

## 4.1 ELECTRICAL MACHINES - I

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### RATIONALE

Electrical machines is a subject where a student will deal with various types of electrical machines which are employed in industries, power stations, domestic and commercial appliances etc. After studying this subject, a diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Practical aspects of this subject will make the students capable of performing various tests on the machines as per latest BIS specifications

### DETAILED CONTENTS

- |    |   |          |
|----|---|----------|
| 1. | Introduction to Electrical Machines   | (6 hrs)  |
|    | 1.1 Definition of motor and generator   |          |
|    | 1.2 Torque development due to alignment of two fields and the concept of torque angle |          |
|    | 1.3 Electro-magnetically induced emf  |          |
|    | 1.4 Elementary concept of an electrical machine                                       |          |
|    | 1.5 Comparison of generator and motor   |          |
|    | 1.6 Generalised theory of electrical machines   |          |
| 2. | DC Machines   | (24 hrs) |
|    | 2.1 Main constructional features, Types of armature winding                           |          |
|    | 2.2 Function of the commutator for motoring and generation action                     |          |
|    | 2.3 Factors determining induced emf   |          |
|    | 2.4 Factors determining the electromagnetic torque                                    |          |
|    | 2.5 Significance of types of machines   |          |
|    | 2.6 Significance of back e.m.f., the relation between back emf and terminal voltage   |          |
|    | 2.7 Armature Reaction   |          |
|    | 2.8 Methods to improve commutation  |          |
|    | 2.9 Performance and characteristics of different types of DC motors                   |          |
|    | 2.10 Speed control of dc shunt/series motors  |          |
|    | 2.11 Need of starter, three point dc shunt motor starter and 4 point starter          |          |
|    | 2.12 Applications of DC motors  |          |
|    | 2.13 Faults in dc machines and their retrospective                                    |          |
|    | 2.14 Losses in a DC machine   |          |
|    | 2.15 Determination of losses by Swinburne's test                                      |          |
| 3. | Transformers (single phase)   | (24 hrs) |
|    | 3.1 Introduction  |          |
|    | 3.2 Constructional features of a transformer and parts of transformer                 |          |
|    | 3.3 Working principle of a transformer  |          |
|    | 3.4 EMF equation  |          |

- 3.5 Transformer on no-load and its phasor diagram
  - 3.6 Transformer – neglecting voltage drop in the windings – Ampere turn balance – its phasor diagram
  - 3.7 Mutual and leakage fluxes, leakage reactance
  - 3.8 Transformer on load, voltage drops and its phasor diagram
  - 3.9 Equivalent circuit
  - 3.10 Relation between induced emf and terminal voltage, regulation of a transformer-mathematical relation
  - 3.11 Losses in a transformer
  - 3.12 Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance
  - 3.13 Auto transformer construction, working and applications
  - 3.14 Different types of transformers including dry type transformer.
4. Transformers three phase (10 hrs)
- 4.1 Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholtz Relay, Tap Changer (off load and on load) (Brief idea)
  - 4.2 Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star
  - 4.3 Conditions for parallel operation (only conditions are to be studied)
  - 4.4 On load tap changer
  - 4.5 Difference between power and distribution transformer
  - 4.6 Cooling of transformer

### LIST OF PRACTICALS

1. To measure the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence  

**OR**

Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding
2. Speed control of dc shunt motor (i) Armature control method and (ii) Field control method
3. Study of dc series motor with starter (to operate the motor on no load for a moment)
4. Determination of efficiency of DC motor by Swinburne's Test at (i) rated capacity (ii) half full load
5. To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load
6. To find the efficiency and regulation of single phase transformer by actually loading it.

7. Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
8. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as
  - (a) Star-star
  - (b) Star delta
  - (c) Delta star
  - (d) Delta - Delta configuring conditions.

### INSTRUCTIONAL STRATEGY

Electrical machines being a core subject of electrical and electronics engineering diploma curriculum, where a student will deal with various types of electrical machines which are employed in industry, power stations, domestic and commercial appliances etc. After studying this subject, an electrical diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Special care has to be taken on conceptual understanding of concepts and principles in the subject. For this purpose exposure to industry, work places, and utilization of various types of electrical machine for different applications may be emphasized. Explanation of practical aspects of the subject will make the students capable of performing various tests on the machines as per latest BIS specifications.

### RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd. New Delhi
2. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
3. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
4. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
5. Electrical Machines by Fitzgerald
6. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.

### SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (Hrs)	Marks Allocation (%)
1	Introduction to Electrical Machine	6	10
2	DC Machines	24	40
3	Transformers (single phase)	24	35
4	Transformers three phase	10	15
	<b>Total</b>	<b>64</b>	<b>100</b>

## 4.2 ANALOG COMMUNICATION SYSTEM

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### RATIONALE:

Communication plays vital role in our lives. Development in communication technology has increased its applications in allied fields of communication including satellite, mobile, RADAR, telephony, telegraphy, industrial controls, etc. It is the technology subject which expert the student to understand the operation and fault finding of AM & FM transmitter, AM & FM radio receiver.

### DETAILED CONTENTS

1. Introduction (08 hrs)  
Introduction to electronic communication, Importance, Block diagram of communication system, Modulation, Need for modulation, Types of Electronics communications, Simplex, Duplex – Full & Half, Digital and Analog, Applications of communication, Electromagnetic spectrum (different bands & their frequencies), Concept of Transmission bandwidth.
2. Amplitude Modulation (08 hrs)  
Definition, Modulation index – definition, its effect on modulated signal, simple numerical. Mathematical representation of amplitude modulated wave & its meaning (concept of sidebands), Bandwidth requirement, Representation of AM signal in time & frequency domain, Power relation in AM wave, simple numericals.
3. Frequency Modulation (06 hrs)  
Definition – Deviation ratio, max. Deviation ratio. Mathematical representation of frequency modulation and its meaning. Representation of frequency modulated signal in time domain and frequency domain, Bandwidth requirement – simple numericals.
4. Phase Modulation (06 hrs)  
Derivation of expression for phase modulated wave, modulation index, Comparison with Frequency Modulation.
5. AM Modulators (07 hrs)  
Block diagram, working principles and applications of Square law modulator, Switching modulator, Collector modulator, Balanced modulator, Ring modulator.
6. AM Demodulators (05 hrs)  
Principles of demodulation diode detector, concept of clipping and formula for RC time constant for minimum distortion.
7. FM Modulators (06 hrs)  
Block diagram, working principles and applications of reactance modulator, Varactor diode modulator, VCO & Armstrong phase modulator.

8. FM Demodulators (04 hrs)  
Principles of working of Foster-see lay discriminator, Ratio detector and slope detector.
9. AM/FM Transmitters (06 hrs)  
Block diagram of AM transmitters and working of each stage, Block diagram and working principle of reactance FET and Armstrong FM transmitters.
10. AM/FM Radio Receivers (08 hrs)  
Principle and working with block diagram of super heterodyne AM receiver, Performance characteristics of radio receiver: sensitivity, selectivity, fidelity, S/N ratio and image rejection ratio, Selection criteria for intermediate frequency, Block diagram of FM receiver and function of each block.

### LIST OF PRACTICALS

1. (a) To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation.  
(b) To measure the modulation index of the wave obtained in above practical.
2. (a) To obtain an AM wave from a square law modulator circuit and observe waveforms .  
(b) To generate a DSB-SC signal and observe the pattern on CRO for different levels of modulating signal.
3. To obtain an AM wave from reactance tube modulator/voltage controlled oscillator circuit and measure the frequency deviation for different modulating signals.
4. To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.
5. To obtain modulating signal from a FM detector (Foster Seely/Ratio detector /quadrature) circuit and plot the discriminator characteristics.
6. To plot the sensitivity characteristics of a radio receiver and determination of the frequency for maximum sensitivity.
7. To plot the selectivity characteristics of a radio receiver.
8. To plot the fidelity characteristics of a radio receiver.
9. To align AM broadcast radio receiver.

