4.1 NETWORK FILTERS AND TRANSMISSION LINES

L T P
3 - 3

RATIONALE

The Study of networks, filters and transmission lines leads to understanding of line communication, audio and video communication, and microwave communication. Particularly the study of networks takes off from principles of a.c. theory and introduces the student to parameters and characteristics of various networks, including filters. Also the study of transmission lines becomes important as its analogy is used in study of transmission of plane electromagnetic waves in bounded media.

DETAILED CONTENTS

1. Networks (14 hrs)

   a) Two port (four terminals) network: Basic concepts of the following terms:

      - Symmetrical and asymmetrical networks: Balanced and unbalanced network; T-network, Л network, Ladder network; Lattice network; L-network and Bridge T-network

   b) Symmetrical Network:

      - Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss of T-network and Л Network

   c) Asymmetrical Network

      - Concept and significance of iterative impedance, image impedance, image transfer constant and insertion loss.
      - The half section (L-section); symmetrical T and Л sections into half sections

2. Attenuators (05 hrs)

   a) Units of attenuation (Decibels and Nepers): General characteristics of attenuators

   b) Analysis and design of simple attenuator of following types; Symmetrical T and Л type, L type.

3. Filters (13 hrs)

   a) Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters.

   b) Prototype Filter Section:

- Impedance characteristics vs frequency characteristics of a low and high pass filter and their significance

- Attenuation Vs frequency; Phase shift Vs frequency, characteristics impedance vs frequency of T and Л filters and their significance

- Simple design problems of prototype low pass filter.

c) M-Derived Filter Sections
Limitation of prototype filters, need of m-derived filters

d) Crystal Filters
Crystal and its equivalent circuits, special properties of piezoelectric filters and their use

e) Active Filters
Basic concept of active filters and their comparison with passive filters.

4. Transmission Lines (16 hrs)

a) Transmission Lines, their types and applications.

b) Distributed constants, T and Л representation of transmission line section.

c) Definition of characteristic impedance, propagation constant, attenuation constant and phase shift constant.

d) Concept of infinite line

e) Condition for minimum distortion and minimum attenuation of signal on-the-line and introduction to loading methods.

f) Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation).

g) Transmission line equation, expression for voltage, current and impedance at a point on the line.

h) Concept of transmission lines at high frequencies.

i) Introduction to stubs. (single, open and short stubs).

LIST OF PRACTICALS

1. To measure the characteristic impedance of symmetrical T and Л networks
2. To measure the image impedance of a given asymmetrical T and Л networks
3. For a prototype low pass filter:

   a) Determine the characteristic impedance experimentally

b) Plot the attenuation characteristic

4. To design and measure the attenuation of a symmetrical T/ Л type attenuator

5. For a prototype high pass filter:

   a) Determine the characteristic impedance experimentally
   b) To plot the attenuation characteristic

6. a) To plot the Impedance characteristic of a prototype band-pass filter
   b) To plot the attenuation characteristic of a prototype band pass filter

7. a) To plot the impedance characteristic of m- derived low pass filter
   b) To plot the attenuation characteristics of m-derived high pass filter

8. To observe the information of standing waves on a transmission line and measurement of SWR and characteristic impedance of the line

9. Draw the attenuation characteristics of a crystal filter

INSTRUCTIONAL STRATEGY

Stress should be laid on problems in networks/ filler and transmission lines. Practical must be carried out after completion of topic to gain a good know how on the subject students should be given home assignments on various topics, stress on making own circuit models to calculate input/output impedance, characteristic impedance, losses etc. should be carried out by the students.

RECOMMENDED BOOKS

1. Network Lines and Fields by John D Ryder; Prentice Hall of India, New Delhi
2. Network Filters and Transmission Lines by AK Chakarvorty; Dhanpat Rai and Co. Publication, New Delhi
3. Network Analysis by Van Valkenburg: Prentice Hall of India, New Delhi
4. Network Analysis by Soni and Gupta; Dhanpat Rai and Co. Publication, New Delhi
5. Network Theory and Filter Design by Vasudev K. Aatre
6. Network Filters and Transmission line by Umesh Sinha
7. Network filter and Transmission lines by Yashpal, Ishan publications, Ambala City

8. Network Analysis by G.K. Mithal
9. Network Filters and Transmission line by Nardeep Goyal, Rajneesh Kumari, Tech. Max Publication, Pune.

