

Faculty of Engineering and Technology
Radha Govind University
Chandausi, Sambhal (U.P.)



Evaluation Scheme & Syllabus for
Department of Computer Science & Engineering
Diploma Computer Science & Engineering
II Year
(III & IV Semester)
(Effective from session _____)

DIPLOMA IN COMPUTER SCIENCE & ENGG.

STUDY AND EVALUATION SCHEME

2nd Year, 3th Semester

SUBJECT CODE	SUBJECT NAME	STUDY SCHEME Periods /Week			Credits	MARKS/EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DCS 301	OPERATING SYSTEM	3	-	-	3	30	-	30	70	-	70	100
DCS 302	DATA BASE MANAGEMENT SYSTEM	3	-	-	3	30	-	30	70	-	70	100
DCS 303	COMPUTER NETWORK	2	-	4	4	30	-	30	70	-	70	100
DCS 304	WEB TECHNOLOGIES	1	-	4	3	30	-	30	70	-	70	100
DCS 305	COMPUTER PROGRAMMING USING C	1	-	4	3	30	-	30	70	-	70	100
DCS 306	OPERATING SYSTEM LAB	-	-	2	1	-	25	25	-	25	25	50
DCS 307	DATA BASE MANAGEMENT SYSTEM LAB	-	-	4	2	-	25	25	-	25	25	50
DCS 308	COMPUTER NETWORK LAB	-	-	2	1	-	25	25	-	25	25	50
DCS 309	COMPUTER PROGRAMMING USING C LAB	-	-	4	2	-	25	25	-	25	25	50
					22	150	100	250	350	100	450	700

DIPLOMA IN COMPUTER SCIENCE & ENGG.

STUDY AND EVALUATION SCHEME

2nd Year, 4th Semester

SUBJECT CODE	SUBJECT NAME	STUDY SCHEME			Credits	MARKS/EVALUATION SCHEME						Total Marks of Internal & External
		Periods /Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DCS 401	DATA STRUCTURES USING C	3	-	-	3	30	-	30	70	-	70	100
DCS 402	Software Engineering	2	-	4	4	30	-	30	70	-	70	100
DCS 403	Introduction to E-Governance	2	-	-	2	30	-	30	70	-	70	100
DCS 404	PROGRAM ELECTIVE-I	3	-	-	3	30	-	30	70	-	70	100
DCS 405	Scripting Languages (Python)	1	-	4	3	30	-	30	70	-	70	100
DCS 406	OPEN ELECTIVE-I	2	-	-	2	30	-	30	70	-	70	100
DCS 407	Operating system Lab	-	-	2	1	-	25	25	-	25	25	50
DCS 408	Software Engineering Lab	-	-	4	2	-	25	25	-	25	25	50
DCS 409	Scripting Languages (Python) Lab	-	-	4	2	-	25	25	-	25	25	50
					22	180	75	255	420	75	495	750

DCS 404 ELECTIVE-I	DCS 406 OPEN ELECTIVE-I
1. Computer System Organization 2. FOSS (Free Open Source software)	1. Project Management 2. INDUSTRIAL ROBOTICS

Industrial training of 4-6 weeks duration to be organized after 4th semester exam.

OPERATING SYSTEMS

L	T	P
3	-	-

COURSE OBJECTIVES

A general introduction to various ideas in implementation of operating systems, particularly introduction to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Understand functional architecture of an operating system.

CO2: Understand process management and distinguish CPU scheduling algorithms.

CO3: Understand the concept of memory management.

CO4: Understand I/O System and distinguish Disk scheduling algorithms

CO5: Classify File System and directory implementations.

COURSE CONTENT

Units	Topics	No. of Lectures
1st	Overview of Operating System Introduction, Different types of OS, Functions & Services of OS, UNIX/LINUX Architecture, Kernel, Services and systems calls, System programs.	6 Periods
2nd	Process Management: Process concepts, Operations on processes, CPU Scheduling, Scheduling Algorithms, IPC, Process synchronization, critical section, Deadlock, Condition, Avoidance & Prevention.	10 Periods
3rd	Memory Management: Memory allocation, First Fit, Best fit & Worst Fit, Swapping, Paging and Segmentation, Page faults, Page Replacement Algorithm, Fragmentation & Compaction, Concept of virtual Memory.	10 Periods
4th	I/O System: Mass storage structure - Overview, Disk structure, Disk attachment, Disk scheduling algorithms, swap space management, RAID types.	8 Periods
5th	File management: Concept of a file, access methods, directory structure, file system mounting, file sharing and protection, file system structure and implementation, directory implementation, free- space management, efficiency and performance. Different types of file systems.	8 Periods

Reference Books:

1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited
2. UNIX Concepts and Applications, Sumitbha Das, McGraw-Hill Education
3. Rahul Wadhwa, Operating System, Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-139-7
4. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India
5. Operating System Concepts, Ekta Walia, Khanna Publishing House
6. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India

