# FOURTH SEMESTER

# 4. DETAILED CONTENTS OF VARIOUS SUBJECTS

## 4.1 ELECTRONICS CIRCUITS

L T P

Periods per week 4 – 4

**RATIONALE**

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

**DETAILED CONTENTS**

1. Multistage Amplifiers (10 period)

- Need for multistage amplifier
- Gain of multistage amplifier
- Different types of multistage amplifier, Coupling, Comparison between different types of coupling, RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth

2. Large Signal Amplifier (08 period)

- Difference between voltage and power amplifiers
- Importance of impedance matching in amplifiers
- Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A,B,C
- Single ended power amplifiers, Graphical method of calculation (without derivation) of out put power; heat dissipation curve and importance of heat sinks. Push-pull amplifier, and complementary symmetry push-pull amplifier
- Concept of Thermal Runaway & its protection

3. Feedback in Amplifiers (10 period)

- Basic principles and types of feedback
- Derivation of expression for gain of an amplifier employing feedback
- Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier
- RC coupled amplifier with emitter bypass capacitor
- Emitter follower amplifier and its application
- Darlington Amplifier.

4. Sinusoidal Oscillators (08 period)

- Barkhausen criterion for oscillations
- Tank Circuits
- Use of positive feedback
- Classification of oscillators
- Tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles (no mathematical derivation but only simple numerical problems)

5. Tuned Voltage Amplifiers (06 period)

- Series and parallel resonant circuits and bandwidth of resonant circuits
- Single and double tuned voltage amplifiers and their frequency response characteristics

6. Wave Shaping Circuits (06 period)

- General idea about different wave shapers
- RC and RL integrating and differentiating circuits with their applications
- Diode clipping and clamping circuits and simple numerical problems on these circuits

7. Multivibrator Circuits (08 period)

- Working principle of transistor as switch
- Concept of multi-vibrator: astable, monostable, and bistable and their applications
- Block diagram of IC555 and its working and applications
- IC555 as monostable and astable multi-vibrator

8. Operational Amplifiers (08 period)

- Characteristics of an ideal operational amplifier and its block diagram
- Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current
- Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator
- Concept of Schmitt trigger circuit and sample/hold circuit using operational amplifier and their application

## LIST OF PRACTICALS

1. Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
2. To measure the gain of push-pull amplifier at 1KHz
3. To measure the voltage gain of emitter follower circuit and plot its frequency response
4. Plot the frequency response curve of Hartley and Colpitts Oscillator
5. Plot the frequency response curve of phase shift and Wein bridge Oscillator
6. To observe the output waveforms of series and shunt clipping circuits
7. To observe the output for clamping circuits
8. Use of IC 555 as monostablemultivibrator and observe the output for different values of RC
9. Use of IC 555 as astablemultivibrator and observe the output at different duty cycles
10. To use IC 741 (op-amplifier) as

    i) Inverter, ii) Adder, iii) Subtractor iv) Integrator
11. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

## INSTRUCTIONAL STRATEGY

This subject being of fundamental importance for diploma holders in electronics engineering and related fields, emphasis on conceptual understanding may be given by taking the help of charts, simulation packages etc. Sufficient exercises may given to the students in single stage and multi-stage amplifier circuits in addition to simple exercises in fabricating and testing of various simple d.c circuits. The students may be encouraged to perform some additional practical exercises apart from the list provided.

## RECOMMENDED BOOKS


1. Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hill, New Delhi
2. Electronic Principles by Sahdev, DhanpatRai and Sons, New Delhi.
3. Electronics Principles by Malvino, Tata McGraw Hill, New Delhi
4. Electronic Devices and Circuits by Millman and Halkias, McGraw Hill, New Delhi
5. Electronics Devices and Circuits by BhupinderjitKaur,modern Publishers, Jalandhar
6. Basic Electronics by Grob, Tata McGraw Hill, New Delhi
7. Art of Electronics by Horowitz
8. Electronic Circuit Theory by Boylstead
9. Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi
10. Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad

11. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
12. Electronics Devices and Circuits-II by Rajesh Kumar, Eagle Prakashan, Jalandhar

**SUGGESTED DISTRIBUTION OF MARKS**

| Topic | Time Allotted (period) | Marks Allocation |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 08 | 15 |
| 3 | 10 | 15 |
| 4 | 08 | 15 |
| 5 | 06 | 10 |
| 6 | 06 | 05 |
| 7 | 08 | 10 |
| 8 | 08 | 10 |
| **Total** | **64** | **100** |

## 4.2 MICROPROCESSOR AND ITS APPLICATIONS

L T P

Periods per week 3 1 4

**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 and Architecture of a Microprocessor (With reference to 8085 microprocessor) (12 period)

Typical organization of a microcomputer system and functions of its various blocks. 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

2. Programming (with respect to 8085 microprocessor) (16 period)

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).