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (hrs)	Marks Allocation%
1	Networks	14	25
2	Attenuators	5	10
3	Filters	13	30
4	Transmission Lines	16	35
Total		**48**	**100**

4.2 COMMUNICATION SYSTEMS

L	T	P
3	-	3

RATIONALE

This course provides the basics of electronic communication systems including transmitters, receivers, antennas and various modes of propagation of signals. In addition to components and systems of fiber optic communication, the students will learn the basics of satellite communication. This course will provide the students with perspectives of different communication systems.

DETAILED CONTENTS

1. AM/FM Transmitters (04 hrs)

   a) Classification of transmitters on the basis of modulation, service, frequency and power
   b) Block diagram of AM transmitters and working of each stage
   c) Block diagram and working principles of reactance FET and armstrong FM transmitters

2. AM/FM Radio Receivers (10 hrs)

   a) Principle and working with block diagram of super heterodyne AM receiver. Function of each block and typical waveforms at input and output of each block
   b) Performance characteristics of a radio receiver: sensitivity, selectivity, fidelity, S/N ratio, image rejection ratio and their measurement procedure. ISI standards on radio receivers (brief Idea)
   c) Selection criteria for intermediate frequency (IF). Concepts of simple and delayed AGC
   d) Block diagram of an FM receiver, function of each block and waveforms at input and output of different blocks. Need for limiting and de-emphasis in FM reception
   e) Block diagram of communication receivers, differences with respect to broadcast receivers.

3. Antennas: (12 hrs)

   a) Electromagnetic spectrum and its various ranges: VLF, LF, MF, HF, VHF, UHF, Microwave.
   b) Physical concept of radiation of electromagnetic energy from a dipole. Concept of polarization of EM Waves.
   c) Definition and physical concepts of the terms used with antennas like point source, gain directivity, aperture, effective area, radiation pattern, beam width and radiation resistance, loss resistance.
   d) Types of antennas-brief description, characteristics and typical applications of half wave dipole, medium wave (mast) antenna, folded dipole, patch, loop antenna, yagi and ferrite rod antenna (used in transistor receivers)
   e) Brief description of broad-side and end fire arrays, their radiation pattern and applications (without analysis); brief idea about Rhombic antenna and dish antenna

4. Propagation: (12 hrs)

a) Basic idea about different modes of wave propagation and typical areas of application. Ground wave propagation and its characteristics, summer field equation for field strength.

b) Space wave communication – line of sight propagation, standard atmosphere, concept of effective earth radius range of space wave propagation standard atmosphere

c) Duct propagation: sky wave propagation - ionosphere and its layers. Explanation of terms - virtual height, critical frequency, skips distance, maximum usable frequency, multiple hop propagation.

5. Digital Modulation Techniques (10 hrs)

Introduction of:

a) PCM, DPCM

b) DELTA Modulation

c) Basic block diagram and principle of working of the following ASK, FSK, PSK, QPSK

d) Spread Spectrum Techniques, Frequency Hopping Technique

NOTE: Visits to appropriate sites of digital/data communication networks, satellite communication, telemetry centres (like remote sensing) and fibre optic communication installations should be made with a view to understand their working. A comprehensive report must be prepared by all students on these visits, especially indicating the dates and locations of their visits.

LIST OF PRACTICALS

1. To observe the waveforms at different stages of a AM transmitter
2. To observe the waveforms at different stages of a Radio Receiver
3. To align AM broadcast radio receiver
4. To identify and study the various types of antennas used in different frequency ranges.
5. To plot the radiation pattern of a directional and omni directional antenna
6. To plot the variation of field strength of a radiated wave, with distance from a transmitting antenna
7. Installation of Dish Antenna for best reception
8. To observe waveforms at input and output of ASK and FSK modulators

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

RECOMMENDED BOOKS

1. Communication Systems by George Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Communication Systems by A.K. Gautam, SK Kataria and Sons, New Delhi.
3. Fundamentals of Communication System by Fitz, Tata McGraw Hill Education Pvt Ltd, New Delhi
4. Communication System by Puri, Ishan Publications, Ambala City.
5. Electronic Communication Sytesms by K.S. Jamwal, Dhanpat Rai and Sons, New Delhi.
6. Electronic Communication System by Roddy and Coolen, Prentice Hall of India, New Delhi.
7. Handbook of Experiments in Electronics and Communication Engineering by S. Poornachandra Rao, and B Sasikala, Vikas Publishing House Pvt Ltd, Jangpura, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted%
1	AM/FM Transmitters	4	10
2	AM/FM Radio Receivers	10	25
3	Antennas	12	25
4	Propagation	12	20
5.	Digital Modulation Techniques	10	20
	Total	**48**	**100**

