

#### 4.4 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 pass-outs for enhancing their employability and self confidence.

##### **LEARNING OUTCOMES**

After undergoing the subject, the student will be able to:

- Explain the importance of generic skills
- Manage himself/herself physically, intellectually and psychologically●  
Work effectively as a team member
- Manage tasks effectively
- Develop an entrepreneurial mindset.
- Identify entrepreneurial support system for new ventures and small businesses.●  
Recognize a business opportunity.
- Conduct market survey and prepare project report.

##### **DETAILED CONTENTS**

1. Introduction to Generic Skills (04hrs)

Importance of Generic Skill Development

Life Long Learning and associated importance of Generic Skill Development

2. Managing Self (07hrs)

Knowing Self for Self Development

- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

Managing Self-Physical

Personal grooming, Health, Hygiene, Time Management

Managing Self–Intellectual development

- Information Search: Sources of information
- Communication: Official & business correspondence, Job application covering letter and resume

#### Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance
- Techniques to manage stress

### 3. Managing in Team (06hrs)

Team-definition, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

### 4. Task Management (03hrs)

Task Initiation, planning, execution, closeout

Exercises/case studies on task planning towards development of skills for task management

### 1. Problem Solving (05hrs)

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving.

### 2. Entrepreneurship (20hrs)

#### Introduction

- Concept/Meaning and its need
- 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.

Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yojana (PMMY), Make in India, Start up India, Stand up India, National Urban Livelihood Mission (NULM); Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

#### Market Survey and Opportunity Identification (Business Planning)

How to start a small scale unit/ industry

- Procedures for registration of small-scale unit/industry

- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection

#### Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on preparation of Detailed Project Report

### 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 one's 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. Balasubramanian, S., "Soft Skills for Interpersonal Communication", Orient Black Swan, New Delhi.
2. "Lifelong learning", Policy Brief (www.oecd.org).
3. Rathore, BS, and Dr JS Saini, "A Handbook of Entrepreneurship", Aapga Publications, Panchkula (Haryana).
4. Gupta, CB, and P Srinivasan, "Entrepreneurship Development", Sultan Chand and Sons, New Delhi.
5. "Entrepreneurship Development", Tata McGraw Hill Publishing Company Ltd., New Delhi.

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	04	06
2.	07	08
3.	06	06
4.	03	04
5.	05	06
6.	20	20
<b>Total</b>	<b>45</b>	<b>50</b>

## DATA STRUCTURES

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### RATIONALE

Data structures are the techniques of designing the basic algorithms for real-life projects. Understanding of data structures is essential and this facilitates the understanding of the language. The practice and assimilation of data structure techniques is essential for programming. The knowledge of 'C' language and data structures will be reinforced by practical exercises during the course of study. The course will help students to develop the capability of selecting a particular data structure.

### LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify the problem and formulate an algorithm for it.●  
Identify the various designing techniques
- Store data, process data in linked list.
- Sort the data in ascending or descending order.
- Apply various data structure techniques in an array.●  
Implement trees and various traversing techniques.
- Implement various sorting algorithms and to compare them for checking efficiency.
- Identify proper data handling technique for handling data.

### DETAILED CONTENTS

- |    |  |        |
|----|--|--------|
| 1. | Fundamental Notations  | (6hrs) |
|    | Problem solving concept top down and bottom up design, structured programming<br>Concept of data types, variables and constants<br>Concept of pointer variables and constants  |        |
| 2. | Arrays   | (6hrs) |
|    | Concept of Arrays, Single and multidimensional arrays,<br>Representation of arrays - Row major order and column major order<br>Finding location of an element in single and multidimensional arrays<br>Operations on arrays with Algorithms (searching, traversing, inserting, deleting) |        |

3. Stacks, Queues and Recursion (8hrs)
- Introduction to stacks
  - Representation of stacks
  - Implementation of stacks
  - Applications of stacks
  - Introduction to queues
  - Implementation of queues
  - Circular Queues
  - De-queues
  - Recursion
4. Linked Lists (9hrs)
- a. Introduction to linked list
  - b. Representation of linked lists in Memory
  - c. Operations on linked list
  - d. Application of linked lists
  - e. Doubly linked lists
  - f. Operations on doubly linked lists
5. Trees (8hrs)
- 5.1 Concept of Trees
  - 5.2 Representation of Binary tree in memory
  - 5.3 Traversing Binary Trees (Preorder, Postorder and Inorder)
  - 5.4 Searching, inserting and deleting binary search trees
6. Sorting and Searching (8hrs)
- 6.1 Introduction to sorting and searching
  - 6.2 Search algorithm (Linear and Binary)
  - 6.3 Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort).

