

## 4.1 DATA STRUCTURES USING C

L T P

Periods/week 5 - 4

### 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.

### DETAILED CONTENTS

1. Fundamental Notations (08 Periods)  
Problem solving concept, top down and bottom up design, structured programming, Concept of data types, variables and constants, Concept of pointer variables and constants
2. Arrays (10 Periods)  
Concept of Arrays, Single dimensional array, Two dimensional array storage strategy of multidimensional arrays, Index Formula for single and multidimensional Array, Operations on arrays with Algorithms (Insertion, deletion), Advantages and disadvantages.
3. Linked Lists (14 Periods)  
Introduction to linked list and double linked list, Representation of linked lists in Memory, Traversing a linked list, Searching linked list, Insertion and deletion into linked list, Application of linked lists, Doubly linked lists, Traversing a doubly linked lists, Insertion and deletion into doubly linked lists
4. Stacks, Queues and Recursion (10 Periods)  
Introduction to stacks, Representation of stacks, Implementation of stacks using Array & Link List, Uses of stacks, Introduction to queues, Implementation of queues (with algorithm), Circular Queues, De-queues, Recursion.
5. Trees, Graph and Table (24 Periods)  
Concept of Trees, Concept of representation of Binary tree, Binary search trees Traversing Binary Trees (Pre order, Post order and In order), Searching, inserting and deleting binary search trees, AVL Tree, B-Tree, Introduction to graphs, types of graphs, Breadth first search, Depth first search, Adjacent matrix, Searching Sequential table, Hash tables
6. Sorting and Searching (14 Periods)  
Introduction, Search algorithm (Linear and Binary), Concept of sorting, Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort, Radix Sort) and their comparisons, Complexity Analysis of Sorting Algorithms.

## **LIST OF PRACTICALS**

*Write programs in C to implement*

1. Inserting and deleting elements in an array
2. Insertion and deletion of elements in linked list
3. Insertion and deletion of elements in double linked list
4. Stack implementation using arrays
5. Stack implementation using pointers
6. Queue implementation using arrays
7. Queue implementation using pointers
8. Linear search in a given list
9. Binary search in a given list
10. Implementation of binary search tree
11. Implementation of bubble sort algorithm
12. Implementation of insertion sort algorithm
13. Implementation of quick sort algorithm
14. Implementation of selection sort algorithm
15. Conversion from infix and post-fix notation
16. Implementation of factorial of a number using recursion
17. Implementation of Fibonacci series using recursions

## **INSTRUCTIONAL STRATEGY**

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 and algorithms in theory class and then write programs for the algorithms. Finally all the programs should be run on computers. This will help the students to have clear concepts of programming.

## **RECOMMENDED BOOKS**

1. Data structures – Schaum’s Outline Series by Lipschutz; McGraw Hill Education P Ltd , New Delhi
2. Data Structures using C and C++ by Rajesh K. Shukla; Wiley-India Pvt Ltd. Daryaganj, New Delhi
3. Data Structures and Algorithm Using C by RS Salaria; Khanna Book Pub. Co. (P) Ltd. New Delhi
4. Data Structure using C by Manoj Kumar Jambla; Eagle Publishing House, Jalandhar
5. Expert Data Structures with C by R.B. Patel; Khanna Publishers, New Delhi.
6. Data Structure through C by Yashwant Kanekar; BPB Publications

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	8	10
2	10	12
3	14	18
4	10	12
5	24	30
6	14	18
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.2 OBJECT ORIENTED PROGRAMMING USING C++

L T P

Periods/week 5 - 3

### RATIONALE

Object orientation 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 C++. This course offers the modern programming language C++ 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 C++.