4.3 INSTRUMENTATION

L	P
3	2

RATIONALE

This subject deals with the various instruments, their construction and working which control the various parameters and operations in any industry. Electrical supervisor employed for maintenance of electrical equipment/ machinery is required to diagnose faults, rectify them and test the total system for good performance. Thus there is a need of introducing diploma holders to the basics of Instrumentation. Basics of instrumentation has been dealt with in this subject

DETAILED CONTENTS

1. Measurements: (3 hrs)

   Importance of measurement, basic measuring systems, advantages and limitations of each measuring systems and display devices

2. Transducers: (6 hrs)

   Theory, construction and use of various transducers (resistance, inductance, capacitance, electromagnetic, piezo electric type)

3. Measurement of Displacement and Strain: (10 hrs)

   Displacement Measuring Devices: wire wound potentiometer, LVDT, strain gauges and their different types such as inductance type, resistive type, wire and foil type etc. Gauge factor, gauge materials and their selections. Use of electrical strain gauges, strain gauge bridges and amplifiers.

4. Force and Torque Measurement: (10 hrs)

   Different types of force measuring devices and their principles, load measurements by using elastic transducers and electrical strain gauges. Load cells, measurements of torque by brake, dynamometer, electrical strain gauges, speed measurements; different methods, devices.

5. Pressure Measurement: (5 hrs)

   Bourdon pressure gauges, electrical pressure pick ups and their principle, construction and applications. Use of pressure cells.

6. Flow Measurement: (4 hrs)

   Basic principles of magnetic and ultrasonic flow meters

7. Measurement of Temperature: (5 hrs)

   Bimetallic thermometer, thermoelectric thermometers, resistance thermometers, thermocouple, thermisters and pyrometer. Temperature recorders

8. Measurement of other non electrical quantities such as humidity, pH, level and vibrations (5 hrs)

PRACTICAL EXERCISES

1. To measure the level of a liquid using a transducer
2. To measure temperature using a thermo-couple
3. Study and use of digital temperature controller
4. Use of themistor in ON/OFF transducer
5. Study of variable capacitive transducer
6. Draw the characteristics of a potentiometer
7. To measure linear displacement using LVDT
8. To study the use of electrical strain gauge
9. To study weighing machine using load cell
10. To study pH meter.

INSTRUCTIONAL STRATEGY

The teacher should explain the scope of various measuring devices and their practical applications in the field. The transducers and measuring devices must be shown to the students and they should be trained in the reaction, operation, maintenance and calibrations. Frequent visits to nearby process industries will be of immense help to the students.

RECOMMENDED BOOKS

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad
2. Electronic Measurement and Instrumentation by JB Gupta, SK Kataria and Sons, New Delhi
3. Electrical and Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co., New Delhi
4. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick Prentice Hall of India Pvt. Ltd. New Delhi
5. Industrial Instrumentation by Umesh Rathore, SK Kataria and Sons, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1	Measurements	3	6
2	Transducers	6	12
3	Measurement of Displacement and Strain	10	20
4	Force and Torque Measurement	10	20
5	Pressure Measurement	5	12
6	Flow Measurement	4	8
7	Measurement of Temperature	5	12
8	Measurement of other non electrical quantities	5	10
	Total	**48**	**100**

4.4 DIGITAL ELECTRONICS - II

L	T	P
3	-	3

RATIONALE

Digital design is a vital area in electronics with a lot of scope in industry and research. This subject involves conventional and sequential circuit designs both of which are very important fields. This subject forms the basis for research and development of digital systems. This subject will enable the students to learn concept of

DETAILED CONTENTS

1. Logic Families (08 hrs)

   a) Logic family classification. TTL, ECL, MOS, CMOS. Types of integration SSI,MSI, LSI, VLSI

   b) Characteristics of TTL and CMOS and the comparison. Propagation delay. Speed, noise margin. Logic levels., power dissipation, fan-in, fan-out, power supply requirements

   c) Open collector and totem pole output circuits, operation of a standard TTL, CMOS, NAND, NOR gates

   d) CMOS to TTL interfacing and TTL to CMOS interfacing

   e) Introduction to tri-state devices, tri-state buffer and inverter circuits.

2. A/D and D/A Converters (08 hrs)

   a) D/A Converters : Performance characteristics of D/A converters, binary resister network and resistance ladder network methods of D/A converters and applications

   b) A/D Converters : Performance characteristics of A/D converters, single slope, dual slope, successive approximation and parallel A/D converters

3. Memories (12 hrs)

   Memory organisation, classification of semi conductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory. CCD memories, content addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA), familiarization with common ICs.

