

ELECTRONICS AND COMMUNICATION ENGINEERING (For J&K State)

<h3 style="margin: 0;">VARIOUS SUBJECTS IN <u>THIRD YEAR</u></h3>
--

FIFTH SEMESTER

5.1	Microwave and Radar Engineering	112
5.2	Trouble Shooting of Electronic Equipment	115
5.3	Elective - I: to choose any one from the following:	
(a)	Computer Organisation and Networking	117
(b)	Medical Electronics	119
5.4	Power Electronics	122
5.5	Advanced Microprocessor	125
5.6	Consumer Electronics	127

SIXTH SEMESTER

6.1	Mobile Communication	131
6.2	Micro controllers and Embedded Systems	133
6.3	PLC and Programming	135
6.4	Elective-II : to choose any one from the following:	
(a)	Digital Signal Processing	138
(b)	Digital System Design	140
6.5	Entrepreneurship Development and Management	143
6.6	Major Project Work	146

5.1 MICROWAVE AND RADAR ENGINEERING

L T P Cr
4 - 2 5

RATIONALE

This subject includes an exposure to microwaves engineering, radar systems, 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.

DETAILED CONTENTS

1. Introduction to Microwaves (2 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 (12 hrs)

Basic concepts of thermionic emission and vacuum tubes, Effects of inter-electrode capacitance Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes, and steps to extend their high frequency operations.

Constructional, 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 (8 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 (3 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 (6 hrs)
Structure characteristics and typical applications of Horn and Dish antennas.
6. Microwave Communication systems (15 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 (12 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: (06 hrs)
- Basic idea, 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.

LIST OF PRACTICALS

- To measure electronics and mechanical tuning range of a reflex klystron
- To measure VSWR of a given load.
- To measure the Klystron frequency by slotted section method
- To measure the directivity and coupling of a directional coupler.
- To plot radiation pattern of a horn antenna in horizontal and vertical planes.
- To verify the properties of magic tee.
- To carry out installation of a dish antenna.

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.

INSTRUCTIONAL STRATEGY

To teach this subject, teacher must take various wave guide components to the class and demonstrate these to the students in addition to providing basic concept on microwaves. For Radar system teaching, a visit to radar installation before instruction be arranged.

RECOMMENDED BOOKS

1. Microwave Communication by Wheeler
2. Microwave Communication by Samuel y Liao
3. Radar Systems by Skolnik
4. Communication Systems by Kennedy

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Introduction to Microwaves	2	5
2.	Microwave Devices	12	20
3.	Wave Guides	8	10
4.	Microwave Components	3	5
5.	Microwave Antennas	6	10
6.	Microwave Communication System	15	10
7.	Radar Systems	12	20
8.	Satellite Communications	6	10
Total		64	100

5.2 TROUBLESHOOTING OF ELECTRONIC EQUIPMENT

L	P	Cr
-	6	3

RATIONALE

The stress should be laid on tracing the circuits and its trouble shooting. Students should do fault removal. As well as fault analysis. it is assumed here that students knows the operation of electronic instruments such as multi-meter, logic pulsar, logic prob, soldering and desoldering station, CRO, digital IC tester etc.

Here is a sample list of electronic equipment whose repair can be carried out by students. at least eight exercises should be carried out by each students.

54

1. Repair Servicing and Maintenance Concept
 - Introduction, Modern electronic equipment, mean time between failures(MTBF), mean time to repair (MTTR), 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. Fundamentals trouble shooting Procedures
 - Fault Location
 - Fault finding aids
 - Service manuals
 - Test the measuring instruments
 - Special tools
 - Trouble shooting Techniques
 - Functional Areas Approach
 - Split half method
 - Divergent, convergent and feedback path circuit analysis
 - Measurement techniques
 - Typical length of troubleshooting of following (at least 5)
 1. Stereo Amplifier/CD Player
 2. Tape recorder
 3. Telephone hand set
 4. Fax machine
 5. B/W and colour TV
 6. VCR/VCD player
 7. Regulated power supply
 8. Analog and digital voltmeter

9. Function generator
10. CRO
11. Automatic Stabilizer
12. Inverter, UPS.
13. Cordless phone
14. EPABX
15. Video Games
16. Security devices
17. Computer and Peripherals
18. Mobile phone
19. Fan regulator
20. Temp. controller
21. Power supplies
22. Digital multimeters.