OPERATING SYSTEMS (Lab)

LIST OF PRACTICALS

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 Usage of File Management commands of Linux: cat, chmod,cp, mv, rm, pg, more, find
5. Use the general purpose commands of Linux: wc, od, lp, cal , date, who, whoami
6. Using the simple filters: pr, head, tail, cut, paste, nl, sort
7. Communication Commands: news, write, talk, mseg, mail, wall
8. Write a shell program that finds the factorial of a number.
9. Write a shell program that finds whether a given number is prime or not.
10. Write a shell program to find the average of three numbers.
11. Write a shell program that will convert all the text of the file from lowercase to uppercase.

Data Base Management System

COURSE OBJECTIVES

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

L	T	P
3	-	-

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Describe fundamentals of DBMS, its installation and working.

CO2: Understand the concept of keys and various data model.

CO3: Understand relational model and relational algebraic operations.

CO4: Designing a Relational Database

CO5: Apply SQL commands to create, insert, retrieve, update, delete data from the Relational Database.

COURSE CONTENT

Units	Topics	No. of Lectures
1 ST	Introduction Database System Concepts and Architecture, Components of DBMS, Table Structure, Schema definition, Three views of Data (External View, Conceptual View, Internal View).	(2Periods)
2 ND	Data Model and Keys: Define data model, Data Models : Network Model Hierarchical Model, E-R Model, Advantage & Disadvantages of each Data Model, Concept of Keys (Primary, Candidate, Super, Foreign), Constraints, Strong Entity Set and Weak Entity Set.	(3Periods)
3 RD	Relational Model: The Relational Data Model and Relational Database Constraints; ER/EER to Relational Model mapping; Relational Algebra and Relational Calculus, Relations algebra (Basic operation: Union intersection difference and Cartesian product), Additional Relational Algebraic Operations (Projection, Selection rows, Division, rename and join)	(3 Periods)
4 TH	Relational Database Design : Functional dependencies and normalization for relational databases, Types of Normalization (1NF, 2NF, 3NF, multivalued dependencies and BCNF, Forth Normal Form, Fifth Normal Form).	(3 Periods)
5 TH	SQL/MySQL: MySQL data types – Data Definition Commands – Data Manipulation Commands – Data Retrieval Commands, Types of operators – Arithmetic, Comparison and Logical Operators	(3 Periods)
Reference Books: 1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education 2. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India. 3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India. 4. Introduction to Database Systems, C.J.Date, Pearson Education 5. Introduction to SQL, Rick F.Vander Lans, Pearson Education		

Data Base Management System LAB

NAME OF EXPERIMENT

1. Install and configure a database system (MySQL through XAMPP Server, My SQL, Postgre SQL, or SQ Lite)
2. Design an ER Model for a Library Management System
3. Study of the different properties present in an ER Model
4. Creating Database
 - Creating a database
 - Creating a table
 - Specifying relational data types
 - Specifying constraints
 - Creating indexes
5. Table and Record Handling
 - INSERT statement
 - Using SELECT and INSERT together
 - DELETE, UPDATE, TRUNCATE Statement.
 - DROP, ALTER statement
6. Retrieving Data From a Database The SELECT statement
 - Using the WHERE clause
 - Using Logical Operators in the WHERE clause
 - Using In, BETWEEN, LIKE, ORDER BY, GROUP BY & HAVING clause
 - Using Aggregate Functions
 - Combining Tables Using JOINS
7. Case Study 1: SQL - Library Management System
 - Scenario:
 - An institute manages a Library Management System with following column
 - Book ID, Title, Author_ Name, Year_ of_ publication, Publisher_ name, Subject,
 - Member ID, (You may add other fields also)

DCS 303 COMPUTER NETWORK

COURSE OBJECTIVES

Understand functioning of computer networks and popular networking protocols.

L	T	P
2	-	4

COURSE OUTCOMES:

CO1: Explain the fundamental concepts of data communication.

CO2: Describe the functionalities of the physical layer and Data Link

CO3: Understanding the concept of IP address and key protocols of the Network Layer

CO4: Describe the functionalities of the transport layer.

CO5: Recognize various network devices and network management system.

COURSE CONTENT

UNIT 1: Introduction :

(06 Periods)

Introduction to computer networks; Network Models- OSI Reference Model, TCP/IP Model.

UNIT 2: Data Communication and Communication Methodologies : (10 Periods)

Transmission Media – principles, issues and examples; Wired Media – Coaxial, UTP, STP, Fiber Optic Cables; Wireless Media – HF, VHF, UHF, Microwave, Ku Band; Network topologies; Data Link Layer – design issues, example protocols (Ethernet, WLAN, Bluetooth); Switching Techniques (Circuit, Packet, Message).