### DETAILED CONTENTS

1. Introduction and Features (06 Periods)  
Introduction, procedure oriented programming Vs. object oriented programming (OOP)., differentiate C & C++, Object oriented programming concepts – object, Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing and data hiding
2. Language Constructs (14 Periods)  
Review of constructs of C used in C++ : variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, structure, unions, functions, pointers; preprocessor directives
3. Classes and Objects (08 Periods)  
Creation, accessing class members, Private Vs Public, Constructor and Destructor Objects
4. Member Functions (08 Periods)  
Method definition, Inline functions implementation, Constant member functions, Friend Functions and Friend Classes, Static functions
5. Overloading Member Functions (10 Periods)  
Need of operator overloading, operator overloading, instream / ostream operator overloading function overloading, constructor overloading
6. Inheritance (14 Periods)  
Definition of inheritance, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of derived classes, and virtual functions, size of a derived class, order of invocation, types of inheritance, single inheritance, hierarchical inheritance, multiple inheritance, hybrid inheritance, multilevel inheritance
7. Polymorphism and Virtual Functions (10 Periods)

Importance of virtual function, function call binding, virtual functions, implementing late binding, need for virtual functions, abstract base classes and pure virtual functions, virtual destructors

8. File and Streams (10 Periods)

Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of-file.

### LIST OF PRACTICALS

- 1 Programming exercises on control flow statements in C++
- 2 Programming exercises on arrays, strings, function and pointers in C++
- 3 Writing programs to construct classes and deriving objects
- 4 Writing programs for constructors, destructors, using public and private access specifies
- 5 Programming exercises on operator overloading, type conversions and inheritance
- 6 Programming exercises on functional overloading
- 7 Writing programs on steam computation and life operations
- 8 Implementation of a mini project in C++
- 9 Introduction to latest ANSI C++ Compiler and elaboration of short comings of Turbo C++ Compiler

### INSTRUCTIONAL STRATEGY

Since the entire course is totally practical oriented, it is strongly intended that after discussing the individual concepts in class, the students shall be asked to write the programmes for the same in the practical class. The theory and practical shall go hand in hand. It is required that the students make a file of practical exercises which may include the problem definition, algorithms flow charts (wherever required) and the print outs for each listed practical

### RECOMMENDED BOOKS

- 1) Object Oriented Programming in C++ by E. Balaguruswamy, Tata McGraw Hill Education Pvt Ltd , New Delhi
- 2) C++ by Robert Lafore, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
- 3) Schaum's Outline of Programming with C++ by John R. Hubbard
- 4) The C++ Programming Language by Bjarne Stroustrup Pearson Education New Delhi
- 5) Object Oriented Programming and C++ by R Rajaram; New Age International (P) Ltd., Publishers, New Delhi
- 6) Object Oriented Programming using C++ by Vipin Arora, Eagle Publication, Jalandhar
- 7) Object Oriented Programming using C++ by RS Salaria
- 8) Object Oriented Programming by D Ravi Chandran Tata McGraw Hill

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	6	8
2	14	18
3	8	10
4	8	10
5	10	12
6	14	18
7	10	12
8	10	12
<b>Total</b>	<b>80</b>	<b>100</b>

**RATIONALE**

The subject provides the students with the knowledge of architecture and organization of personal computers. Computer arithmetic algorithms for different arithmetic operations. The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer.

**DETAILED CONTENTS**

1. Evolution and Architecture of a Microprocessor (16 period)  
Computer System organization and architecture. 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.
2. Micro Programming (20 period)  
A. Brief idea of machine and assembly languages, assembler, program loops, programming arithmetic, and logic operations, sub routines, input- output programming with examples  
B. 8085 micro processor assembly language programming  
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. Instruction Timing and Cycles (08 period)  
Instruction cycle, machine cycle and T-states, Fetch and execute cycle
4. Interrupts (08 period)  
Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use.
5. Data transfer techniques (08 period)  
Concept of programmed I/O operations, input output interface, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA,
6. Micro Programmed Control (10 Period)  
Control memory, address sequencing, micro programs example
7. Computer Processing (10 Period )  
Pipeline and vector processing, parallel processing, pipelining, arithmetic pipelines, RISC pipelines, Vector processing, array processors.

