

3.1 INDUSTRIAL / IN – HOUSE TRAINING - I

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RATIONALE

Industrial training / In – house training will help the students to understand the working environment of relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. This training is very important for development of required competencies and skills for employment and start– ups.

COURSE OUTCOMES

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

- CO1: Understand the working environment of industries
- CO2: Take necessary safety precautions and measures.
- CO3: Learn about present and future requirement of industries.
- CO4: Work in team for solving industrial problems
- CO5: Develop competencies and skills required by relevant industries.
- CO6: Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1. Report writing based on industrial training.
2. Preparation of Power Point Slides based on industrial training and presentation by the candidate.
3. Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
4. External Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.

GUIDELINES

Students will be evaluated based on Industrial training / In – house training report and their

presentation using Power Point about the knowledge and skills gained during the training. The Head of the Department will depute faculty coordinators by assigning a group of students to each. The coordinators will mentor and guide the students in preparing the PPTs for final presentation. The following performance parameters are to be considered for assessment of the students out of 100 marks:

	Parameter	Weightage
i	Industrial / In-house assessment of the candidate by the trainer	40%
ii	Report Writing	20%
iii	Power Point Presentation	20%
iv	Viva-voce	20%

3.2 OPERATING SYSTEMS

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RATIONALE

This course will the students in understanding the computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course.

COURSE OUTCOMES

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

CO1: Explain various types and services of operating system

CO2: Categorize different types of schedulers and scheduling algorithms.

CO4: Define deadlock and the various ways to recover from deadlock

CO5: Describe memory management and virtual memory.

CO6: Practice general commands, filters, shell scripts in Linux

DETAILED CONTENTS

UNIT I

Overview of Operating Systems

Definition of Operating Systems, Types of Operating Systems, Operating System Services, User operating system interface, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machine, Benefits of Virtual Machine

UNIT II

Process Management and Deadlocks

Process concept, Process State, Process Control Block, Scheduling Queues, Scheduler, Job Scheduler, Process Scheduler, Context Switch, Operations on Processes, Interprocess Communication, Shared Memory Systems, Message-Passing Systems, CPU Scheduler, Scheduling Criteria, Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS),

Shortest Job first (SJF), Round Robin (RR), Multiprocessor scheduling, Process Synchronization. Deadlock, Conditions for Dead lock, Methods for handling deadlocks, Dead Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

UNIT III

Memory Management Function

Definition – Logical and Physical address Space, Swapping, Memory allocation, Contiguous Memory allocation, Fixed and variable partition, Internal and External fragmentation and Compaction, Paging – Principle of operation, Page allocation, Hardware support for paging, Protection and sharing, Disadvantages of paging, Segmentation, Virtual Memory.

UNIT IV

I/O Management Functions and File Management

Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering, Spooling.

Types of File System; Simple file system, Basic file system, Logical file system, Physical file system, Various Methods of Allocating Disk Space

UNIT V

Linux Operating System

History of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, Open Linux, Linux System Requirements, Linux Commands and Filters: mkdir, cd, rmdir, pwd, ls, who, whoami, date, cat, chmod, cp, mv, rm, pg, more, pr, tail, head, cut, paste, nl, grep, wc, sort, kill, write, talk, mseg, wall, merge, mail, news Shell: concepts of command options, input, output, redirection, pipes, redirecting and piping with standard errors, Shell scripts, vi editing commands

PRACTICAL EXERCISES

1. Demonstration of all the controls provided in windows control panel.
2. Exercise on Basics of windows.
3. Installation of Linux Operating System.
4. Usage of directory management commands of Linux: ls, cd, pwd, mkdir, rmdir.
5. Usage of File Management commands of Linux: cat, chmod, cp, mv, rm, pg, more, find.
6. Use the general purpose commands of Linux: wc, od, lp, cal, date, who, whoami.
7. Using the simple filters: pr, head, tail, cut, paste, nl, sort.
8. Communication Commands: news, write, talk, mseg, mail, wall.
9. Write a shell program that finds the factorial of a number.