UNIT 3: Network Layer :

(10 Periods)

Network Layer – design issues, example protocols (IPv4); Concept of IPV6, Routing principles /issues, algorithms (Distance - vector, Link-state) and protocols (RIP, OSPF).

UNIT 4: Transport Layer:

(08 Periods)

Transport Layer – design issues, example protocols (TCP/UDP); Application Layer Protocols (SMTP, DNS).

UNIT 5: Network Devices

(08 Periods)

Functioning of Network Devices – NIC, Hub, Bridge, Switch, Router, WiFi Devices; Network Management System and example protocol (SNMP).

REFERENCE BOOKS:

1. Computer Networks, 4th Edition (or later), Andrew S. Tanenbaum, PHI
2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addison Wesley
3. Priyam Tayal, Priyanka, Manish Sahoo, Data Communication & Computer Network, Asian Publishers, Muzaffarnagar. ISBN: 978-93-91541-41-5
4. Data and Computer Communications, William Stallings, PHI
5. An Engineering Approach to Computer Networking, S. Keshav, Addison Wesley/Pearson
6. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House
7. Behrouz A Forouzan, Data Communications and Networking , Mc Graw Hill Publications.
8. Data Communication & Networking by Behrouz A. Forouzan 5th Edition.

COMPUTER NETWORK LAB

NAME OF EXPERIMENT

1. Study of any Network simulation tool (Wireshark, Cisco Packet Tracer, NS-2, GNS3 etc).
2. To understand and practically observe how the data travels through OSI layers using network tools (Wireshark, Cisco Packet Tracer, NS-2, GNS3 etc).
3. Showing various types of networking cables and connectors, identifying them clearly
4. Looking at specifications of cables and connectors of various companies on Internet, find out differences.
5. Making patch cords using different types of cables and connectors - crimping, splicing, etc
6. Demonstration of different type of cable testers, using them for testing patch cords prepared by the students in Lab and standard cables prepared by professionals .
7. Configuring computing devices (PC, Laptop, Mobile, etc) for network, exploring different options and their impact – IP address, gateway, DNS, security options, etc.
8. TCP communication between two devices.
9. Showing various networking devices – NICs, Hub, Bridge, Switch, Router, Gateway, WIFI access point, etc.
10. Looking at specifications of various networking devices various companies on Internet, find out differences.

DCS 304 WEB TECHNOLOGIES

L	T	P
1	-	4

COURSE OBJECTIVES

This course will enable the students to understand and develop competency amongst the students to design professional database backed dynamic and feature based web sites. The course covers the use of programming with PHP applications. The main objective for this course is to motivate student's interest in learning Web-app development by giving them an insight into its possibilities through practical applications. In addition, the course also provides a sufficiently broad but practical introduction to Server side web technologies.

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Analyze a webpage and identify its elements and attributes.

CO2: Create webpages using HTML

CO3: Using Cascading Style Sheets to create webpages.

CO4: Build dynamic webpages using JavaScript (Client-side programming).

CO5: Build dynamic webpages using PHP (Server-side programming).

COURSE CONTENT

Unit 1: Web Development Introduction (2 Periods)

WWW, Internet, Browser, Search engine Client Server Model, URL, Web Pages, Website and Web Services, Types of Websites (Static, Dynamic and Responsive), Developer options of Browser (View page source, Developer Tools, Inspect Element etc)

Unit 2: HTML Basics (3 Periods)

HTML Document, Basic Structure of HTML, Syntax, HTML Tags and Attributes, Types of HTML Tags, Rules of nesting, Basic Tags (HTML Tag, Head Tag, Title Tag, Body Tags).

Page Formatting: Adding a new Paragraph, Adding a line break, Inserting a blank space, changing page background, Div and Span tags .

Text Formatting: Html Headings, Formatting elements (Bold text, Important text, <i> Italic text, Emphasized text, <mark> Marked text, <small> Small text, Deleted text, <ins> Inserted text, <sub> Subscript text, <sup> Superscript text), Comments, Horizontal Lines.

Creating Lists: Ordered List, Unordered Lists, Definition Lists Others: Images, Text Links, Image. Links, opening a page in New Window or Tab, Linking to an area of same page, Introduction to Table Tags, Frames & I frame, HTML Forms.

Unit 3: Cascading Style Sheets

(3 Periods)

Introduction, Benefits of CSS, CSS Syntax, CSS Implementation (inline, internal and external), CSS Selectors (ID Selectors, Class Selectors, Grouping Selectors, Universal Selectors, CSS Pseudo-classes), CSS properties (background-color, background-image, border-style, height, width, color, text-align, font-family, font-style, font-size, font-weight), Box Model in CSS (margin, border, padding)

Unit 4: Java Scripts

(3 Periods)

Java Script Introduction , variables , data types , operators, control flow (if-else, for loop, while loop, do-while loop), Declaring Functions, Calling functions with parameters, Adding JavaScript to Web Documents, JavaScript Objects, Document Object Models, HTML Events and calling Java Script functions on Events.