INSTRUCTIONAL STRATEGY

Emphasis may be given on practical, repair work and hardware trouble shooting

5.3 ELECTIVE-I

5.3 (a) MEDICAL ELECTRONICS

L	T	P	Cr
4	-	2	5

RATIONALE

Electronics is being used in medical science. A large number of new equipment is being used in hospitals and research laboratories for patient care and diagnosis or carrying out advanced surgeries. This subject will enable the students to learn the basic principles of different instruments used in medical science. This subject will enable the students to learn the basic principles of different electronic instrument/equipment used in medical science. The practical work done in this area will impart skill in the use, servicing and maintenance of these instrument/equipment. Proficiency in this area will widen the scope of equipment for diploma holder in Electronics and Communication Engineering.

DETAILED CONTENTS

1. Anatomy and Physiology (06 hrs)
 - Elementary ideas of cell structure
 - Heart and circulatory system.
 - Central nervous system
 - Muscle action
 - Respiratory system
 - Body temperature and reproduction system

2. Overview of Medical Electronics Equipment (06 hrs)

classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments

3. Electrodes (08 hrs)

Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG , EEG

4. Transducers (08 hrs)

Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor,

5. Bio Medical Recorders (12 hrs)

Block diagram description and application of following instruments

 - ECG Machine
 - EEG Machine
 - EMG Machine

6. Patient Monitoring Systems (12 hrs)
- Heart rate measurement
 - Pulse rate measurement
 - Respiration rate measurement
 - Blood pressure measurement
 - Principle of defibrillator and pace mark
 - Use of Microprocessor in patient monitoring.
7. Safety Aspects of Medical Instruments (08 hrs)
- Gross current shock
 - Micro current shock
 - -Special design from safety consideration
 - Safety standards.

INSTRUCTIONAL STRATEGY

In addition to classroom teaching, maximum stress may be given on practical exposure in nearby hospitals, clinics, biomedical laboratories etc. Expert lectures may be arranged from field/organization related to biomedical instruments

RECOMMENDED BOOKS

1. Handbook of biomedical Instrumentation by RS Khandpur
2. Biomedical Instrumentation by Cromwell,
3. Modern Electronics Equipment by RS Khandpur, TMH, New Delhi
4. Introduction to BioMedical Electronics by Edward J. Perkstein; Howard Bj, USA

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Anatomy and Physiology	6	10
2.	Overview of Medical Electronics Equipment	6	10
3.	Electrodes	8	15
4.	Transducers	8	10
5.	Bio Medical Recorders	12	5
6.	Safety Aspects of Medical instruments	8	10
Total		64	100

5.3(b) COMPUTER ORGANIZATION AND NETWORKS

L T P Credits
4 - 2 5

RATIONALE

PCs have become a necessity in the Industry and in Offices and becoming increasingly popular in homes too, with advanced in technology. This course gives organization of a personnel computer based on the Bus structure and principles of working of various other components like visual display, key board, drives and printers etc. In addition the features like BIOS and DOS services have been included. Also the feature of computer technology is in computer network. A Diploma holder in Electronics and Communication Engineering should therefore understand the functions of networks.

DETAILED CONTENTS

Part – I Computer Organization

1. Buses and Ports (2 hrs)
Introduction to different types of Bus and Ports including PCI, SCSI, ISA buses
2. The Keyboard of the PC (2 hrs)
The basic principles of the working of a PC keyboard, scan codes.
3. Disk Drives (4 hrs)
Constructional Features of Hard Disk, Floppy disk and their drives (HDD and FDD)
4. Peripheral Devices (6 hrs)
Basic features of various other peripheral devices e.g. mouse, printers (DMP, Inkjet, Laser), scanner plotter, digitizer and modem.
5. Power Supplies (5 hrs)
SMPS used in PC, various voltage, basic data of constant voltage transformer (CVT) and un-interrupted power supply (UPS), off-line and on-line.
6. BIOS and DOS Services (07 hrs)
The basis ideas of BIOS & DOS services for Diskette, serial port, keyboard, printer and Misc. services

Part II Computer networking

1. Networking Basics (5 hrs)
 - Definition of a network.
 - Model of network computing
 - Introduction to LAN, MAN and WAN
 - Network services
2. Open system Inter-connection Models (OSI) (5 hrs)
 - Standards

