S. S. JAIN SUBODH P.G. COLLEGE

(AUTONOMOUS)

JAIPUR

SYLLABUS

THREE YEAR UNDERGRADUATE PROGRAMME IN SCIENCE

I & II SEMESTER EXAMINATION 2023-24
III & IV SEMESTER EXAMINATION 2024-25
V & VI SEMESTER EXAMINATION 2025-26

As per NEP-2020

S. S. JAIN SUBODH P.G. COLLEGE

(AUTONOMOUS)

JAIPUR

FACULTY OF SCIENCE

Programme Name: THREE YEAR UNDERGRADUATE PROGRAMME IN SCIENCE

Subject/Discipline: Computer Science

(Syllabus as per NEP-2020 and Choice Based Credit System)

Medium of Instruction: English

w.e.f Academic Session 2023-24

Core Subject: Computer Science

Programme Specific Outcomes:

PSO1: Identify, formulate, analyze, and solve programming problems using different programming languages.

PSO2: Improve logical ability and programming concepts through practical implementation in the programming lab.

PSO3: Introduce the concept of project development using the technologies learned during the semester to enhance programming skills in young IT professionals.

PSO4: Prepare students for the future Technologies like Big Data, Cloud Computing, AI etc.

PSO5: Ability to understand changes and future trends in the field of computer applications.

Examination Scheme

Duration: 3 hrs.

(Min. Marks/Max. Marks): As per B.Sc. program norms of S. S. Jain Subodh PG (Autonomous) College

Theory: CIA / ESE: 15 / 35 Total: 50 per paper   Practical: CIA / ESE: 20 / 30 Total: 50 per Practical

Note: There will be two parts of end semester theory paper.

- Part A Question 1 is compulsory comprises ten very short answer questions. Candidate has to attempt any seven questions. Each question carries 2 marks.
- Part B The paper will consist of four questions with internal choice. Each question will carry ten marks.

Semester-I

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS101	Basic Concepts of Programming (Using "C")	DSC	2	2			3	
2.	BSCS102	Operating System	DSC	2	2			3	
3.	BSCS151	Computer Practical-I	DSCP	2			6		2

Semester-II

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS201	Advance Concepts of Programming (Using "C")	DSC	2	2			3	
2.	BSCS202	Database Management System	DSC	2	2			3	
3.	BSCS251	Computer Practical-II	DSCP	2			6		2

Semester-III

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS301	Java Programming	DSC	2	2			3	
2.	BSCS302	Data and Computer Network	DSC	2	2			3	
3.	BSCS351	Computer Practical-III	DSCP	2			6		2

Semester-IV

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS401	Web site Development	DSC	2	2			3	
2.	BSCS402	Software Engineering	DSC	2	2			3	
3.	BSCS451	Computer Practical-IV	DSCP	2			6		2

Semester-V

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS501	PHP Programming	DSC	2	2			3	
2.	BSCS502	Elective-I Artificial Intelligence/Data Warehousing and Mining/ Open-Source Operating System	DSC	2	2			3	
3.	BSCS551	Computer Practical-V	DSCP	2			6		2

Semester-VI

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Theory	P
1.	BSCS601	Python Programming	DSC	2	2			3	
2.	BSCS602	Elective-II Cloud Computing / Business Informatics/ Big Data Technology	DSC	2	2			3	
3.	BSCS651	Computer Practical-VI	DSCP	2			6		2

BSCS101: Basic Concepts of Programming (Using "C")

Course Outcomes
CO1: Understand the concept of Algorithms and different symbols used in flowcharts
CO2: Develop conditional statements to write C programs.
CO3: Able to implements different loops in C programs
CO4: Understand the use of Nested loops in C programs

UNIT - I
Preliminary Concepts: Programming Concepts, Language Evaluation Criteria and Language Categories, Evolution of Major Programming Languages, Describing Syntax and Semantics

UNIT - II
Problem solving techniques: Pseudocode, Flowchart, Algorithm, Characteristics of Algorithms, Time and Space Complexity of Algorithms

UNIT - III
Fundamentals of C: History and Importance of C, Basic Structure and Execution of a C program, Constants, Variables, Data Types, Qualifiers, Operators and Expressions, Operator Precedence and Associativity, Managing Input and Output Operations, Decision Making and Branching

UNIT – IV
Iteration: While, Do…While, For Loop, Nested Loops, Break and Continue, Go to Statements

Reference Books:-
1. Principles of Programming Languages Notes – PPL Notes – PPL Pd Notes
2. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education.
3. Programming Languages –Louden, Second Edition, Thomson.