Unit 5: PHP

(3 Periods)

Server side scripting, Arrays, function and forms, advance PHP Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs.

Reference Books:

1. “Web Technologies--A Computer Science Perspective”, Jeffrey C.Jackson,
2. “Priyal Tayal, Manish Sahu, internet & Web Technology, Asian Publishers, Muzaffarnagar.
3. “Internet & World Wide Web How To Program”, Deitel, Deitel, Goldberg, Pearson Education
4. “Web programming- Building Internet Application”, Chris Bales
5. Web Applications: Concepts and Real World Design, Knuckles.

DCS 305 COMPUTER PROGRAMMING USING C

COURSE OBJECTIVES

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1	-	4

To enable student, develop structured solutions to problems and implementing them using computers. This involves two parts: i) Formulating a solution for a given problem as a well-defined sequence of actions, ii) Expressing solution in a machine-readable form or a programming language. For the second part, we will learn the common units of programming languages. The first part can only be learned through the repeated practice of solving problems.

COURSE OUTCOMES

At the end of the course, students will be able

CO1: Demonstrate knowledge on C Programming concepts.

CO2: Develop simple programs in C using basic constructs.

CO3: Develop C programs using conditional and looping concepts

CO4: Understand the concept of multi-dimensional array and strings.

CO5: Design modular C programs with reusable functions and pointers to improve code readability and maintainability.

COURSE CONTENT

UNIT 1: Introduction to Problem Solving: (2 Periods)

Computational way of thinking, Flowchart and Algorithm, Variable, constant and Representation, Data Types, Keywords, Identifier.

Practical Exercise:

1. Installation of C Compiler
2. Familiarization with programming environment and options/menu of the installed compiler.
3. Draw a Flowchart using MS Word (or any other editor or online tools like Draw.io etc.)

UNIT 2: Operators & Expression: (3 Periods)

Arithmetic, Relational, Logical and Bitwise Operators, Input, Output, Expressions, Data Type Casting.

Practical Exercise:

1. Programs using I/O statements and various operators
 - a. WAP to print your name
 - b. WAP to perform various arithmetic and logical operators.
 - c. WAP to swap two numbers with and without using third variable

2. Programs using expression evaluation and precedence

- a. WAP using unary and tertiary operators
- b. WAP using post and pre - increment operators

UNIT 3: Conditional & Looping Statements:

(3 Periods)

if, if-else, if-else ladder, switch–case, break and continue, Loops: for, while and Do-while and Nested Loops.

Practical Exercise:

1. Programs using decision making statements and branching statements

- a. WAP to check whether the given number is odd or even
- b. WAP to check whether a given number is Prime or not.
- c. WAP to find the largest among the given three numbers

2. Programs using loop statements

- a. WAP to find the factorial of a given number
- b. WAP to print table of a given number
- c. WAP to print all prime numbers from 1 to 100
- d. WAP to print Fibonacci series till a given number n
- e. WAP to print different star patterns

UNIT 4: Arrays & String:

(3 Periods)

Introduction to Arrays, Array Declaration, Length of array, Manipulating array elements, Single and Multidimensional Array, Arrays of characters, Introduction of Strings, String declaration and definition, String Related function i.e. strlen, strcpy, strcmp,.

Practical Exercise:

1. Programs to demonstrate applications of n dimensional arrays

- a. WAP to print 3 x 3 matrix.
 - b. WAP to print the transpose of a 3 x 3 matrix.
 - c. WAP to add two matrices.
2. Programs to demonstrate use of string manipulation functions
- a. WAP to find the length of a given string
 - b. WAP to concatenate two strings
 - c. WAP to check whether the given string/number is palindrome or not

UNIT 5: Function & Pointer:

(3 Periods)

Introduction to functions, Global and Local Variables, Function Declaration, Function Call and Return, Types of Functions, Standard functions, Introduction to Pointer, Parameters and Parameter Passing, Call-by value/reference, recursive function, I/O and Formatting.

Practical Exercise:

1. Programs to demonstrate parameter passing mechanism

- a. Create a user defined function to add two numbers.
- b. WAP to implement call by value
- c. WAP to implement call by reference
- 2. Programs to demonstrate recursion
 - a. WAP to print the factorial of a given number using recursion.
- 3. Programs to demonstrate use of pointers
 - a. WAP to print the address of variable using pointer
 - b. WAP to swap the contents of two variable using pointer.

Reference Books:

- 1. Let Us C, Yashavant Kanetkar
- 2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
- 3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
- 4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
- 5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
- 6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.
- 7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

DCS 401 DATA STRUCTURES USING C

COURSE OBJECTIVES

To provide strong foundation for implementing programming language to formulate, analyze and develop solutions related to various data structures problems.