- OSI Reference Models (concept of the seven layers of OSI, Model)
- 3. Transmission Media (3 hrs)
- 4. Introduction to Network, Topologies and protocols - Protocol Types including Ipx/SPx, TCP/IP Internet Protocols (6 hrs)
- 5. Network Architecture with Element Specification and features
Architecture of TCP/IP network (4 hrs)
- 6. Network connectivity Devices: Principle of working of the following: (8 hrs)
 - Hubs, Repeaters bridges and switches
 - Routers and Gateways
- 7. Installation of an Ethernet network card (8 hrs)
 - Preparation of networking cable using BNC/ RJ45 connector
 - Operation and use of hubs and routers
 - Sharing of a printer on network

LIST OF PRACTICALS

1. To identify various components, devices and accessories of a PC
2. To interconnect the system unit with the video monitor, mouse and keyboard, and test the operation of the PC.
3. To connect various add-on cards and I/O devices to a PC motherboard, and test their working.
4. To note the voltages and waveforms at various terminals in the I/O channel (Bus Slots).
5. To study the SMPS circuit of a PC, measure various supply voltages, and connect it to the motherboard and other appropriate I/O devices.
6. To study the operation of a CVT used to supply power to a PC
7. To study the operation of an uninterrupted power supply (UPS)
8. To Install and test the Local area Network

RECOMMENDED BOOKS

1. Bose, SK, "Hardware and Software of Personal Computers", Wiley Eastern Limited, New Delhi.
2. Hall, Douglas, " Microprocessors and Interfacing ", Mc Graw Hill.
3. Uffenbeck – 8086 Microprocessor
4. Computer Networking – A. Tanncnbaum

5. Computer Networking – W. Stallings

INSTRUCTIONAL STRATEGY

This subject has two sections viz: Computer organization and networking. The focus of teacher should be towards hardware and networking. Before giving theoretical inputs the students should be exposed to **hardware components and peripherals**. Then give demonstration of networking at different places.

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
Part-I Computer Organization			
1.	Buses and Ports	2	3
2.	The Keyboard of the PC	2	2
3.	Disk Drives	4	5
4.	Peripheral Devices	6	10
5.	Power Supplies	5	10
6.	BIOS and DOS Services	7	10
Part-II Computer Networking			
1.	Networking Basics	5	10
2.	OSI Model	5	10
3.	Transmission Media	3	5
4.	Introduction to Network	6	10
5.	Network Architecture	4	5
6.	Network Connectivity	8	10
7.	Installation of an Ethernet Network Card	8	10
Total		64	100

5.4 POWER ELECTRONICS

L T P Cr
4 - 2 5

RATIONALE

Diploma holders in Electronics and Instrumentation and Control are required to handle a wide variety of power electronic equipment used in process control Industry. This subject will provide the student basic understanding of the principles of their working. The practical training will further reinforce the knowledge and skill of the students.

DETAILED CONTENTS

1. Introduction to thyristors and other power electronics devices (18 hrs)
 - a) Construction, Working principles of SCR, two transistor analogy of SCR, VI characteristics of SCR.
 - b) SCR specifications and ratings.
 - c) Different methods of SCR triggering.
 - d) Create Triggering using R, RC and UJT triggering.
 - e) Different commutation circuit for SCR.
 - f) Series and parallel operation of SCR.
 - Construction and working principle of DIAC, TRIAC & their V-I characteristics.
 - Construction, working principle of UJT, VI characteristics of UJT. UJT as relaxation oscillator.
 - Brief introduction to Gate Turn off thyristor (GTO), Programmable uni-junction transistor (PUT)
 - Basic idea about the selection of Heat sink for thyristors.
 - Application of SCR such as light intensity control, speed control of universal motors, fan regulator, battery charger.

2. Controlled Rectifiers (08 hrs)
 - a) Single phase half wave controlled rectifier with load (R, R-L)
 - b) Single phase half controlled full wave rectifier (R, R-L)
 - c) Fully controlled full wave bridge rectifier.
 - d) Single phase full wave centre tap rectifier.

3. Inverters, Choppers, Dual Converters and Cyclo converters. (16 hrs)
 - i) Principle of operation of basic series and parallel inverter circuits, concepts of duty cycle of series and parallel. Inverters & their application.