BSCS102: Operating System

Course Outcomes:
CO1: Analyze various scheduling algorithms.
CO2: Understand deadlock, prevention and avoidance algorithms.
CO3: Compare and contrast various memory management schemes.
CO4: Understand the functionality of file systems.

UNIT- I
Introduction to Operating System: Need of operating systems, Evolution of operating system, Characteristics, Types of Operating System, Functions of Operating System, Systems Calls

UNIT- II
Process Management: Process Concept, Process States, CPU Scheduling- Preemptive and Non preemptive Scheduling Algorithms, Types of Schedulers, Context Switching, Critical Section Problem, Semaphores and Inter process Communication

UNIT-III
Deadlock: Deadlock Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock

UNIT- IV
Memory management: Logical And Physical Address Space, Contiguous Memory Allocation, Fragmentation- Internal and External Fragmentation, Compaction, Paging, Segmentation, Swapping, Virtual Memory Management, Demand Paging, Page Replacement Algorithms

Reference Books:-
1. James L. Peterson & A. Silberschatz: Operating System Concepts.
2. Andrew S. Tenenbaum: Modern Operating Systems; Prentice Hall, India.
3. Systems Programming & Operating Systems, 2nd Edn., Tata Mc Graw Hill.
4. Operating System by Achyut Godbole.
5. Operating System by Galvin.

BSCS151: COMPUTER PRACTICAL-I

Course Outcomes

CO1: Develop a C program based on a given task or algorithm.
CO2: Read, comprehend, and trace the execution of C programs.
CO3: Implement C programs using arrays, pointers, decision-making statements, and looping statements.

Exercises to be framed to cover the Programming Concepts using C taught in the theory paper.

Semester – II
BSCS201: Advance Concepts of Programming (Using "C")

Course Outcomes:
CO1: Understand the concept of Arrays
CO2: Able to implement various sorting and searching algorithms through C
CO3: Understand Strings and string functions of C
CO4: Utilize user-defined functions to solve real-time problems.
CO4: Create C programs that utilize pointers to access arrays, strings, and functions.
CO5: Apply user-defined data types, including structures and unions, to solve problems.
CO6: Demonstrate the concept of file handling to showcase input and output operations in C programs.

UNIT- I
Arrays: Declaration, Initialization and Representation of One –Dimensional and Two-Dimensional Arrays,
Searching and Sorting: Linear Search, Binary Search, Selection Sort, Bubble Sort

UNIT- II
Strings: Strings and String - Handling Functions
Functions: Definition, Need of Functions, Function Calls and Declaration, Parameter Passing, Passing Arrays and Strings to Functions, Scope, Visibility and Life Time of Variables, Recursion

UNIT-III
Understanding Pointers: Declaration and Initialization of Pointer Variables, Pointers and Arrays, Pointers and Function Arguments
Structures and Unions: Declaring a Structure Variable, Accessing Structure Members, Array of Structures, Union

UNIT –IV
File Handling in C: Basic operations- Creating, Opening and Closing a File, Modes of files, Reading and Writing in a File
Preprocessor: Macro Substitution, File Inclusion, Compiler Control Directives

Reference Books:-
1. E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi ; 2004.
2. Programming with C, B.S.Gottfried (TMH).
3. Y. Kanetkar – Let us C, 4th Edition, BPB Publication , New Delhi; 2002.
4. Kerighan & Richie The C programming language (PHI Publication).