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COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Understand the fundamental data structures

CO2: Apply the operations of stack and queue

CO3: Understand the concepts of linked lists

CO4: Implement various sorting and searching techniques

CO5: Illustrate tree and graph traversal techniques

COURSE CONTENT

UNIT 1: Introduction to Data Structures:

(6 Periods)

Basic Terminology, Classification of Data Structures, Operations on Data Structures.

UNIT 2: Linear Data Structures- Stacks

(10 Periods)

: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks Infix-to-Postfix Transformation, evaluating Postfix Expressions.

Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues Dequeue, Circular Queue, Applications of Queues.

UNIT 3: Linked Lists:

(07 Periods)

Singly Linked List, Representation in Memory, Operations on a Single Linked List, Circular Linked Lists, Doubly Linked Lists

UNIT 4: Sorting :

(07 Periods)

Introduction to different sorting techniques - Bubble sort, Insertion sort, Quick sort and Merge Sort Searching: Symbol Tables, Linear Search, Binary Search, Hash Tables.

UNIT 5: Trees:

(12 Periods)

Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals, Types of Binary Trees, binary tree traversals: in-order, pre-order, post-order. Various operations of Binary Search Tree, B Tree and AVL Tree.

Graph: Graph Terminologies, Representation of Graphs- Adjacency List, Adjacency Matrix, Graph Traversals.

REFERENCE BOOKS:

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.

DATA STRUCTURES USING C (Lab)

LIST OF PRACTICALS

1. Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2. Write a program to implement Array
3. Write a program to implement different operations in Array
4. Write a program to implement different Stack operations
5. Write a program to implement different Queue operations
6. Write a program to implement single linked list
7. Write a program to implement double linked list
8. Write a program to implement circular linked list
9. Write a program to implement Linear and Binary Search
10. Write a program to implement different Sorting Algorithms
11. Write a program to implement Depth First Search and Breadth First Search
12. Write a program to implement Binary Search Tree.

DCS 402

SOFTWARE ENGINEERING

COURSE OBJECTIVES

The system analysis and design is the backbone of Application software development. After studying the subject the students will be able to develop and design the system according to given requirements. It involves various steps in analysis and design of the system. It includes the knowledge of preparing project systematically. It is important to know about various aspects of the system analysis and design so that the students will be able to understand the responsibilities while designing and implementing the project.

L	T	P
2	-	4

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Understand functional architecture of an operating system.

CO2: Understand process management and distinguish CPU scheduling algorithms.

CO3: Understand the concept of memory management.

CO4: Understand I/O System and distinguish Disk scheduling algorithms

CO5: Classify File System and directory implementations.

COURSE CONTENT

Units	Topics	No. of Lectures
1 st	Introduction to Software Engineering System Concepts: Types of systems : (open, closed, static and dynamic systems), Basics of Software Engineering : Need for Software Engineering – Definition, Programs v/s Software Products, Software Characteristics.	(8 Periods)
2 nd	Software Life Cycle Models Requirement of Life Cycle Model, Classic Waterfall Model, Prototyping Model, Evolutionary Model, Spiral Model, Introduction to agile methodology.	(8 Periods)
3 rd	Software Planning, Requirement Analysis and Specification Requirement gathering and Analysis, Software Requirement Specifications(SRS), Characteristics of good SRS., Metrics for Project Size Estimation- LOC(Lines of Code), Function Point Metric, Project estimation Techniques- Using COCOMO Model, Responsibilities of Software Project Manager.	(10 Periods)
4 th	Software Design and Implementation Characteristics and features of good Software Design Cohesion and Coupling, Software design Approaches- Function Oriented Design (Data flow diagrams, Data dictionary, Decision Trees and tables), Object Oriented Design, Structured Coding Techniques, Coding Styles, and documentation.	(8 Periods)

5 th	Software Testing and Maintenance Concept of Testing, Unit Testing, Black Box Testing, White Box Testing, alpha , beta testing, Integration testing, System testing, Testing type cycle (V-Model), Verification v/s Validations, Configuration management, Overview of test cases.	(8 Periods)
RECOMMENDED BOOKS 1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi 2. An Integrated Approach to Software Engineering by Pankaj alote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002 3. Priyam Tayal, Pawan Kumar Gupta, Pradyumna Kumar, software Engineering, Asian Publishers Muzaffarnagar. ISBN: 978-93-91541-85-9 4. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi 5. Software Engineering by KK Aggarwal and Yogesh Singh 6. Software Engineering – A Practitioner’s Approach by RS Pressman, Tata McGraw Hill Publishers, New Delhi		
<u>SOFTWARE ENGINEERING LAB</u> LIST OF PRACTICALS 1-Perform comparative analysis of various Models 2-Develop a SRS on a given topic/project/problem. 3-Develop DFD Model (level 0 and level 1 DFD) of the problem. 4- Use of testing tools such as J-meter, Canoo Web Test 5. Write test cases for any known application		

INTRODUCTION TO e-GOVERNANCE

COURSE OBJECTIVES

To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

L	T	P
2	-	-

COURSE OUTCOME:

CO1: Exposure to various e-Governance lifecycle.