## LIST OF PRACTICALS

Write programmes in C to implement

1. Sorting an array
2. The addition of two matrices using functions
3. The multiplication of two matrices
4. Push and pop operation in stack
5. Inserting and deleting elements in queue
6. Inserting and deleting elements in circular queue
7. Insertion and deletion of elements in linked list
8. Insertion and deletion of elements in doubly linked list
9. The Factorial of a given number using with recursion and without recursion
10. Fibonacci series with recursion and without recursion
11. Program for binary search tree operation

12. Theselectionsorttechniques
13. Thebubblesorttechnique
14. Thequicksorttechnique
15. Themergesorttechnique
16. Thebinarysearchprocedurestosearchanelementinagivenlist
17. Thelinearsearchprocedurestosearchanelementinagivenlist

### **INSTRUCTIONALSTRATEGY**

This subject clears all fundamentals of programming techniques. Teachers should stress on explaining all the techniques and algorithm in detail in theory sessions. The students should be asked to convert their ideas about a problem into algorithms in theory class and then write programs for the algorithms. Finally all the programmes should be run on computers. This will help the students to have clear concepts of programming.

### **RECOMMENDED BOOKS**

1. Lipschutz, "Data structures – Schaum's Outline Series", McGraw Hill Education Pvt Ltd, New Delhi.
2. ISRD Group, "Data Structure using C", Tata McGraw Hills Education Pvt Ltd., New Delhi.
3. Sofat, Sanjiv, "Data Structures", Khanna Publishers, New Delhi.
4. Patel, R.B., "Expert Data Structures with C", Khanna Publishers, New Delhi.
5. Salaria, RS, "Data Structures and Algorithm Using C", Khanna Book Publishing Co. (P)Ltd. New Delhi.
6. Kanetkar, Yash want, "Data Structure through C", BPB Publications.

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>TopicNo.</b>	<b>TimeAllotted(Hrs)</b>	<b>MarksAllotted (Out of 50)</b>
1	6	6
2	6	6
3	9	10
4	8	10
5	8	10
6	8	8
<b>Total</b>	<b>45</b>	<b>50</b>

## OBJECTORIENTEDPROGRAMMINGUSINGJAVA

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### RATIONALE

Object oriented programming is a new approach to understand the complexities of the real world. In contrast to the earlier approaches like procedural etc, object orientation helps to formulate the problems in a better way giving high reliability, adaptability and extensibility to the applications. The students are already familiar with this concept of programming in C which is the basic for JAVA. This course offers the modern programming language JAVA that shall help the students to implement the various concept of object orientation practically. The students will be able to programme in the object oriented technology with the usage of JAVA.

### LEARNINGOUTCOMES

After undergoing the subject, students will be able to:

- Explain the concepts of OOPS
- Explain and execute the language construct concepts.
- Debug and compile the program written in Java.
- Explain and implement class program.●  
Explain and execute member functions.
- Describe and implement inheritance concepts.
- Explain and implement Polymorphism using Java program.
- Install Java IDE, Compiler, Java virtual machines
- Explain and implement the packages, abstract class and interface.●  
Implement the exception handling in live projects

### DETAILED CONTENTS

1. Overview of Java (06hrs)  
  
History and evolution, Features of Java, OOPs using Java, Anatomy of Java Programme, Java Bytecode, Difference between JDK, JRE and JVM, Installing JDK, Compiling Java Program, Applications of Java
  
2. Language Constructs (12hrs)  
  
Data types and type declarations, Literals, variables, type conversion, and casting, operators, control statements, looping and jump statements, input using scanner class, arrays and functions.

3. ClassesandObjects (08hrs)  
 Creatingclassesanddeclaringobjects, Object&ObjectReferencedefining methods, Defining access specifiers, accessing class members, Constructors, using this keyword, garbage collection
4. Inheritance (05hrs)  
 Definition of inheritance, constructor chaining, order of invocation, types of inheritance, single inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, Using final keyword
5. Polymorphism (04hrs)  
 Method&constructoroverloading, methodoverriding, up-castinganddown-casting.
6. Packages, Abstractclass&Interface (06hrs)  
 Defining packages, Access protection, Importing packages, Key points of Abstractclass & interface, difference between an abstract class & interface, implementation of multiple inheritance through interface.
7. ExceptionHandling (04hrs)  
 Definition of exception handling, implementation of keywords like try, catch, finally, throw & throws. importance of exception handling in practical implementation of live projects.