BSCS202: Database Management System

Course Outcomes:

CO1: Gain a solid understanding of the fundamental concepts of database management systems, including data models, data independence, database architecture, and components.
CO2: Learn the principles and techniques involved in relational database management systems.
CO3: Ability to transform user requirements into efficient and well-structured database schemas.
CO4: Develop proficiency in SQL

Unit-I
Introduction to Database Concepts: Database and Need for DBMS ,Characteristics of DBMS, Database Users, 3-tier architecture,(its advantages over 2- tier) Data Models, Views of data-schemes and instances,
Data Independence, Overview of Network Model, Hierarchical Model, Relational Model, Object-Oriented Model, ER Model

Unit-II
ER Model: Entities, Relationships, Representation of entities, attributes, relationship set, Generalization , Aggregation. Relational model: Overview of database models, Relational Model, Structure of relational database, different types of keys, Expressing M:N relation, relational algebra, Constraints.

Unit-III
Relational Database Design: Functional dependencies, Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) Lossless joins and dependency preserving decomposition.

Unit-IV
SQL: Introduction to SQL, SQL Data types and Literals, Types of SQL commands, SQL Operators and their procedures, Tables, Views and Indexes, queries and sub-queries, aggregate function, insert, delete and update operations, Joins, Unions, Intersections, Minus in SQL. Query Processing: Query Processing Stages, Estimation of Query Processing Cost.

Reference Books
1. Fundamental of Database Systems by R. Elmasri; S. Navate; Benjamin Cummings;
2. Introduction to database systems by C. J .Date
3. Database system concept by Korth
 4. Principles of Database Management by James Martin
5. Relational database design for Micro computers Application by Prentice Hall (Jackson)

BSCS251: Computer Practical -II

Course Outcomes:

CO1: Write programs that perform operations utilizing derived data types.

CO2: Develop and implement modular applications in C by effectively utilizing functions.

CO3: Develop applications in C that leverage structures and pointers.

CO4: Write both simple and complex SQL queries to retrieve information from databases with many tables to support business decision making.

CO5: Write SQL DDL to create, modify and drop objects within a relational database.

CO6: Retrieve and store information in a relational database using SQL in a multi-user environment.

Exercises to be framed to cover the advanced concepts of C and SQL taught in theory papers.

Semester – III

BSCS301: Java Programming

Course Outcomes:
CO1: Understand the concepts of OOPs
CO2: Knowledge of basic programming constructs of Java
CO3: Understand and Implement the concepts of Classes and Objects
CO4: Implement Polymorphism, Inheritance, and Multithreading
CO5: Enlighten the use of Interfaces, Packages and Exception Handling
CO6: Perform Database Connectivity through JDBC

Unit- I
Introduction to Object Oriented Concepts: Evolution of OOP, OOP Paradigm, Advantages of OOP, Difference between Procedure Oriented and Object Oriented Paradigm, Features of Object Oriented Language – Encapsulation, Data Abstraction, Inheritance, Polymorphism
Introduction to JAVA: Features of Java, Java virtual machine, Java Tokens, Operators, Data types, Programming Concepts, Conditional Statements, Iterative Statements, Arrays, Methods in Java

Unit-II
Classes and Objects: Object References, Method Overloading, Constructors, Constructor Overloading
Inheritance and Interfaces: Super classes- sub classes –Protected members – constructors in sub classes, abstract classes and methods, final methods and classes Introduction of Inheritance, Types of Inheritance, Super Keyword Basics of Interfaces, defining an interface, implementing interface, differences between classes and interfaces and extending interfaces

Unit-III
Packages: Access Specifiers, Package Creation, Use of packages
Exception handling in Java: Exception classes, Exception raising & handling, use of Try, Catch and finally, Throwing Exceptions, User Defined Exceptions.

Unit-IV
Multi-Threading: Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads
JDBC: JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Managing Database Transactions- Insertion, deletion and updation

Reference Books:-
1. C. Thomas Wu, An Introduction to OOP with Java, Mc Graw Hill.
2. Deitel and Deitel, Java, How to Program, Pearson Education Asia.
3. E. Balaguruswmy, Programming with Java, Tata McGraw Hill.
4. Zukowski: Mastering Java 2, BPB Publications.
5. Herbert Scliildt, Java 2, Tata Mc Graw Hill.