CO2: Introductory ideas of and practices followed in e-Governance initiatives in India.

CO3: Understanding the architecture and various models of e-governance

CO4: Introduction to various e-government projects.

CO5: Analysis and evaluation of various e-governance projects.

COURSE CONTENT

Units	Topics	No. of Lectures
1 st	Introduction: Exposure to emerging trends in ICT for development; Understanding of design and implementation of eGovernment projects, e-governance lifecycle.	(4 Periods)
2 nd	Government Process: Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules	(5 Periods)
3 rd	Architecture and models of e-Governance Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for In- novation and Change Management in e- Governance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws	(7 Periods)
4 th	e-Governance projects: Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.	(7 Periods)
5 th	Mini Projects: Mini Projects by students in groups – primarily evaluation of various e-governance projects.	(5 Periods)
Reference Books: 1.Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd. e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India http://www.csi-sigegov.org/publications.php https://negd.gov.in https://www.nisg.org/case-studies-on-e-governance-in-india		

DCS 404 PROGRAM ELECTIVE -I

COMPUTER SYSTEM ORGANIZATION

L	T	P
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COURSE OBJECTIVES

To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers. To identify the elements of modern instructions sets and their impact on processor design. To explain the function of each element of a memory hierarchy. To identify and compare different methods for computer I/O.

COURSE OUTCOMES:

CO1: Understand the basic architecture of computer and number systems.

CO2: Understand concept of Logic Gates and Boolean Algebra.

CO3: Introduction to different combinational circuits.

CO4: Introduction to assembly language programming and microprocessor

CO5: Understanding Memory and Digital Interfacing

COURSE CONTENT

Units	Topics	No. of Lectures
1 st	Structure of Computers: Computer Functional units, Von-Neumann architecture, Bus structures, Basic Operational Concepts Number System: Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa, Binary addition and subtraction including binary points. 1's and 2's complement method of addition/subtraction, Error detecting codes.	(8 Periods)
2 nd	Logic Gates and Simplification: Concept of negative and positive logic, Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates, SSI, MSI, LSI, VLSI (Definition), Propagation delay, Noise Margin, Fan in, Fan out, Power dissipation, Postulates of Boolean algebra, De Morgan's Theorems. Implementation of Boolean (logic) equation with gates, Karnaugh map (up to 4 variables).	(9 Periods)
3 rd	Introduction to combinational circuit: Multiplexer, De-multiplexer, Encoder, Decoder block diagram and Circuit, 7 segment decoder, BCD Encoder Circuit, Half adder and Full adder circuit, design and implementation, Half subtractor and Full subtractor or Circuit, design and implementation.	(9 Periods)
4 th	Introduction to Microprocessor Architecture: Instruction Set Architecture design principles from programmer's perspective. One example microprocessor (Intel, ARM, etc). Assembly Language Programming: Simple programs, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.	(8 Periods)
5 th	Memory and Digital Interfacing: Addressing and address decoding, interfacing RAM, ROM, EPROM, programmable peripheral interface, various modes of operation and interfacing to processor, inter-facing keyboard, displays, etc.	(8 Periods)

Reference Books:

1. Computer System Architecture, M. Moris Mano, Pearson/PHI, India.
2. Microprocessors Interface, Douglas V.Hall, Tata McGraw-Hill.
3. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, McGraw-Hill
4. Advanced Microprocessors and Peripherals- Architecture, Programming and interfacing, A.K.Ray, K.M. Bhurchandi, Tata McGraw-Hill, New Delhi, India.
5. Computer Organization and Design: A Hardwar/Software Interface (MIPS Etion) by Patterson and Hennessy

PROGRAM ELECTIVE -I

FOSS (FREE AND OPEN SOURCE SOFTWARE)

COURSE OBJECTIVES

The Free and Open Source Software (FOSS) course is designed to familiarize students with the development process using free and open source software, which includes Linux operating system, service configuration management, application software, and development tools.

COURSE OUTCOME

CO1: Understanding basic introductory concept of Open-Source Software.

CO2: Hands on with Linux Operating System.

CO3: Working with Different Open Source Software.

CO4: Understanding Mobile Programming and Project Management Tools.