### **LIST OF PRACTICALS**

1. Installation of JDK and compiling a simple Java program
2. Programming exercise on control flow statement, operators and looping statements in Java.
3. Program to scan the input using input scanner class
4. Programming exercise on arrays and functions in Java
5. Program to demonstrate the concept of classes and objects using access specifiers
6. Program to demonstrate the use of constructors
7. Programming exercise on different types of inheritance in Java
8. Program to demonstrate the concept of overloading and overriding
9. Program to demonstrate the concept of packages, abstract classes and interfaces
10. Programming exercise on exception handling

### **INSTRUCTIONAL STRATEGY**

The subject is totally practical based. Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to draw flow chart write algorithm and then write program for algorithm and run on computer. It is required that students should maintain records (files with printouts).



### RECOMMENDED BOOKS

1. Herbert, Schildt, "The Complete Reference Java", McGraw Hill Publishers
2. Bhutani, Sunil, & Amrendra Shara, "Object Oriented Programming using JAVA", Eagle Publishing House, Jalandhar.
3. Malhotra, Sachin, "Java Programming", Oxford University Press, New Delhi.
4. "Head First Java", O'REILLY, Kathy Sierra & Bert Bates.
5. Wu, C. Thomas, "Object-Oriented programming With Java".

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (Out of 50)
1.	06	02
2.	12	12
3.	08	09
4.	05	12
5.	04	05
6.	06	05
7.	04	05
<b>Total</b>	45	50

## COMPUTER ARCHITECTURE

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### RATIONALE

This subject provides the students with the knowledge of detailed organization of currently available personal computers in order to understand their functioning and maintenance. The students will also get familiar with different types of mother boards, architecture and bus standards.

### LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Illustrate the use of number system and coding system.
- Compare and contrast different RISC and CISC architectures.
- Understand the use of registers in computer organization.
- Apply various arithmetic operations.
- Identify different I/O interfaces.
- Distinguish different types of interrupts and DMA.
- Understand the purpose of memory hierarchy.
- Compare and contrast the use of different memory organizations.

### DETAILED CONTENTS

1.    Data Representation (6hrs)  
       Data Types- Number System, 1's Complement, 2's Complement, BCD Code, Gray Code
2.    Central Processing Unit (7hrs)  
       Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Introduction to RISC, CISC architecture, Pipeline processing, Parallel processing
3.    Arithmetic Operations (8hrs)  
       Introduction, Addition, Subtraction, Multiplication and Division algorithm
4.    Input-Output Organisation (12hrs)  
       Input-output interface, I/O bus and interface for module, I/O vs memory bus. Isolated vs memory mapped, IP modes of data transfer, first in first out buffer, priority interrupt, daisy chaining priority, parallel priority interrupt priority encoder, interrupt cycle, direct memory access DMA controller, DMA transfer

5. Memory Organisation (12hrs)

Memory hierarchy; main memory, memory address, map, RAM and ROM chips, memory connection to CPU, auxiliary memory, associative memory, read and write operation, cache memory, associative mapping, virtual memory, memory management hardware, memory segmentation.

### INSTRUCTIONAL STRATEGY

As this paper is fully theoretical so it should be taught in a way to make it interesting by showing charts to the students to enable them to understand the subject theoretically. Block diagram of computer, algorithms to various arithmetic operations, CDs for demonstrations should be used to make the students understand the subject. After completing the subject, students must know how the computer works, about various types of controllers and memory organization.

### RECOMMENDED BOOKS

1. Rafiqzaman, "Computer Architecture", M; Prentice Hall of India, New Delhi.
2. Bose, SK, "Hardware and Software of Personal Computers", Willey Eastern Ltd., New Delhi.
3. Tanenbaum, Andrew S, "Structured Computer Organisation", Prentice Hall of India, New Delhi.
4. Mano, Morris, "Computer system Architecture", Pearson Education India

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	6	06
2	7	08
3	8	08
4	12	14
5	12	14
<b>Total</b>	<b>45</b>	<b>50</b>

## COMPUTER NETWORK AND SECURITY

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### RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

### LEARNING OUTCOMES

After undergoing the subject, the student will be able to:

- Setup Networking Labs
- Setup Basic Wireless Labs
- Diagnose & Solve Network Problems
- Diagnose & Solve Network Problems remotely●
- Provide security to networks
- Manage & handle WAN
- Prevent external Network Attacks

### DETAILED CONTENTS

- |    |  |         |
|----|--|---------|
| 1. | Networks Basics  | (05hrs) |
|    | <ul style="list-style-type: none"> <li>● Concept of network</li> <li>● Types of network - LAN, MAN and WAN●</li> <li>● Network Services</li> <li>● Topologies</li> <li>● Switching Techniques</li> </ul> |         |
| 2. | Networking Models  | (10hrs) |
|    | <ul style="list-style-type: none"> <li>● Introduction to IEEE Standards</li> <li>● OSI Reference Model</li> <li>● TCP/IP Model</li> </ul>  |         |