8. Computer Arithmetic Algorithm (16 Period)

Addition and Subtraction algorithm, multiplication algorithms, division algorithms, floating point arithmetic operations

### **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 of two 8 bit numbers
4. Writing and execution of ALP for subtraction of two 8 bit numbers
5. Writing and execution of ALP for multiplication of two 8 bit numbers
6. Writing and execution of ALP for division of two 8 bit numbers
7. Writing and execution of ALP for arranging 10 numbers in ascending order
8. Writing and execution of ALP for arranging 10 numbers in descending order

### **LIST OF RECOMMENDED BOOKS**

1. Computer Architecture by Rafiquzzaman, M; Prentice Hall of India, New Delhi
2. Fairhead- 80386/80486, BPB Publication, New Delhi
3. Hardware and Software of Personal Computers by Bose, SK; Willey Eastern Ltd., New Delhi
4. Structured Computer Organization by Tanenbaum, Andrew S; Prentice Hall of India, New Delhi
5. Upgrading and preparing PCs by Scott Muller, Techmedia Publications
6. Computer Organization and Architecture by Linda Labor, Narosa Publishing House Pvt, Ltd., Darya Ganj, New Delhi  
Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
7. Introduction to Microprocessor by Mathur, Tata McGraw Hill Education Pvt Ltd, New Delhi
8. Microprocessor and Microcontrollers by Dr B P Singh, Galgotia Publications, New Delhi
9. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi
10. Microprocessor and Microcomputers by Rafiquzzaman, Prentice Hall of India Ltd., New Delhi
11. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
12. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hill, New Delhi
13. Digital Integrated Electronics by Herbert Taub and Donalds Sachilling; Prentice Hall of India Ltd., New Delhi
14. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
15. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	16	10
2	20	30
3	08	10
4	08	10
5	08	10
6	10	10
7	10	10
8	16	10
<b>Total</b>	<b>96</b>	<b>100</b>

## 4.4 INTERNET AND WEB TECHNOLOGIES

L T P

Periods/week 4 - 3

### RATIONALE

This course will enable the students to understand the basics of internet and various application of internet like e-mail, FTP, Telnet, Newsgroups and video conferencing. In addition, this course develops competency amongst the students to design professional web sites and interactive web pages. They will have overview of different technologies like of HTML, DHTML, XML, CGI, Java Scripts, PHP, My Sql.

### DETAILED CONTENTS

1. Internet Basics (10 Periods)  
Specification and technical details for establishing Internet. Types and functions of modems, IP addressing, internet domains, domain name server, TCP/IP protocols, Internet service providers, Intranets, E-mail, Telnet, FTP, IRC, NNTP, Video conferencing, e-commerce, Internet connecting media
2. World Wide Web (WWW): (08 Periods)  
World Wide Web and its evolution, web page, web server, HTTP protocol. Examples of web servers, Navigation Tools: Mozilla Firefox, Google Chrome, Internet Explorer, Uniform Resource Locator (URL). Hypertext, hyperlinks and hypermedia, URL, its registration, browsers, search engines, proxy servers, Common Gateway Interface (CGI)
3. Web pages development: (10 Periods)  
Introduction to HTML-5 and CSS-3 Basic structure of HTML, designing a web page, inserting links images, horizontal rules, comments, Formatting text, title, headings, colors, fonts, sizes, simple tables and forms. HTML tags, hyperlinks. Adding graphics and images, image maps, image files, Using tables, forms, style sheets and frames
4. Client-side Scripting: (12 Periods)  
Introduction to Java Script, event handling, verifying forms, working with browser Windows, embedding with HTML, Operator and expression, control statements, loop, array, Java Script Event Modeling, Validating Forms using Java script, data base connectivity, developing interactive website using Java script
5. Server-side Programming using PHP: (12 Periods)  
Basic, Intro, Install, Syntax, Variables, String, Operators, If...Else, Switch, Arrays, Sorting Arrays, While Loops, For Loops, Functions, Forms, \$\_GET, \$\_POST, Advanced, Arrays Multi, Date, Include, File, File Upload, Cookies, Sessions, E-mail, Secure E-mail, Error, Exception, Filter
6. Database Programming: (12 Periods)