### 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, New Delhi.
2. Communication systems By A.K. Gautam, SK Katria and Sons, New Delhi.
3. Electronic communication systems By K.S. Jamwal, Dhanpat Rai and Sons, New Delhi.
4. Wayne Tomasi, "Electronic Communication Systems", 4<sup>th</sup> Edition, Pearson Publication, 2008.

### SUGGESTED DISTRIBUTION OF MARKS

Sr.No	Topic	Time Allotted (Hrs)	Marks Allotted%
1	Introduction	08	12
2	Amplitude Modulation	08	13
3	Frequency Modulation	06	10
4	Phase Modulation	06	10
5	AM Modulators	07	10
6	AM Demodulators	05	08
7	FM Modulators	06	10
8	FM Demodulators	04	05
9	AM/FM Transmitters	06	10
10	AM/FM Radio Receivers	08	12
	<b>Total</b>	<b>64</b>	<b>100</b>

### 4.3 ELECTRICAL AND ELECTRONICS ENGINEERING DESIGN AND DRAWING

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#### RATIONALE

A polytechnic pass-out is supposed to have ability to :

- i) Read, understand and interpret electrical and electronics engineering drawings
- ii) Communicate and co-relate through sketches, drawings and circuits
- iii) Prepare working drawings of panels, transmission and distribution
- iv) Prepare working drawings of circuits for the preparation of PCBs

The contents of this subject have been designed to develop requisite knowledge and skills of electrical drawings in the students of diploma in electrical engineering.

#### DETAILED CONTENTS ( To make 12 Sheets and to design PCB on CAD))

1. Symbols and Signs Conventions **(1 Sheets)** (4 hrs)  
  
Various Electrical Symbols used in Domestic and Industrial Installation and Power System as per BIS.
2. Panels/Distribution Boards **(2 Sheets)** (18 hrs)
  - Design and Drawing of panels/Distribution board using MCBS, ELCB main switches and change over switches for domestic installation, industrial and commercial installation.
  - Design and drawing of electronic circuits for making PCBs
3. Orthographic projections of Simple Electrical Parts **(3 Sheets)** (22 hrs)
  - Bus bar post/ Kit Kat
  - Pin type and shackle type insulator (Pin Type 11kV/66kV)
  - Bobbins of a small transformer / choke
  - Stay insulators/Suspension type insulators
  - Free hand sketching of M.C.B. and E.L.C.B Placed on Distribution Board.
4. Orthographic Projection of Machine Parts **(3 Sheets)** (20 hrs)
  - Rotor of a squirrel cage induction motor
  - Motor body (induction motor) as per IS Specifications (using outside dimensions)
  - Slip rings of 3-phase induction Motor.
  - Stator of 3 phase Induction motor (Sectional View)

5. Contactor Control Circuits: Schematic and Wiring Diagram.(3 Sheets) (14 hrs)

- DOL Starter of 3-phase induction Motor.
- Forwarding/reversing of 3-phase induction motor
- Limit switch control of a 3-phase induction motor
- Sequence operation of two motors using T.D.R.
- Two speed motor control.
- Automatic star-delta starter for 3-phase induction motor.

6. Computer Aided Design(CAD) (18 hrs)

Computer aided design of electric and electronic circuits using symbols and conventions of electrical and electronic components and devices for making PCB

### INSTRUCTIONAL STRATEGY

Teacher should identify/prepare more exercises on the pattern shown above. The teacher should make the students confident in making drawing and layouts of electrical wiring installations and doing estimation and costing. In addition students should have This capability will lead the students to become a successful entrepreneur. Take the students to field/laboratory and show the material and equipment.