3. Memories and I/O interfacing (10 period)

Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. Concept of stack and its function. Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM.

4. Instruction Timing and Cycles (08 period)

Instruction cycle, machine cycle and T-states, Fetch and execute cycle

5. Interrupts (06period)

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

6. Data transfer techniques (06period)

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

7. Peripheral devices (06 period)

8255 PPI and 8253 PIT, 8257 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter, 8155/8156

**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 substation 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 and D/A card in sampling, wave generation, multiplexer, de-multiplexer and counter

**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 B P 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. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
7. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hill, New Delhi
8. Digital Integrated Electronics by Herbert Taub and DonalsSachilling; Prentice Hall of India Ltd., New Delhi
9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala

## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 20 |
| 2 | 16 | 25 |
| 3 | 10 | 15 |
| 4 | 08 | 10 |
| 5 | 06 | 10 |
| 6 | 06 | 10 |
| 7 | 06 | 10 |
| Total | 64 | 100 |

## 4.3 ELECTRONICS MEASURING INSTRUMENTS

L T P

Periods per week 3 1 4

**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 period)

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, importance and applications of standards and calibration

2. Voltage, Current and Resistance Measurement (12 period)

- Principles of operation and construction of permanent magnet moving coil (PMMC) instruments
- Moving iron type instruments, measurement of d.c voltage and current, measurement of d.c voltage and current, milli-volt measurement
- Measurement of voltage, current and resistance using multimeter
- Specifications of multimeter and its applications
- Limitations with regard to frequency and input impedance

3. Cathode Ray Oscilloscope (10 period)

- Construction and working of Cathode Ray Tube (CRT)
- Time base operation and need for blanking during fly back, synchronization
- Block diagram, description of a basic CRO and triggered sweep oscilloscope, front panel controls.
- Specifications of CRO and their explanation.
- Measurement of voltage, current, frequency, time period and phase using CRO.
- CRO probes, special features of dual beam, dual trace, delay sweep.
- Digital storage oscilloscope (DSO) : block diagram and working principle.

4. Signal Generators and Analytical Instruments (08 period)

- Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
- Wave analyzer, distortion measurement and spectrum analyser

5. Impedance Bridges and Q Meters (14 period)

- 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 and working principle of Q meter

6. Digital Instruments (14 period)

- 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

**LIST OF PRACTICALS**

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
2. To observe the limitations of a multimeter for measuring high frequency voltage
3. Measurement of voltage, frequency, time period and phase using CRO
4. Measurement of rise time and fall time using CRO
5. Measurement of Q of a coil and its dependence on frequency
6. Measurement of voltage, frequency, time and phase using DSO
7. Measurement of resistance and inductance of coil using RLC Bridge
8. Use of logic pulser and logic probe
9. Measurement of time period, frequency, average period using universal counter/ frequency counter

**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. Electronics Measurement and Instrumentation by AK Sawhney, DhanpatRai and Sons, New Delhi
2. Electronics Measurement and Instrumentation by Oliver, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
4. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
5. Electronics Instrumentation by JB Gupta, SatyaPrakashan, New Delhi


**SUGGESTED DISTRIBUTION OF MARKS**

| Topic | Time Allotted (Period) | Marks Allocation (%) |
|---|---|---|
| 1 | 6 | 05 |
| 2 | 12 | 20 |
| 3 | 10 | 15 |
| 4 | 08 | 10 |
| 5 | 14 | 25 |
| 6 | 14 | 25 |
| **Total** | **64** | **100** |

## 4.4 NETWORK FILTERS AND TRANSMISSION LINES

L T P

Periods per week 3 1 4

**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. Circuit Theory &Networks (20period)

   a) Elements of Networks and its type, Current Sources, Voltage Source and their conversion, Dependent and Independent Sources, Nodal and Mesh analysis.
   b) 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
   c) Symmetrical Network:
      - Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss.
      - T-network and Л Network
   d) 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 (08period)

   - Units of attenuation (Decibels and Nepers): General characteristics of attenuators
   - Analysis and design of simple attenuator of following types; Symmetrical T and Л type, L type

3. Filters (16period)

   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 significancevs
- Simple design problems of prototype low pass section.