Database, MySQL Intro, MySQL Connect, Create DB, Table, Queries, ODBC, XML: XML Expat Parser XML, DOM XML, Simple-XML, AJAX: AJAX Intro AJAX, AJAX Database, AJAX XML AJAX Live Search AJAX RSS Reader AJAX Poll

### **LIST OF PRACTICALS**

1. Configuring computer system to access internet
2. Creation and use of e-mail
3. Searching of information using search engine
4. Creating Web pages using HTML
5. Creating web pages using front page
6. Design of Forms using Java Script
7. Validation of user queries and responses in the Forms using Java Script
8. Design of Forms using Java Script
9. Design of Forms using Java Script or Visual Basic Script
10. Validation of user queries and responses in the Forms using Java Script
11. Create a Homepage with frames, animation, background sound and hyperlinks
12. Design fill-out form with text, check box, radio buttons etc and embed Java script to validate users input.

### **INSTRUCTIONAL STRATEGY**

Students should be exposed to Internet as the subject is practice oriented, theoretical Instruction may be given during practical session also.

### **RECOMMENDED BOOKS**

1. Internet and Web Technologies by Rajkamal, Tata McGraw Hill Education Pvt Ltd , New Delhi
2. Internet 6-in-1 by Kraynak and Habraken, Prentice Hall of India Pvt. Ltd., New Delhi
3. Using the Internet IV edition by Kasser, Prentice Hall of India Pvt. Ltd., New Delhi
4. Using the World Wide Web, (IInd edition) by Wall, Prentice Hall of India Pvt. Ltd., New Delhi
5. A complete guide to Internet and Web Programming by Deven N. Shah, Wiley-India Pvt Ltd., New Delhi
6. Internet for Everyone by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., New Delhi
7. Principles of Web Designing Joel Sklar, Web Warrior Series Available with Vikas Publishing House Pvt. Ltd., New Delhi
8. HTML 4.0 Unleashed by Rick Dranell; Tech Media Publications
9. Teach Yourself HTML 4.0 with XML, DHTML and Java Script by Stephanie, Cottrell, Bryant; IDG Books India Pvt. Ltd., New Delhi
10. Dynamic Web Publishing – Unleashed Tech Media
11. Web Development with Visual Basic with CD ROM by Chapman; Prentice Hall of India, New Delhi
12. Java Script in 24 hrs Tech Media Publications
13. Web Technologies by Ivan Bayross.

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	10	15
2	8	10
3	10	15
4	12	20
5	12	20
6	12	20
<b>Total</b>	<b>64</b>	<b>100</b>

## 4.5 SYSTEM AND SOFTWARE ENGINEERING

L T P

Periods/week 5 - -

### RATIONALE

This subject will enable the diploma students to have awareness about software engineering, various metrics, planning about software, cost estimation, software design etc.

### DETAILED CONTENTS

1. Study of System (06 Period)  
The system concepts, characteristics of a system, organization, interaction, interdependence, integration, control objectives
  
1. Study of system analysis (14 Period)  
Introduction system development life cycle (SLDC), Phases of SDLC, identification, Preliminary investigation/study, facts gathering and its techniques(Interviews, questionnaires, Background reading, onsite observation, record gathering etc), types of feasibility- operational, technical, economical, System analysis, System design (Data flow diagram, data dictionary) ,testing, implementation
  
2. Introduction to Software (S/W) Engineering (10 Period)  
Introduction, size factors. Quality and productivity factors. Management issues, Models: waterfall, spiral, prototyping, fourth generation techniques, s/w process, Introduction to agile technologies
  