10. Write a shell program that finds whether a given number is prime or not.
11. Write a shell program to find the average of three numbers.
12. Write a shell program that will convert all the text of the file from lowercase to uppercase.

RECOMMENDED BOOKS

1. Silberschatz, Galvin, “Operating System Concepts”, Wiley Publication.
2. Stallings, “Operating Systems”, Tata McGraw Hill.
3. Dham Dhare, “Operating Systems- A Concept Based Approach”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. Achyut S Godbole and Atul Kahate, “Operating Systems”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
5. “Unleashed Linux”, Tech Media Publishers, New Delhi.
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Laboratory must have windows as well as Linux operating system. Concepts of O.S. must be taught practically. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

3.3 DIGITAL ELECTRONICS

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RATIONALE

This course has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a detailed exposure of number systems and various codes. The students will understand various logic gates and their logic simplification. It will help the students to design various combinational, sequential circuits, converters and memories.

COURSE OUTCOMES

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

CO1: Understand various types of number systems and digital codes.

CO2: Describe the logic gates and able to perform logics simplification.

CO3: Design various combinational circuits

CO4: Develop various sequential circuits.

CO5: Analyze A/D & D/A converters and various memories.

DETAILED CONTENTS

UNIT I

Number Systems and Codes

- 1.1 Introduction to analog and digital signal
- 1.2 Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa.
- 1.3 Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction.
- 1.4 Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code.
- 1.5 Concept of parity, single and double parity and error detection.

UNIT II**Logic Gates and Logic Simplifications**

- 2.1 Concept of negative and positive logic
- 2.2 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.
- 2.3 Introduction to TTL and CMOS logic families
- 2.4 Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean
- 2.5 Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits

UNIT III**Combinational Circuits**

- 3.1 Half adder, Full adder circuit, design and implementation.
- 3.2 4 bit adder circuit
- 3.3 Four bit decoder circuits for 7 segment display and decoder/driver ICs.
- 3.4 Basic functions and block diagram of MUX and DEMUX with different ICs
- 3.5 Basic functions and block diagram of Encoder

UNIT IV**Sequential Circuits**

- 4.1 Concept and types of latch with their working and applications
- 4.2 Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops. Difference between a latch and a flip flop
- 4.3 Introduction to Asynchronous and Synchronous counters. Binary counters, Divide by N ripple counters, Decade counter, Ring counter
- 4.4 Introduction and basic concepts including shift left and shift right.
- 4.5 Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.
- 4.6 Universal shift register

UNIT V**Converters and Memories**

- 5.1 Working principle of A/D and D/A converters
 - 5.2 Brief idea about different techniques of A/D conversion and study of :
 - a) Stair step Ramp A/D converter
 - b) Dual Slope A/D converter
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- c) Successive Approximation A/D Converter
- 5.3 Detail study of :
 - a) Binary Weighted D/A converter
 - b) R/2R ladder D/A converter
- 5.4 Applications of A/D and D/A converter.
- 5.5 Memory organization, classification of semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM), static and dynamic RAM, introduction to 74181 ALU IC

PRACTICAL EXERCISES

1. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates
2. Realisation of logic functions with the help of NAND or NOR gates
3. To design a half adder using XOR and NAND gates and verification of its operation
4. To design of a full adder circuit using XOR and NAND gates and verify its operation
5. To design circuit for 7 segment display ICs.
6. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops).
7. Verification of truth table for encoder and decoder ICs.
8. Verification of truth table for Multiplexers and x and De-Multiplexers
9. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
10. To design a 4 bit ring counter and verify its operation.
11. Use of Asynchronous Counter ICs (7490 or 7493)
12. To design and verification of A/D converter
13. To design and verification of D/A converter
14. To design and verification of 74181 ALU IC

RECOMMENDED BOOKS

1. Malvino Leach, “Digital Electronics and Applications”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 8th Edition, 2015.
2. Morris Mano, “Digital Logic Designs”, Prentice Hall of India, New Delhi, 6th Edition, 2018.
3. Soumitra Kumar Mandal, “Digital Electronics”, Tata McGraw Hill Education Pvt. Ltd., 2010.
4. V K Sangar, “Digital Electronics”, Raj Publishers, Jalandhar, 2017.