3. IPAddressing (08hrs)
- Conceptofphysicalandlogicaladdressing
  - Different classes of IP addressing, special IP address
  - Sub netting and super netting
  - Loopbackconcept
  - IPV4 and IPV6 packet Format
  - Configuring IPV4 and IPV6
4. NetworkConnectivity (05hrs)
- Network connectivity Devices
  - NICs
  - Hubs, Switches, Routers
  - Configuration of Routers & Switches
- 5 NetworkAdministration (08hrs)
- Network Security Principles, Cryptography, using secure protocols
  - DHCP Server
  - Workgroup/DomainNetworking
- 6 NetworkSecurity (07hrs)
- Usingssh,sftp&https
  - Virus, Worms and Trojans Definitions, preventive measures , deploying virus protection.
  - Computer Network Attacks: Active Attacks, Passive Attacks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Denial-of-Service Attacks, Botnets, Phishing Attacks
  - Firewalls Definition and types of firewalls, Configuring & deployment of Firewall
  - Spoofing vs Hijacking , Remote password guessing, eavesdropping, methods of password cracking,
- 7 WirelessNetworks (02hrs)
- Wireless Basics
  - Wireless Security

## **LIST OF PRACTICALS**

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST
3. Making of cross cable and straight cable
4. Install and configure a network interface card in a workstation.
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
6. Study and Demonstration of subnetting of IP address
7. Use of Netstat and its options.
8. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
9. Installation of Network Operating System (NOS)
10. Simulating a network setup.

## **INSTRUCTIONAL STRATEGY**

Since the facilities are not available in the polytechnic, students need exposure to various security systems and software available in some organisations, universities and engineering colleges. For this, visits may be organized for students. The teachers should also be exposed in this area. Some practicals can be conducted in the laboratory.

## **RECOMMENDED BOOKS**

1. Tanenbaum, "Computer Networks", Prentice Hall of India, New Delhi.
2. Forouzan, "Data Communications and Networking", Edition 2<sup>nd</sup> and 4<sup>th</sup>, Tata McGraw Hill Education Pvt Ltd., New Delhi.
3. Stallings, William, "Data and Computer Communication", Pearson Education, New Delhi.
4. Jain, V.K., and Narija Bajaj, "Computer Network and Communications", Cyber Tech Publications, New Delhi.
5. Katre, J.S., "Computer Network", Tech-Max Publication, Pune.

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (hrs)</b>	<b>Marks Allotted (Out of 50)</b>
1.	05	05
2.	10	10
3.	08	09
4.	05	06
5.	08	10
6.	07	08
7.	02	02
<b>Total</b>	<b>45</b>	<b>50</b>

## MINOR PROJECT

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Minor project work aims at exposing the students to the various industries dealing with computers. It is expected from them to get acquainted with computer environment possess desired attitudes. For this purpose student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments. Depending upon the interest of students they are sent for exposure to:

- 1) Industrial practices in installation and maintenance of computers and computer networks
- 2) Fabrication of computers
- 3) Fault diagnosis and testing of computers
- 4) Industrial practices in respect of documentation and fabrication
- 5) A variety of computers and peripherals in assembly organizations
- 6) Software package development organizations
- 7) Maintenance of database
- 8) Write be stored procedure or functions which can be attached as the library objects to the main projects
- 9) Write a procedure function to convert number of words.
- 10) Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), Library classes in C++ (same application),.
- 11) design web applications using PHP

**The teachers may guide /help students to identify their minor project work and chalk out their plan of action well in advance.**

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers; each teacher may guide a group of 4 to 5 students.

Evaluation of Students for Minor Project:

The criteria for evaluation of minor project work is as follows:

Criteria	Weightage
Punctuality and Regularity	10%
Planning and Execution	30%
Initiative in learning new things	10%
Report Writing	20%
Presentation and Viva	30%

Note:

A viva voce examination will be conducted at the end of minor project for assessing the work of student. The examination Committee for this purpose will consist of a professional and the teacher who has guided the project.



## ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during fourth 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
11. Preparation of Project Report

## INDUSTRIAL TRAINING OF STUDENTS

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 6 weeks duration to be organised during the semester break starting after second year i.e. after 4<sup>th</sup> 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 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 5<sup>th</sup> 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.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4<sup>th</sup> semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. 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% |