### RECOMMENDED BOOKS

1. Electrical Engineering Design and Drawings by Surjeet Singh, Dhanpat Rai and Co, New Delhi
2. Electrical Engineering Design and Drawings by SK Bhattacharya, SK Kataria and Sons, New Delhi
3. Electrical Engineering Design and Drawings by Ubhi & Marwaha, IPH, New Delhi
4. Electrical Design and Drawing by SK Sahdev, Uneek Publications, Jalandhar
5. Electrical Engineering Drawing by Surjit Singh, SK Kataria and Sons, New Delhi

### SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (Hrs)	Marks Allocation (%)
1	Symbols and Signs Conventions	4	05
2	Design and Drawing of Panels	18	20
3	Orthographic Projections of Simple Electrical Parts	22	20
4	Drawing of Machine Parts	20	20
5	Contactor Control Circuits	14	15
6.	Computer aided design (CAD)	18	20
	<b>Total</b>	<b>96</b>	<b>100</b>



## 4.4 MICROPROCESSORS

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### 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 (4 hrs)
  - 1.1 Typical organization of a microcomputer system and functions of its various blocks
  - 1.2 Microprocessor, its evolution, function and impact on modern society
  
2. Architecture of a Microprocessor (With reference to 8085 microprocessor) (12 hrs)
  - 2.1 Concept of Bus, bus organization of 8085
  - 2.2 Functional block diagram of 8085 and function of each block
  - 2.3 Pin details of 8085 and related signals
  - 2.4 Demultiplexing of address/data bus of read/write control signals
  - 2.5 Steps to execute a stored programme
  
3. Memories and I/O interfacing (11 hrs)
  - 3.1 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.
  - 3.2 Concept of stack and its function
  - 3.3 Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.
  
4. Programming (with respect to 8085 microprocessor) (16 hrs)
  - 4.1 Brief idea of machine and assembly languages, Machines and Mnemonic codes.
  - 4.2 Instruction format and addressing modes. Identification of instructions as to which addressing mode they belong.
  - 4.3 Concept of Instruction set. Explanation of the instructions of the following groups of instruction set

- 4.4 Data transfer groups, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group.
- 4.5 Programming exercises in assembly language. (Examples can be taken from the list of experiments).
5. Instruction Timing and Cycles (3 hrs)
- 5.1 Instruction cycle, machine cycle and T-states
- 5.2 Fetch and execute cycle.
6. Interrupts (4 hrs)
- 6.1 Concept of interrupt,
- 6.2 Maskable and non-maskable
- 6.3 Edge triggered and level triggered interrupts
- 6.4 Software interrupt
- 6.5 Restart interrupts and its use
- 6.6 Various hardware interrupts of 8085
- 6.7 Servicing interrupts, extending interrupt system.
7. Data transfer techniques (4 hrs)
- 7.1 Concept of programmed I/O operations, synchronous data transfer (hand shaking),
- 7.2 Interrupt driven data transfer
- 7.3 DMA
- 7.4 Serial output data
- 7.5 Serial input data.
8. Peripheral devices (10 hrs)
- 8.1 8255 PPI and 8253 PIT
- 8.2 8257 DMA controller
- 8.3 8279 Programmable KB/Display Interface.
- 8.4 8251 Communication Interface Adapter
- 8.5 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 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 8279 programmable KB/display interface like to display the hex code of key pressed on display

### 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. Introduction to Microprocessors by Mathur, Tata McGraw Hill Education Pvt Ltd., New Delhi
2. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
3. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala
4. Microprocessors by VK Sangar, Uneek Publication, Jalandhar
5. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi
6. Advanced Microprocessor and Interfacing by Badri Ram, Tata McGraw Hill Education Pvt Ltd., New Delhi
7. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.
8. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
9. Digital Electronics and Applications by Malvino Leach; Tata McGraw Hill Education Pvt Ltd., New Delhi
10. Digital Integrated Electronics by Herbert Taub and Donalds Sachilling; Prentice Hall of India Ltd., New Delhi

### SUGGESTED DISTRIBUTION OF MARKS

Sr. No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Evolution of Microprocessor	04	05
2	Architecture of a Microprocessor (With reference to 8085 Microprocessor)	12	20
3	Memories and I/O Interfacing	10	15
4	Programming (with respect to 8085 Microprocessor)	16	25
5	Instruction Timing and Cycles	08	10
6	Interrupts	04	5
7	Data Transfer Techniques	04	5
8	Peripheral Devices	06	15
	<b>Total</b>	<b>64</b>	<b>100</b>

## 4.5 INSTRUMENTATION AND PROCESS CONTROL

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### INTRODUCTION

Electrical and electronics diploma holder will have the idea of various measuring devices and concepts of internal construction and working. So that he/she can easily understand about the instrumentation in the field of industrial application. With this paper a student can have the concepts of distant monitoring system of a process and also one can have the concepts of designing display device and recorder.