5. Tokheim, “Digital Electronics”, Tata McGraw Hill Education Pvt. Ltd, 4th Edition, 2007.
6. Thomas Floyds, “Digital Fundamentals”, Universal Book Stall, 11th Edition, 2017.
7. RP Jain, “Digital Electronics”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 4th Edition, 2010.
8. KS Jamwal, “Digital Electronics”, Dhanpat Rai and Co., New Delhi, 2010.
9. Yashpal and Sanjeev Kumar, “Digital Electronics”, North Publication, Ambala City, 1st Edition, 2020.
10. BR Gupta, “Digital Electronics”, Dhanpat Rai & Co., New Delhi, 2020.
11. RJ Tocci, “Digital Systems: Principles and Applications”, Prentice Hall of India, New Delhi, 2000 Edition.
12. V. Rajaraman, “Digital Electronics by Prentice Hall of India”, New Delhi, 5th Edition, 2007.
13. Naresh Gupta, “Fundamentals of Digital Electronics”, Jain Brothers, New Delhi, 2005.
14. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. All experiments may preferably be done on Bread Boards.

3.4 PROGRAMING IN C

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RATIONALE

Computers play a vital role in present day professional life of technician's. People working in the field of computer industry, use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers.

COURSE OUTCOMES

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

- CO1: Identify various control structures, variables and implement them.
- CO2: Practice pointer in an array and structure.
- CO3: Use structures and union for handling data.
- CO4: Explain and execute member functions in C language.
- CO5: Describe and implement array in C language.
- CO6: Perform the execution of pointers in C language.

DETAILED CONTENTS

UNIT I

Basics of C Programming

- 1.1 Steps in development of a program, Flow charts, Algorithm development
- 1.2 Programme Debugging, I/O statements, Constants, variables and data types
- 1.3 Operators & Expressions, Unformatted and Formatted IOS, Data Type Casting
- 1.4 Decision making with IF – statement, IF – Else and Nested IF
- 1.5 While and do-while, for loop, Break. Continue, goto and switch statements

UNIT II

Pointers and Functions

- 2.1 Introduction to pointers, Address operator and pointers
- 2.2 Declaring and initializing pointers, Single pointer,
- 2.3 Introduction to functions, Function Declaration, calling, definition
- 2.4 Parameter Passing, Call - by value/reference, Global and Local Variables

UNIT III**Arrays and Strings**

- 3.1 Introduction to Arrays
- 3.2 Array Declaration, Length of array
- 3.3 Single and multi dimensional array
- 3.4 Arrays of characters
- 3.5 Introduction of Strings
- 3.6 String declaration and definition
- 3.7 String related function i.e. strlen, strcpy, strcmp
- 3.8 Passing an array to function
- 3.9 Pointers to an array and strings.

UNIT IV**Structures and Unions**

- 4.1 Declaration of structures
- 4.2 Accessing structure members
- 4.3 Structure Initialization
- 4.4 Pointer to a structures,
- 4.5 Unions

UNIT V**File Handling**

- 5.1 Opening and Closing of File
- 5.2 Modes of Accessing Files
- 5.3 Reading and Writing in the File

PRACTICAL EXERCISES

- 1. Programming exercises on executing and editing a C program.
 - 2. Programming exercises on defining variables and assigning values to variables.
 - 3. Programming exercises on arithmetic and relational operators.
 - 4. Programming exercises on arithmetic expressions and their evaluation.
 - 5. Programming exercises on formatting input/output using printf and scanf and their return type values.
 - 6. Programming exercises using if statement.
 - 7. Programming exercises using if – Else.
 - 8. Programming exercises on switch statement.
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9. Programming exercises on do – while, statement.
10. Programming exercises on for – statement.
11. Simple programs using pointers.
12. Programs on one-dimensional array.
13. Programs on two-dimensional array.
14. Programs for putting two strings together. (ii) Programs for comparing two strings.
15. Simple programs using functions
16. Simple programs using structures.
17. Simple programs using union.
18. Program on Reading and Writing data to a file.