4. Combinational Circuits (04 hrs)

   Minimization of Boolean expressions using Quine Mcclaaskey method

5. Sequential Circuits (08 hrs)

   Essential components of sequential circuit, synchronous and asynchronous sequential circuits, classification of sequential circuits (Meely and Moore Machine), design of counters using J-K and R-S flip-flops.

6. Arithmetic and Logic Unit (04 hrs)

   Basic idea about arithmetic logic unit w.r.t. IC 74181 and applications, implementation of binary multiplication, division, subtraction and addition

7. Introduction to Fuzzy logic (04 hrs)

   Fuzzy sets and classical sets and their operations, Fuzzy relations, Properties of membership functions, Fuzzification, Defuzzfication, Fuzzy control system

LIST OF PRACTICALS

1. Verify the operation of D/A converter
2. Verify the operation of A/D converter
3. Verify the writing and reading operation of RAM IC
4. Design J-K Flip-flop counter and verify its truth table
5. Familiarity with the use of EPROM programmes and UV index
6. Exercise on programming of EPROM
7. Design and implement full adder and full subtractor
8. Verify the logical operation, arithmetic operation of binary numbers using IC74181

RECOMMENDED BOOKS

1. Digital Systems and Applications by RJ Tocci, Prentice Hall of India, New Delhi
2. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi
3. Digital Electronics by KS Jamwal, Dhanpat Rai & Co., New Delhi
4. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
5. Digital Electronics –II by Yashpal and Sanjeev Kumar, North Publication.

6. Digital Designs by CJ Roth, Jaico Publication
7. Digital Electronics by Rajaraman V, Prentice Hall of India, New Delhi
8. Digital Fundamentals by Malvino and Leachy, Tata McGraw Hill Publishers, New Delhi
9. Digital Systems by Sanjay K Bose, Wiley Eastern (P) Ltd., New Delhi
10. Fuzzy logic with Engineering Application by T.J. Ross; Wiley Eastern (P) Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr. No	Topic	Time Allotted (hrs)	Marks All15ocation%
1	Logic Families	08	15
2	A/D and D/A Converters	08	15
3	Memories	12	25
4	Combinational Circuits	04	10
5	Sequential Circuits	08	15
6	Arithmetic and Logic Unit	04	10
7	Introduction to Fuzzy Logic	04	10
Total		**48**	**100**

4.5 MICROPROCESSORS AND PERIPHERAL DEVICES

L T P
4 - 2

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

1. Evolution of Microprocessor (04 hrs)

   Typical organization of a microcomputer system and functions of its various blocks. Microprocessor, its evolution, function and impact on modern society

2. Architecture of a Microprocessor (With reference to 8085 microprocessor) (12 hrs)

   Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme

3. Instruction Timing and Cycles (08 hrs)
   Instruction cycle, machine cycle and T-states, Fetch and execute cycle.

4. Programming (with respect to 8085 microprocessor) (16 hrs)

   Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

5. Memories and I/O interfacing (10 hrs)

   Concept of memory mapping, partitioning of total memory space. Address decoding, concept of peripheral mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices.

6. Interrupts (04 hrs)

Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use, Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system

7. Data Transfer Techniques (04 hrs)

Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data

8. Peripheral devices (06 hrs)

8255 PPI and 8253 PIT, 8257 / 8237 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter.

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 programme on 8085 kit
3. Writing and execution of ALP for addition and sub station 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. Use of 8085 emulator for hardware testing

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing). Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the given in the list may be given to the students.

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
2. Introduction to Microprocessor by Mathur ,Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi

4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.
6. Microprocessor programming & applications.by sudhir Goyal, North Publication.
7. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
8. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1.	Evolution of Microprocessor	04	5
2.	Architecture of a Microprocessor (With reference to 8085 microprocessor)	12	20
3	Instruction Timing and Cycles	08	10
4	Programming (with respect to 8085 Microprocessor)	16	25
5.	Memories and I/O interfacing	10	15
6.	Interrupts	04	5
7.	Data transfer techniques	04	5
8.	Peripheral devices	06	15
Total		**64**	**100**

4.6 ELECTRONICS DESIGN AND FABRICATION TECHNIQUES

L	T	P
-	-	6

RATIONALE

The purpose of this subject is to give practice to the students in elementary design and fabrication of the PCB. The topics of assembly, soldering, testing, and documentation have been included to give overall picture of the process of manufacturing of electronic devices. This subject has been merged with minor project work which aims at developing interest of the students about the, what is inside the electronics devices, what is happening and how it happens. The project may be small in size but should include only those components which he has studied in earlier classes, with a clear idea of signals processing. It would enable first hand experience of components, their purchase, assembly, testing and trouble shooting. It would boost up confidence of the students to repair and preparation of electronics gadgets. There should not be more than 2-3 students for each project. A report must be prepared with a hard and soft copy. The following contents will be discussed in lab classes.