### DETAILED CONTENTS

1. Basics of Instrumentation System and Transducers (10 hrs)
 

Scope and necessity of instruments, basic building blocks of instrumentation systems, Definition of transducers, classification with examples:

  - Variable resistance transducers-Potentiometers, strain gauge
  - Variable inductance transducers-LVDT, RVDT
  - Variable capacitive transducers-Condenser microphone, capacitance pick-up
  
2. Measurement of Pressure and Level (12 hrs)
  - (a) Measurement of Pressure:
 

Concept of pressure measuring devices, construction and working principle of bourdon tube, bellows, diaphragm, capsules, manometers, piezo-electric.
  - (b) Measurement of Level:
 

Concept of level measuring devices, construction and working principle of float, visual, purge, ultrasonic
  
3. Measurement of Temperature and Flow (12 hrs)
  - (a) Measurement of Temperature
 

Concept of temperature measuring devices, construction and working principle of RTD, thermistors, bimetallic, thermocouple, radiation pyrometers
  - (b) Measurement of Flow
 

Concept of flow measuring devices, construction and working principle of orifice, venturimeter, nozzle, pitot-tube, ultrasonic and electromagnetic flow meters

4. Telemetry and Data Acquisition System (08 hrs)
- (a) Telemetry:  
Introduction to telemetry, general telemetry systems, land-line and radio-frequency telemetering (wireless) systems
- (b) Data Acquisition System:  
Basics of data acquisition system, analog data acquisition system, digital data acquisition system.
5. Display Devices and Recorders (08 hrs)
- Concept of displaying and recording devices, Introduction to various indicating, integrating and recording methods, Analog displaying devices (gauge etc), Digital displaying devices-LED display (seven segment and dot matrix display), LCD display, recorders: strip-chart, X-Y recorder.
6. Process Control (14 hrs)
- Basics of process control, Block diagram of open loop and close loop control system, concept of transfer function. concept of P,I,D,P+I, P+D and P+I+D controllers with examples, Introduction to electrical, pneumatic and hydrolic controllers, Basics of valve and actuators.

### LIST OF PRACTICALS

1. Study of strain gauge and measurement of strain for a given sample
2. Study of RTD (Resistance Temperature Detector) and measurement of temperature
3. Study of thermistor and measurement of temperature
4. Study of calibration of LVDT and measurement of displacement
5. Study of thermocouple and measurement of temperature
6. Study of piezoelectric pressure transducer
7. To study the control loop of a system of pressure control with the help of working Model
8. To study the control loop of a system of temperature control with the help of working Model
9. Display 0-9 on seven segment LED using BCD to seven segment decoder

### RECOMMENDED BOOKS

1. Electrical and Electronic Measurement and Instrumentation by AK Sawhney; Dhanpat Rai and Co., New Delhi.

2. Measurement system-Application and Design by E.O. Doebelin, Tata Mc. Graw Hill.
3. Instrumentation, Measurement and Analysis by BC Nakra and K.Chaudhary, Tata Mc Graw Hill Publishing Co., New Delhi
4. Process Control Instrumentation Technology by Curtis Johns; Prentice Hall of India , New Delhi

#### SUGGESTED DISTRIBUTION OF MARKS

Sr. No.	Topics	Time Allotted (Hrs)	Marks Allotted (%)
1	Basics of Instrumentation System and Transducers	10	15
2	Measurement of Pressure and Level	12	20
3	Measurement of Temperature and Flow	12	20
4	Telemetry and Data Acquisition System	08	10
5	Display Devices and Recorders	08	15
6	Process Control	14	20
	<b>Total</b>	<b>64</b>	<b>100</b>

## 4.6 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

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### RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one’s own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability and self confidence.