- ii) Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D). Step up and step down choppers.
 - iii) Dual Converters and cyclo converters: Introduction, types and basic working principle of dual converters and cyclo converters and their application.
4. Thyristorised Control of Electric drives (16 hrs)
- a) DC drive control
 - i) Half wave drives.
 - ii) Full wave drives
 - iii) Chopper drives (Speed control of DC motor using choppers)
 - b) AC drive control
 - i) Phase control (Speed control of induction motor using variable frequency)
 - ii) Constant V/F operation
 - iii) Cyclo converter/Inverter drives.
 - iv) Slip power control of AC drives.
5. Uninterrupted Power supplies (06 hrs)
UPS, on-line, off line & its specifications

LIST OF PRACTICALS

1. To plot VI characteristic of an SCR.
2. To plot VI characteristics of TRIAC.
3. To plot VI characteristics of UJT.
4. To plot VI characteristics of DIAC.
5. Study of UJT relaxation oscillator. And observe I/P and O/P wave forms
6. Observation of wave shape of voltage at relevant point of single-phase half wave controlled rectifier and effect of change of firing angle.
7. Observation of wave shapes of voltage at relevant point of single phase full wave controlled rectifier and effect of change of firing angle.
8. Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC phase control circuit for .
9. Varying lamp intensity and AC fan speed control.
10. Installation of UPS system and routine maintenance of batteries.
11. Speed control of motor using SCRs

INSTRUCTIONAL STRATEGY

The teacher may encourage students to perform practical simultaneously for better understanding of the subjects and verification of theoretical concepts. The various components must be shown to the students for identification and also tested. Practical applications of the various circuits and devices should be discussed in the class. The available video films on the subject must be shown to the students.

RECOMMENDED BOOKS

1. Power Electronics by P.C. Sen: Tata Mc Graw Hill Publishing Co. New Delhi
2. Power Electronics by P.S. Bhimbhrah, Khanna Publishers, New Delhi
3. Power Electronics by M.S. Berde, Khanna Publishers, New Delhi.
4. Power Electronics by MH Rashid
5. Industrial Electronics and Control by SK Bhattacharya and S. Chatterji, New Age Publications. New Delhi
6. Power Electronics by S Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
7. Power Electronics by Sugandhi and Sugandhi
8. Power Electronics – Principles and Applications by J Michael Jacob, Vikas Publishing House, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation
1.	Introduction to thyristors and other power electronics devices	18	30
2.	Controlled Rectifiers	8	15
3.	Inverters, Choppers, Dual Converters and Cyclo converters.	16	25
4.	Thyristorised Control of Electric drives	16	25
5.	Uninterrupted Power supplies	6	5
Total		64	100

5.5 ADVANCED MICROPROCESSORS

L T P Cr
4 - 2 5

RATIONALE

The complex systems require high through put that at times is not met with 8-bit microprocessor system, so 16 bit microprocessors based system become suitable and economical, they provide better facilities to personal computers and other industrial systems in variable use 16 bit microprocessor. This course will also provide familiarization with the interfacing techniques.

DETAILED CONTENTS

- | | | |
|----|---|----------|
| 1. | Introduction | (10 hrs) |
| | Internal architecture of 8086., internal registers, physical and logical address generation, maximum and minimum modes, clock generation, minimum system, comparison between 8086 and 8088 | |
| 2. | Programming 8086 | (12 hrs) |
| | Addressing modes, instruction format, instruction templates and hand assembly instruction set data transfer, arithmetic, bit manipulation, string instructions, program transfer, and processor control instructions, assembler and assembler directives. | |
| 3. | Programming | (8 hrs) |
| | Exercises based on the instruction set and use of assembler | |
| 4. | Memory and I/O Interface | (4 hrs) |
| | Memory interface block diagram, I/O interface (direct and indirect) | |
| 5. | Interrupt Interface of 8086 | (4 hrs) |
| | Types of interrupts, interrupt masking, software interrupts | |
| 6. | Introduction to 32 bit Microprocessors | (12 hrs) |
| | 80386, 80486 and pentium, block diagrams and features | |
| 7. | Brief idea of Interfacing Chips | (14 hrs) |
| | 8257,, 8279, 8259, 8251 and 8155 | |