COURSE CONTENT

UNIT 1: Introduction:

(12 Periods)

FOSS PHILOSOPHY Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free software, open source software, FOSS Licensing Models, FOSS examples

UNIT 2: Basics of LINUX: (10 Periods)

Linux Installation and Hardware Configuration, Boot Process, Dual-Booting Linux and other Operating Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server)

UNIT 3: Programming Tools and Techniques: (12 Periods)

Libreoffice Tools; Samba: Cross platform; Introduction about LAMP; Brief Introduction to Programming using languages like Java /Python / Perl; Database Systems Mysql, PostgreSQL or equivalent; Open Source

UML Tools; Introduction to Mobile Programming; Version Control Systems like SVN, Git or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

UNIT 4: FOSS CASE STUDIES: (8 Periods)

Some example case studies of FOSS implementation

Reference Books:

1. Linux in a Nutshell, by Ellen Siever
2. Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.
3. Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-madeeasy/>.
4. Version control system URL: <http://git-scm.com/>.
5. Samba: URL : <http://www.samba.org/>.
6. Libre office: <http://www.libreoffice.org/>.

DCS 405

SCRIPTING LANGUAGES (PYTHON)

COURSE OBJECTIVES

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability.

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COURSE OUTCOMES

At the end of the course students will be able to –

CO1: Understand the basic programming constructs of Python.

CO2: Develop Python programs using conditional statements and loops.

CO3: Understanding concepts of reusable functions, python packages and modules.

CO4: File handling in Python and understanding regular expression.

CO5: Applying OOP concept to solve different problem.

COURSE CONTENT

Units	Topics	No. of Lectures
1 ST	Introduction, Variables and Data Types History, Features, Setting up path, Installation and Working with Python, Basic Syntax Understanding Python variables, Numeric data types, Using string data type and string operations, Basic Operators, Understanding coding blocks, Defining list and list slicing, Other Data Types (Tuples, List, Dictionary, Set)	(2Periods)
2 ND	Control Structures Conditional blocks using if, else and elif, For loops and iterations, while loops, Loop manipulation using continue, break.	(3Periods)
3 RD	Functions, Modules, Packages and Exception Handling Organizing codes using functions, Organizing projects into modules, Importing own module as well as external modules, Understanding Packages, Exception Handling.	(3 Periods)
4 TH	File I/O, Text Processing, Regular Expressions Understanding read functions, Understanding write functions, Programming using file operations, Pattern matching and searching, Pattern searching using regex.	(3 Periods)
5 TH	Classes in Python Principles of Object –Oriented Programming, Concept of Classes, Class Variables, Creating Classes, Instances, Methods, File Organization	(3 Periods)
REFERENCE BOOKS: 1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House 2. Starting Out with Python, Tony Gaddis, Pearson 3. Core Python Programming, Wesley J. Chun, Prentice Hall 4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University 5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press. 6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing		

SCRIPTING LANGUAGES (PYTHON) LAB

LIST OF PRACTICALS

1. Write and execute scripts based on data types & collections.
2. Write and execute Python scripts with conditional blocks.
3. Write and execute Python scripts with loops.
4. Write and execute Scripts based on Functions and Modules.
5. Write and execute Scripts based on Packages.
6. Write a program which uses exception handling.
7. Write and execute Regular Expressions & File Processing scripts.
8. Develop a program to implement the concept of class.
9. Develop a program using Inheritance concept.
10. Develop a program using Polymorphism concept.

DCS 406 (OPEN ELECTIVE –I)

PROJECT MANAGEMENT

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COURSE OBJECTIVES

To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved. To develop an understanding of key project management skills and strategies.

COURSE OUTCOMES

CO 1: Understand the Project Management Principles.

CO 2: Able to prepare project plans.

CO 3: Able to estimate effective cost of a project.

CO 4: Create risk report and cost benefit analysis.

CO 5: Prepare project scheduling through time-cost trade off.

COURSE CONTENT

UNIT-I: Concept of a project: (5 Periods)

Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time) project priority matrix- work break down structure.

UNIT-II: Capital budgeting process: (6 Periods)

Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

UNIT-III: Financial estimates and projections: (5 Periods)

Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.

UNIT-IV: Basic techniques in capital budgeting: (6 Periods)

Non discounting and discounting methods- payback period- Accounting rate of return-net present value Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects.

UNIT-V: Project administration: (6 Periods)

Progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management software's.

Reference Books:

1. Project planning, analysis, selection, implementation and review – Prasanna Chandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson – McGraw Hill
3. Project management - David I Cleland - McGraw Hill International Edition, 1999
4. Project Management – Gopala Krishnan – McMillan India Ltd.
5. Project Management-Harry-Maylor-Pearson Publication.

(OPEN ELECTIVE –I)

INDUSTRIAL ROBOTICS

COURSE OBJECTIVES

This course aims to equip students with foundational and advanced knowledge of industrial robotics, including robot anatomy, programming, kinematics, and control systems. Students will learn to design, simulate, and operate robotic systems used in manufacturing. Emphasis is placed on automation integration, safety protocols, and real world applications, preparing learners for careers in robotics engineering, industrial automation, and smart manufacturing environments.

COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that Students will be able to

CO1 □ Comprehend and adhere to industry health and safety guidelines while working with robots' vehicles to mitigate hazards.

CO2 □ Differentiate coordinate systems and define the custom or user-defined coordinate frames.

CO3 □ Develop simple robot programs that incorporate various types of movements along with their respective parameters.

CO4 □ Integrate robot with different automation components i.e., PLC HMI, conveyor etc.

CO5 □ Create variety of innovative ideas and develop creative approaches to problem solving.

CONTENT

UNIT 1- INTRODUCTION TO INDUSTRIAL SAFETY PRACTICES AND INTRODUCTION TO INDUSTRIAL ROBOTICS (08 Periods)

Fire Extinguishers & its Types, safely handling Tools & Equipment, Use of proper Tools & Equipment & its maintenance, OSH & practices to be observed as a precaution.

Introduction of Robots and their Importance in Manufacturing and Production, Applications of robots in manufacturing and assembly for which they can be efficiently utilized, Role of robots and automation systems in boosting the safety at dangerous manufacturing tasks, Structure and functions of robot System (Basic Package) and additional Equipment, Major Applications of Robots-Pick and Place, Arc Welding, Ultrasonic welding, Part Transfer, Packing, Palletizing. Type of End of arm tools and differences between them: Handling tools - Pneumatic Gripper, Vacuum Gripper, Hydraulic Gripper, Hydraulic Gripper, and Servo-Electric Gripper. Welding guns – Arc Welding guns, Spot welding guns. Robotic cell and its various components. Cycle time and its importance. Operator job in robotic cell. Safety procedure for Programmer and an Operator.

UNIT 2- JOGGING OF ROBOT (04 Periods)

Turn ON /OFF Steps of Robot, Checking Robotic cell Health, Introduction to Teach pendant and key functions, Industrial robot Coordinate system, Different coordinate systems in Robots, Defining X, Y, Z coordinate system, Jogging Robot using Teach pendant in different Modes of coordinate systems: Joint coordinate system, rectangular

co-ordinate system, and User or object co-ordinate system, Tool co-ordinate system, TCP (Tool centre point definition) i.e., TCP File. , Creating user defined work objects i.e., user coordinate frame File.(Box, circle, triangle work object definition)

UNIT 3- PROGRAMMING OF A OF ROBOT USING TEACH PENDANT (06 Periods)

Robot Program Structure, Different Motion Types used in Programming (PTP, Linear, Circular, Spline): Move J (PTP) , Move L (Linear) , Move C (Circular) , Move S (Spline) ; Different Motion Parameters used in Program Point Recording, Basic Program creation using Motion types and parameters, Path optimization for smooth robot movement and cycle time, Safety instructions to be followed while loading and unloading of parts.

UNIT 4- ROBOT INTEGRATION WITH PLC, HMI AND OTHER EQUIPMENT (06 Periods)

PLC and robot communication and HMI, Conveyor system and its communication with PLC, Methods to create fencing and safety equipment's, Steps to work with two different types of Robots at same project, Tool mounting on Robot Flange, Different connections of grippers (Electric, Pneumatic etc.).

UNIT 5- ROBOT PROGRAMMING WITH ADVANCE LEVEL INSTRUCTIONS (04 Periods)

Loop control instructions, Arithmetic and Logical instructions, Shift instructions, Interfacing End of arm tools to Robot using robot I/O, establishing communication between Robot I/O and PLC modules, Function Keys in Pendant for Arc welding and Material Handling robot, MIG welding Instructions in Robot, MIG welding Program and how to optimize it, Material Handling Program and how to optimize it.

INSTRUCTIONAL STRATEGY

Combine theoretical instruction with hands-on training using robotic arms and simulation software. Use lectures, demonstrations, and lab sessions to teach robot programming, kinematics, and control. Incorporate project-based learning, real-world case studies, and industry visits. Assess through practical tasks, quizzes, and group projects to reinforce industrial robotics applications.

TEXT BOOKS/REFERENCE BOOKS

1. Modern Robotics: Mechanics, Planning, and Control Authors: Kevin M. Lynch, Frank C. Park Publisher: Cambridge University Press
2. Robot Modelling and Control Authors: Mark W. Spong, Francesco Bullo Publisher: Wiley
3. Springer Handbook of Robotics Editors: Bruno Siciliano, Oussama Khatib Publisher: Springer
4. Robotics for Engineers Author: Yoram Koren Publisher: McGraw-Hill
5. Robotic Engineering: An Integrated Approach Author: Richard D. Klafter, Thomas A. Chmielewski, Michael Negin Publisher: Prentice Hall