### DETAILED CONTENTS

1. Introduction to Generic Skills (4 hrs)
  - 1.1 Importance of Generic Skill Development (GSD)
  - 1.2 Global and Local Scenario of GSD
  - 1.3 Life Long Learning (LLL) and associated importance of GSD.
  
2. Managing Self (8 hrs)
  - 2.1 Knowing Self for Self Development
    - Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
  - 2.2 Managing Self - Physical
    - Personal grooming, Health, Hygiene, Time Management
  - 2.3 Managing Self – Intellectual development
    - Information Search: Sources of information
    - Listening: Effective Listening
    - Speaking: Effective Oral Communication
    - Reading: Purpose of reading, different styles of reading, techniques of systematic reading; Note Taking: Importance and techniques of note taking
    - Writing: Correspondence - personal and business

**Note:** Practical sessions should be coupled with teaching of effective listening, speaking, reading and writing.

- 2.4 Managing Self – Psychological
- Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
  - Techniques to manage the above
3. Managing in Team (6 hrs)
- 3.1 Team - definition, hierarchy, team dynamics
- 3.2 Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background
- 3.3 Communication in group - conversation and listening skills
4. Task Management (3 hrs)
- 4.1 Task Initiation, Task Planning, Task execution, Task close out
- 4.2 Exercises/case studies on task planning towards development of skills for task management
5. Problem Solving (5 hrs)
- 5.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
- 5.2 Different approaches for problem solving.
- 5.3 Steps followed in problem solving.
- 5.4 Exercises/case studies on problem solving.
6. Entrepreneurship (22 hrs)
- 6.1 Introduction
- Concept/Meaning and its need
  - Competencies/qualities of an entrepreneur
  - Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.
- 6.2 Market Survey and Opportunity Identification (Business Planning)
- How to start a small scale industry
  - Procedures for registration of small-scale industry
  - List of items reserved for exclusive manufacture in small-scale industry
  - Assessment of demand and supply in potential areas of growth.
  - Understanding business opportunity
  - Considerations in product selection
  - Data collection for setting up small ventures.
- 6.3 Project Report Preparation
- Preliminary Project Report
  - Techno-Economic Feasibility Report
  - Exercises on Preparation of Project Report in a group of 3-4 students



## INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

## RECOMMENDED BOOKS

1. Generic skill Development Manual, MSBTE, Mumbai.
2. Lifelong learning, Policy Brief ([www.oecd.org](http://www.oecd.org))
3. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
4. Towards Knowledge Society, UNESCO Paris Publication
5. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
6. Human Learning, Ormrod
7. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
8. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
9. Handbook of Small Scale Industry by PM Bhandari
10. Generic Skills and Entrepreneurship Development by Ishan Publishers (Ambala)
11. Generic Skills and Entrepreneurship Development by Poonam Goyal (GBD)-Punjab

## SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1.	Introduction to Generic Skills	4	5
2.	Managing Self	8	15
3.	Managing in Team	6	10
4.	Task Management	3	10
5.	Problem Solving	5	10
6.	Entrepreneurship	22	50
	<b>Total</b>	<b>48</b>	<b>100</b>

## 4.6 ENVIRONMENTAL SCIENCE

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### RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

### DETAILED CONTENTS

1. Basics of ecology, eco system and sustainable development (03 hrs)
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table (04 hrs)
3. Sources of pollution - natural and man made, their effects on living and non-living organisms, Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms, Pollution of air-causes and effects of man, animal, vegetation and non-living organisms, Sources of noise pollution and its effects (18 hrs)
4. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods (06 hrs)
5. Mining, blasting, deforestation and their effects (03 hrs)
6. Legislation to control environment (04 hrs)
7. Environmental Impact Assessment (EIA), Elements for preparing EIA statements (04 hrs)
8. Current issues in environmental pollution and its control, role of non-conventional sources of energy in environmental protection (06 hrs)

### RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted for Lectures (Periods)</b>	<b>Marks Allotted (%)</b>
1	03	6
2	04	10
3	18	40
4	06	12
5	03	04
6	04	08
7	04	08
8	06	12
<b>Total</b>	<b>48</b>	<b>100</b>

## ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during or at the end of 4<sup>th</sup> semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business