LIST OF PRACTICALS

1. Study of instructions of 8086 using Debug
2. Addition and subtraction of multi-byte numbers
3. Multiplication of unsigned/signed numbers

4. Division of unsigned/signed numbers
5. Sorting strings in ascending and descending order
6. Modular programming using subroutines
7. Program to reverse a string interfacing using chips
8. Use of 8279 for (seven segment display)
9. Use of 8155 (for serial communication)

Note: Programming should be done on computer using assembler

INSTRUCTIONAL STRATEGY

The teacher may take help of charts, simulation packages for giving in depth knowledge of the subject to the students. Sufficient programming and interfacing exercises on microprocessors should be given to the students. The practical programming exercises may be performed on the microprocessor kit as well as on computer using TASM or MASM assemblers

RECOMMENDED BOOKS

1. Microprocessor and Applications by DV Hall
2. Microprocessor and Applications by Uffenback
3. Microprocessor and Application by B Raina
4. Introduction to Assembly Language Programming by Ytha-Yu

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Introduction	10	15
2.	Programming 8086	12	15
3.	Programming	8	15
4.	Memory and I/O Interface	4	5
5.	Interrupt Interface of 8086	4	5
6.	Introduction to 32 bit Microprocessors	12	20
7.	Brief idea of Interfacing Chips	14	25
Total		64	100

5.6 CONSUMER ELECTRONICS

L T P Cr
4 - 2 5

RATIONALE

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will 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

1. 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 CD system
Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers

2. Television (15hrs)
 - 2.1 Monochrome TV :
 - Elements of TV communication system.
 - Scanning- its need for picture transmission.
 - Need for synchronizing and blanking pulses.
 - Progressive scanning- Gross structure, interlaced scanning, resolution and band width requirement, tonal gradation.
 - Composite Video Signal (CVS) at the end of even and odd fields. 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.
- Block diagram of a TV receiver: function of each block and waveform at the input and output of each block.

2.2 Concept of positive and negative modulation VSB Transmission Tuner

3. **Colour TV** (18 hrs)

3.1 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

3.2 Compatibility of colour TV system with monochrome system. Block diagram of colour TV camera.

3.3 Colour Schemes

- Introduction to PAL, NTSC, SECAM systems, Advantages and disadvantages, block diagram of video camera and its explanation
- Construction and working principles of Trinitron and PIL types of colour picture tubes.
- Concept of convergence, purity of beam shifting
- Block diagram of PAL TV receiver, explanation and working

4. Cable Television (06 hrs)

Block diagram and principles of working of cable TV and DTH, cable TV

5. VCD, DVD and Video Camera (08 hrs)

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

6. Basic Block Diagram; working Principle and Application of: (10

- (1) Cordless Telephone
- (2) Photostat Machine
- (3) Electronic Ignition system for automobiles

- (4) Cellular Phones
- (5) Microwave Oven

LIST OF PRACTICALS

1. To plot the frequency response of a microphone
2. To plot the frequency response of a loud speaker
3. Demonstration of Microwave oven
4. Trouble shooting of tape-recorder system (including Tpt. Mech.)
5. Study of Tape Transport Mechanism
6. To observe the wave forms and voltage of a B/W and colour T.V receiver.
7. Fault finding of colour T.V
8. Trouble shooting of C.D. Player
9. Demonstration of DVD Player.
10. Demonstration and study of a VCD especially its transport mechanism.
11. Study of a TV cable network system
12. Demonstration of a Photostat Machine

INSTRUCTION STRATEGY

This subject gives the knowledge of the various day-to-day life electronic products. So, the teacher is required to impart practical knowledge to the student. For that one should give home assignment and frequent industrial visit should be there. Visit to TV station and TV transmitter should be arranged to give a practical exposure to the students

LIST OF 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, New Delhi
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 McGraw Hill, New Delhi
6. Colour TV by A.Dhake
7. Service Manuals, BPB Publication, New Delhi
8. Audio and video system by RG Gupta

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Percentage Weightage	Marks Allocation
1.	Audio System	10	15.62	10
2.	Television	15	23.43	10
3.	Colour TV	18	28.12	15
4.	Cable Television	6	9.37	10
5.	VCR, VCD and DVD	8	12.5	5
6.	Basic Block Diagram;Working Principle and Application	10	15.62	10
Total		64	100	100