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

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 (20period)

- Transmission Lines, their types and applications.
- Distributed constants, T and Л representation of transmission line section.
- Definition of characteristic impedance, propagation constant, attenuation constant and phase shift constant.
- Concept of infinite line
- Condition for minimum distortion and minimum attenuation of signal on-the-line and introduction to loading methods.
- Concept of reflection and standing waves, definition of reflection coefficient, SWR &VSWR and their relation (no derivation).
- Transmission line equation, expression for voltage, current and impedance at a point on the line.
- Concept of transmission lines at high frequencies.
- 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:
   - Determine the characteristic impedance experimentally
   - 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:
   - Determine the characteristic impedance experimentally
   - 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; DhanpatRai and Co. Publication, New Delhi
3. Network Analysis by Van Valkenburg: Prentice Hall of India, New Delhi
4. Network Analysis by Soni and Gupta; DhanpatRai and Co. Publication, New Delhi
5. Network Theory and Filter Design by Vasudev K. Aatre
6. Network Filters and Transmission line by UmeshSinha
7. Electrical and Electronics Measuring instrumentation , A.K Sawhney, DhanpatRai and Co. Publication, New Delhi
8. Network Analysis by G.K. Mithal
9. Network Filters and Transmission line by NardeepGoyal, Rajneesh Kumari, Tech. Max Publication, Pune.


**SUGGESTED DISTRIBUTION OF MARKS**

| **Topic** | **Time Allotted (period)** | **Marks Allocation (%)** |
|---|---|---|
| 1 | 20 | 32 |
| 2 | 08 | 12 |
| 3 | 16 | 24 |
| 4 | 20 | 32 |
| **Total** | **64** | **100** |

## 4.5 SIGNAL SENSING AND CONDITIONING

L T P

Periods per week 4 03

**RATIONALE**

This subject provides knowledge about signals, sensing of signals, signal transmission, conditioning and recording.

**DETAILED CONTENTS**

1. Introduction (04 Periods**)**

- Signal
- Types of Signals
- Functional Elements of System
- Importance of Sensing of Signals

2. Sensing Elements (24 Periods)

- Resistive sensing elements: potentiometers, resistance thermometers, strain gauges, Load cell/Pressure cell
- Capacitive sensing elements: variable separation, area and dielectric
- Inductive sensing elements: variable reluctance and LVDT displacement sensors
- Electromagnetic sensing elements: velocity sensors
- Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems
- Elastic sensing elements : sensing elements for force, torque, acceleration, pressure
- Piezoelectric sensing elements: static and dynamic characteristics
- Electrochemical sensing elements: ion selective electrodes, solid state gas sensors
- Photo sensing elements : Basic principle and characteristics of photo sources and photo detector, photo resisters, photo diodes, photo transistors, photo electric cells, LCDs, LEDs and photocouplers, LDR
- Photo Detectors : Optical detection Principles, Electro-optic effect, Integrated Optical Devices, Magneto optic effect, Acousto-optic effect
- Digital Transducer element, Micro sensor, smart sensors

3. Signal Transmission (12 Periods)

- Introduction

- Methods of Data Transmission
- General Telemetry System
- Types of Telemetry Systems
- Land Line Telemetering System
- Voltage Telemetering Systems
- Current Telemetering System
- Position Telemetering System
- Land Line Telemetering
- Feed-back System
- Radio Frequency (R.F.) Telemetry

4. Signal Conditioning (07 Periods)

- Basic Instrumentation Amplifier
- Applications of Instrumentation Amplifiers (Specific Bridge)
- Chopped and Modulated DC Amplifier

6. Signal Recording and Display (10Periods)

- Recording Requirements
- Analog Recorders
- Graphics Recorders
- Strip Chart Recorders
- Types of Strip Chart Recorders
- Galvanometer Type Recorders
- Null Type Recorders
- Potentiometric Recorders
- X-Y Recorders
- Direct Recording
- Digital Display Methods
- Digital Display Units
- Segmental Displays
- Dot Matrices
- Rear Projection Display

7. Data Acquisition System (07 Periods)

- Introduction
- Objective of DAS
- Single Channel Acquisition System
- Multi-Channel DAS
- Computer Based DAS
- Data Loggers
- Sensors Based Computer Data Systems

**LIST OF PRACTICALS**

1. Measurement of Displacement using LVDT
2. Measurement of Temperature using Thermocouple &Thermister
3. Measurement of Strain using strain gauge

4. Application of Load Cell/Pressure Cell
5. Application of capacitive transducer
6. Application of Potentiometer
7. Application and use of LDR, Photocell
8. Application of Potentiometer recording
9. Application and use of graphic and strip chart recorder
10. Use of Telemetry System

## INSTRUCTIONAL STRATEGY

The teaching should be supplemented by using audio visual aids.