DETAILED CONTENTS

1. Electronic Design (22 hrs)

   1.1 Selection and use of commonly used active and passive components

   1.2 Testing of active and passive components

   1.3 Develop skills in assembly of components, soldering, and soldering techniques

   1.4 Procedure for Cabinet Making

2. Fabrication Techniques (23 hrs)

   2.1 Printed Circuit Boards (PCBs):

   a) PCB board materials, their characteristics and plating, corrosion and its prevention.

   b) Photo processing, screen printing, etching, high speed drilling, buffing, surface treatment and protection from harsh environments, plated through holes, double sided and multilayer PCBs.

   c) Standards of board sizes. Modular assemblies edge connectors, multi board racks, flexible boards.

   d) Assembly of circuits on PCB, soldering techniques, role of tinning, flow and wave soldering, solderability, composition of solder. Edge connector. Elements of wire shaping.

2.2 Production

Storage and supply of components for assembly, role of incoming inspection of components, assembly line reduction, tools and jigs for lead bending. Manual and automatic insertion techniques. Closed loop assembly of modules and/or complete instruments. Specific examples of small scale and large-scale production be given to illustrate above mentioned methods.

2.3 Testing

Jigs and fixtures for operational testing of modules / sub- assemblies. Sequence testing for failure analysis. Environmental testing at elevated temperature and humidity. Vibration and mechanical endurance testing. Packing for transportation.

2.4 Documentation

Statement of brief specifications, detailed specifications and limitations. Block diagram detailed diagrams. Testing and checking points. Warning relative to high voltage for handling during repair. Fault location guide. Simple solutions for fault removal

2.4 Introduction to log books and history sheets

3. Every student must design and prepare a PCB, mount the components and assemble in a cabinet (32 hrs)

4. Computer Aided Design (CAD) (6 hrs)

Computer aided design of electronics circuit using different software like Eagle, ORCAD, and Circuit Maker.

5. Production Planning (3 hrs)

6. CNC drilling, photo plating, concept of SMDs (Surface Mount Devices) (10 hrs)

Some of the projects are listed below which is just a guideline for selecting the minor project. Students can also select any other project with the advice of his teacher.

LIST OF PROJECTS:

1. Regulated power supply
2. Timers using 555 and other oscillators
3. Touch plate switches – transistorized or 555 based
4. Door bell/cordless bell
5. Clapping switch and IR switch
6. Blinkers

7. Sirens and hooters
8. Single hand AM or FM
9. Electronic toy gun, walker, blinkers
10. Electronic dice
11. Cell charger, battery charger, mobile charger
12. Fire/smoke/intruder alarm
13. Liquid level controller
14. Counters
15. Combination locks
16. Electronics musical instruments
17. Telephone handset
18. Electronic Ballasts
19. Audio amplifiers
20. Tape recorders
21. Automatic stabilizer/CVT
22. Emergency light
23. Design and manufacture of transformer
24. Fan regulator
25. Dish Antenna

INSTRUCTIONAL STRATEGY

More emphasis may be laid on practical Project. Small industrial problems may be taken as assignments. Practical training regarding fabrication techniques using CAD may be carried out.

LIST OF RECOMMENDED BOOKS

1. Printed Circuit Board by Bosshart

2. Printed Circuit Board by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi

3. Electronics Techniques by Rajesh Kumar, NITTTR, Chandigarh.

4. Electronics Design Fabrication Techniques –H.M. RAI, Ishan Publication

5. Modular CAD for PCBs using EAGLE Software by Rajesh Kumar, NITTTR, Chandigarh

6. Electronic Manufacturing Technology by KS Jamwal, Dhanpat Rai and Sons, New Delhi

INDUSTRIAL TRAINING OF STUDENTS

(after IV Semester examinations)
(During Summar vacations)

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 4 weeks duration to be organised during the semester break starting after second year i.e. after IV Semester examinations. The concerned HODs/ TPO along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.

Teachers and students are requested to see the footnote below the study and evaluation scheme of IV Semester for further details.