RECOMMENDED BOOKS

1. Yashwant Kanetkar, “Let us C”.
2. E Balaguruswami, “Programming in ANSI C”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. RS Salaria, “Problem Solving and Programming in C”, Khanna Book Publishing Co (P) Ltd. New Delhi.
4. Reema Thareja, “Programming in C”, Oxford University Press, New Delhi.
5. Gottfried, “Programming in C”, Schaum Series, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
6. Yashwant Kanetkar, “Exploring C”, BPB Publications, New Delhi.
7. R Subburaj, “Programming in C”, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
8. M.H. Lewin, “Elements of C”, Khanna Publishers, New Delhi.
9. Stephen G Kochan, “Programming in C”.
10. BP Mahapatra, “Programming in C”, Khanna Publishers, New Delhi.
11. Ajay Mittal, “Programmimg in C: A Practical Approach”, Pearson Publication.
12. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

This is a programming skill based subject and topics taught in the class should be practiced in the lab regularly for development of required skills in the students. This subject contains five units of equal weight age with hands on practice for programming skill development.

3.5 DATABASE MANAGEMENT SYSTEM

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RATIONALE

Database management systems have become an essential component of everyday life in modern society. This course will acquaint the students with the knowledge of fundamental concepts of DBMS and its application in different areas. It will give exposure to the students about storage, manipulation and retrieval of data using query languages like Oracle/My SQL/SQL

COURSE OUTCOMES

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

- CO1: Define and describe the database
- CO2: Compile the design of database architecture
- CO3: Convert database in the form of tables
- CO3: Provide the security to the database
- CO5: Respond various queries in the SQL

DETAILED CONTENTS

UNIT I

Introduction to Database system Concepts and Architecture

Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification of DBMS Users; Actors on the scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers, Workers behind the scene (DBMS system designers and implementers, tool developers, operator and maintenance personnel).

Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence; Logical data Independence, Physical data Independence. Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems- Centralized, Distributed, parallel and object based.

UNIT II**Data Modeling using E.R. Model (Entity Relationship Model) and Relational**

Data Models Classification; File based or primitive models, traditional data models, semantic data models. Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities, Database design with E/R model.

Relational Model Concepts: Domain, Attributes, Tuples cardinality, keys (Primary, Secondary, foreign, alternative keys) and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key. Comparison b/w E/R model and Relational model.

UNIT III**Normalization Trivial and Non-trivial Dependencies.**

Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form, denormalization.

UNIT IV**Database Access and Security**

Creating and using indexes, creating and using views.

Database security, process controls, database protection, grant and revoke.

UNIT V**MYSQL/SQL (Structured Query Language)**

SQL* DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table. DML (Data Manipulation Language): Database Security and Privileges, Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of joins, sub query, aggregate functions. Challenges of My SQL. Introduction to Big Data. Understanding Big Data with samples.

PRACTICAL EXERCISES

1. Exercises on creation and modification of structure of tables.
 2. Exercises on inserting and deleting values from tables.
 3. Exercises on querying the table (using select command).
 4. Exercises on using various types of joins.
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5. Exercises on using functions provided by database package.
6. Exercises on commands like Grant, Revoke, Commit and Rollback etc.
7. Design of database for any application.

RECOMMENDED BOOKS

1. Dr. Renu Vig and Ekta Walia, “Fundamentals of Database Management Systems”, an ISTE, Publication, New Delhi.
2. Arun K Majumdar and P Bhattacharya, “Database Management Systems”, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi.
3. ISRD Group, “Introduction to DBMS”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing House Pvt. Ltd., New Delhi.
5. Date C.J. Addison Wesley, “An Introduction to Database Systems”.
6. Elmasri/Navathe/Addison Wesley, “Fundamentals of Database Systems”.
7. “SQL Unleashed”, Hans Ladanyi Techmedia Publications, New Delhi.
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weightage. Server can be used as package to explain concepts.