## RECOMMENDED BOOKS


1. Electronic Instrumentation; by H.S.Kalsi; McGraw-Hill Education India Pvt.Ltd.
2. Principles of Measurement Systems by John P.Bently (Pearson)
3. Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney; DhanpatRai& Co.
4. Instrumentation measurement and Analysis by B.C. Nakra, K.K.Chaudhary
5. Optoelectronics An Introduction to Materials and Devices by Singh Jasprit;McGraw Hill
6. Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill


## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allocation (%) |
|---|---|---|
| 1 | 04 | 08 |
| 2 | 24 | 32 |
| 3 | 12 | 15 |
| 4 | 07 | 10 |
| 5 | 10 | 15 |
| 6 | 07 | 10 |
| **Total** | **64** | **100** |

## 4.6 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

| | L | T | P |
|---|---|---|---|
| Periods per week | 5 | - | - |

**RATIONALE**

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

**DETAILED CONTENTS**

**SECTION – A ENTREPRENEURSHIP**

1. Introduction (23 periods)

- Concept /Meaning and its need
- Qualities and functions of entrepreneur and barriers in entrepreneurship
- Sole proprietorship and partnership forms of business organisations
- Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification (17 periods)

- Scanning of business environment
- Salient features of National and State industrial policies and resultant business opportunities
- Types and conduct of market survey
- Assessment of demand and supply in potential areas of growth
- Identifying business opportunity
- Considerations in product selection

3. Project report Preparation (14 periods)

- Preliminary project report
- Detailed project report including technical, economic and market feasibility
- Common errors in project report preparations
- Exercises on preparation of project report

**SECTION –B MANAGEMENT**

4. Introduction to Management (06 periods)

- Definitions and importance of management
- Functions of management: Importance and Process of planning, organising, staffing, directing and controlling
- Principles of management (Henri Fayol, F.W. Taylor)
- Concept and structure of an organisation
- Types of industrial organisations

  a) Line organisation
  b) Line and staff organisation
  c) Functional Organisation

5. Leadership and Motivation (05 periods)

a) Leadership

- Definition and Need
- Qualities and functions of a leader
- Manager Vs leader
- Types of leadership

b) Motivation

- Definitions and characteristics
- Factors affecting motivation
- Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas (10 periods)

a) Human Resource Management

- Introduction and objective
- Introduction to Man power planning, recruitment and selection
- Introduction to performance appraisal methods

b) Material and Store Management

- Introduction functions, and objectives
- ABC Analysis and EOQ

c) Marketing and sales

- Introduction, importance, and its functions
- Physical distribution
- Introduction to promotion mix
- Sales promotion

d) Financial Management

- Introductions, importance and its functions
- Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

7. Miscellaneous Topics (05 periods)

a) Customer Relation Management (CRM)

- Definition and need
- Types of CRM

b) Total Quality Management (TQM)

- Statistical process control
- Total employees Involvement
- Just in time (JIT)

c) Intellectual Property Right (IPR)

- Introductions, definition and its importance
- Infringement related to patents, copy right, trade mark

**Note:** In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

**INSTRUCTIONAL STRATEGY**

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

## RECOMMENDED BOOKS


1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
5. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.


## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Pds) | Marks Allotted (%) |
|---|---|---|
| 1 | 23 | 28 |
| 2 | 17 | 20 |
| 3 | 14 | 16 |
| 4 | 6 | 10 |
| 5 | 5 | 06 |
| 6 | 10 | 14 |
| 7 | 5 | 06 |
| **Total** | **80** | **100** |

## 4.7 INDUSTRIAL TRAINING

Industrial training 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.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organised during the semester break starting after IV Semester examinations. The concerned HODs 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 teacher may guide a group of 4-5 students. A minimum of one visit 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.

Internal assessment and external assessment 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, if any. The components of evaluation will include the following.

| | |
|---|---|
| a) Punctuality and regularity | 15% |
| b) Initiative in learning new things | 15% |
| c) Relationship with workers | 15% |
| d) Industrial training report | 55% |