3. Software Metrics Engineering (10 Period)  
Size, function and design oriented metrics, halstead software science, McCabe's complexity
  
4. Planning (10 Period)  
The development process, an organizational structure, other planning activities
  
5. Software Cost Estimations (10 Period)  
Cost factors, cost estimations techniques. Staffing level estimation, estimating software maintenance costs, COCOMO
  
6. Software Requirements Definition (10 Period)  
Problem analysis, requirement engineering. The software requirements specifications (SRS), formal specifications techniques, characteristics of a good SRS
  
7. Software Design and Implementation Issue (10 Period)  
Fundamental design, concept design notations, design techniques, structured coding techniques coding styles, documentation guidelines

## RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi
2. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi
4. Software Engineering by KK Aggarwal and Yogesh Singh
5. Software Engineering – A Practitioner’s Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	6	08
2	14	20
3	10	12
4	10	12
5	10	12
6	10	12
7	10	12
8	10	12
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.6 DATA COMMUNICATION & NETWORKS

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Periods/week	5	-	2

### RATIONALE

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

### DETAILED CONTENTS

1. Concept of Communication (20 Periods)  
Communication concept and type, need of modulation, types, difference of AM/ FM and FM/PM, PAM and PCM, Transmission of Digital Data, Transmission media and medium modes, data transfer, rate of data transfer, Data packets, data encryption and decryption concept and type of Modems: Transmission rate, modem standards, Error Detection and correction techniques(CRC,VRC)
2. Network (15 Periods)  
Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.
3. Medium Access sub layer: (15 Periods)  
Channel Allocations, LAN protocols- ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.
4. Network Layer (10 Periods)  
Network Layer, Point - to Point Networks, routing, Congestion Control Internetworking -TCP / IP, IP packet, IP address, IPv6.
5. Transport Layer (10 Periods)  
Transport Layer - Design issues, connection management session Layer-Design issues, remote procedure call., Presentation Layer, Design issues, Data compression techniques, cryptography, TCP , Window Management.
6. Application Layer (10 Periods)  
Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

### 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. Recognition of network devices (Switches, Hub, Routers of access points for Wifi).
4. Making of cross cable and straight cable.
5. Install and configure a network interface card in a workstation.
6. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation.
7. Managing user accounts in windows and LINUX.
8. Study and Demonstration of sub netting of IP address.
9. Use of Netstat and its options.
10. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG.
11. Installation of Network Operating System(NOS).
12. Visit to nearby industry for latest networking techniques.

### **INSTRUCTIONAL STRATEGY**

This subject deals with both theory and practicals. The students should be made to practically establish LAN with various hardware and software and their integration.

### **LIST OF RECOMMENDED BOOKS**

1. Computer Networks by Tanenbaum; Prentice Hall of India, New Delhi
2. Data Communications and Networking by Forouzan, (Edition 2<sup>nd</sup> and 4<sup>th</sup>); Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Data and Computer Communication by William Stallings; Pearson Education, New Delhi
4. Networking Essentials; BPB Publications New Delhi
5. Computer Network and Communications by V.K. Jain and Narija Bajaj; Cyber Tech Publications, New Delhi.
6. Linux – The Complete Reference by Richard Peterson; Tata McGraw Hill Education Pvt Ltd, New Delhi.
7. Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates; IDG Books India Private Limited, Delhi.
8. Unleashed Linux; TechMedia Publishers, New Delhi
9. Computer Network by J.S. Katre; Tech-Max Publication, Pune

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time allotted (Period)</b>	<b>Marks Allotted (%)</b>
1	20	26
2	15	20
3	15	18
4	10	12
5	10	12
6	10	12
<b>Total</b>	<b>80</b>	<b>100</b>

## 4.7 INDUSTRIAL TRAINING OF STUDENTS

(During Vacations after IV Semester)

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%