (16 hrs)
  - a) Instruction and data format – opcode and operand and is word size
  - b) Instruction cycle, machine cycle, T-states, fetch cycle, and execute cycle
  - c) Different addressing modes
  - d) Status flags and their importance
  - e) Data transfer, arithmetic and logical operation, branding, and machine control instructions
  - f) Use of stacks and subroutines
  - g) Assembly language programming
4. Interfacing and Data Transfer Schemes (08 hrs)
  - a) Memory mapped I/O and I/O mapped I/O schemes

- b) Interrupts of 8085
- c) Programmable data transfer, DMA data transfer and interrupt driven data transfer schemes with their applications

5. Peripheral Devices (12 hrs)

Detailed study of the following

- a) 8255 PPI
- b) 8253 PIT/8284
- c) 8257 DMA Controllers/8237
- d) 8259 PIC
- e) 8279 Programmable KB/Display Interface
- f) 8251 Communication Interface Adapter
- g) 8155/8156

6. Introduction to 16-bit microprocessor 8086 (08 hrs)

- a) Internal Architecture of 8086
- b) Concept of memory segmentation and physical address generation
- c) Memory and data addressing
- d) Minimum and maximum mode of 8086

### LIST OF PRACTICALS

1. Familiarization of different keys of 8085 microprocessor kit and its memory map
2. Steps to enter, modify data/program and to execute a program on 8085 kit
3. Writing and execution of ALP for addition and subtraction of two 8 bit numbers
4. Writing and execution of ALP for multiplication and division of two 8 bit numbers
5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order
6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)
7. Interfacing exercise on 8255 like LED display control
8. Interfacing exercise on 8253 programmable interval timer
9. Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display
10. Study and use of interfacing 8 bit A/D card
11. Study and use of interfacing 8 bit D/A card
12. Use of 8085 emulator for hardware testing

**RECOMMENDED BOOKS**

1. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar
2. Microprocessor and Applications by B Ram
3. Comprehensive Study of Microprocessor by Naresh Grover
4. Introduction to Microprocessor by Adithya P Mathur, Tata McGraw Hill Publishers, New Delhi
5. Microprocessor by SK Goel
6. 8051 by Mcakenzie, Prentice Hall of India, New Delhi

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER**

<b>Topic No.</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allocation</b>
1.	Introduction	04	5
2.	Architecture of a Microprocessor-8085	16	25
3.	Introduction Set for Intel 8085	16	30
4.	Interfacing and Data Transfer Schemes	08	10
5.	Peripheral Devices	12	20
6.	Introduction to 16-bit microprocessor	08	10
<b>Total</b>		<b>64</b>	<b>100</b>

## **GENERIC SKILL DEVELOPMENT CAMP - I**

As per general feedback received from the employers regarding Technician Engineers during formal interactions, the pass outs of polytechnics are labeled of falling short of employable skills which comprises of Communication, inter-personal relationship, leadership qualities, team work, problem solving, managing task, managing self etc. in addition to technical knowledge and skills. We have, therefore, added papers such as English and Communication Skills and Entrepreneurship Development and Management in the curriculum in addition to proposed camps of 3-4 days to be conducted in polytechnics on common and vital issues e.g. Environmental Awareness, Entrepreneurship Development and Generic Skill Development.

It is proposed that a camp of 3-4 days duration on Generic Skills Development (GSD) during 5<sup>th</sup> semester be organized by arranging expert lectures/discussion sessions either by polytechnic teachers or by eminent educationists from the neighborhood to deal with the following topics. Few students may also be encouraged to prepare on some of these topics and make presentation during the camp. Expert lectures must be followed by distribution of relevant handouts for further study. The attendance of students should be compulsory and marks be awarded under provision of Student Centred Activities. **It is envisaged that such camps will bring in a significant improvement in confidence level and personality of the pass outs from polytechnics.**

Suggested list of topics for arranging lectures/discussion sessions:

1.     **Independent Study Technique**
  - 1.1     Information search, information extraction, storage and retrieval
  - 1.2     Reading skills
  - 1.3     Life long learning
  - 1.4     Continuing education
  
2.
  - 2.1     Introduction
  - 2.2     Time Management
  - 2.3     Stress and emotions
  - 2.4     Health and hygiene
  
3.     **Task Management**
  - 3.1     Task planning and organizing
  - 3.2     Task execution
  - 3.3     Task evaluation
  - 3.4     Event management
  
4.     **Action Research**
  - 4.1     Importance and Scope
  - 4.2     Steps in action research
  - 4.3     Analysis of data
  - 4.4     Conclusions and report writing