PBSC302: Data and Computer Networks

Course Outcomes:
CO1: Able to understand network communication using the layered concept, Open System Interconnect (OSI) and TCP/IP Model.
CO2: Understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device.
CO3: Understand the concept of flow control, error control and LAN protocols
CO4: Understand the working principles of LAN and the concepts behind physical and logical addressing, subnetting and supernetting.

Unit-I
Computer Networking: Introduction, Definition, Characteristics, Advantages and Limitations. Types of Network on the basis of Geographical Span (LAN, MAN, WAN) Network Topology - Bus, Star, Ring, Tree, Mesh, Hybrid. Transmission Mode - Simplex, Half Duplex and Full Duplex, Components of Network.

Unit-II
Introduction to OSI Model:
Physical Layer - Transmission Media: Guided (Twisted Pair, Coaxial Cable, Fiber Optics) & Unguided Media (Radio, Microwaves, Satellite), Multiplexing (FDM, TDM, WDM)
Data Link Layer - Error Detection (Types of Errors, Redundancy – Simple Parity, Two-Dimensional Parity, CRC, Checksum), Error Correction (Hamming Code)

Unit-III
Computer Network Devices: Hub, Switch, Repeater, Router, Bridge, Brouter, Gateway, Network Interface Card
Network Layer: Routing Algorithm, Congestion Control.
Transport Layer: UDP, TCP. Overview of Presentation and Session Layer, Application Layer, DNS, WWW, HTTP, E-mail

Unit-IV
Introduction to TCP/IP Model: Merits and Demerits, OSI v/s TCP/IP., Broadband, Leased line connection, Overview of Wi-Fi, Bluetooth Technology.
Brief Introduction of Protocols: FTP, HTTP, DHCP, POP3, Telnet, SMTP

Reference Books
1. Andrew S. Tanenbaum, Computer Networks, Prentice Hall
2. Behrouz A forouzan, TCP/IP, Tata Mc Graw Hill Pub. Co.
3. DE Corner and DL Stevens, Internet working with TCP/IP Volume I-III, Prentice Hall of India.
4. Minasi, Mastering LAN, BPB Publications.
5. Minoli, Internet, Interact Engineering, Tata McGraw Hill Pub. Co. Ltd.

BSCS351: COMPUTER PRACTICAL-III

Course Outcomes:
CO1: Able to implement the basic concepts such as function Overloading, array and string manipulation in Java
CO2: Use utility classes in the real time applications
CO3: Understand the types of inheritance
CO4: Implement packages, manipulate threads and exception handling techniques
CO5: Connect databases with Java programs

To make students familiar with the concept of JAVA programming. Exercises to be framed to cover the topics and tools covered in theory paper.

Semester – IV

BSCS401: Website Development

Course Outcomes:
CO1: Understand the fundamentals of Internet, and the principles of web design.
CO2: Able to construct websites using HTML and Cascading Style Sheets.
CO3: Able to build dynamic web pages with validation using Java Script objects
CO4: Implement the event handling mechanisms.

Unit-I
Internet Basics: Brief History of Internet, Uses of internet, Advantages and Disadvantages of Internet, Major Elements of Internet, WWW, Web Browser, Overview of Website and Web Pages, Static and Dynamic Websites, Informative and Interactive Websites, Need of Websites, URL, Overview of Search Engine.
Introduction to HTML: Basic Structure of HTML Document, HTML Tags, Paired and Empty Tags, Text Formatting, Text Style, Lists, Adding Graphics to HTML Documents, Tables , Frames, I Frames

Unit-II
Hyper linking and Forms: Linking Documents, Forms, Image Maps, Lists, Tables and Hyperlinks, Images and Multimedia, Forms and Controls
CSS: Types of Style Sheets, Different Elements of Style Sheets, CSS Properties, CSS Classes, Pseudo Classes, Pseudo Elements CSS Styling (Background, Text Format, Controlling Fonts),Working With Block Elements and Objects, Working with Lists and Tables, CSS Filter Effects, Animations

Unit- III
Java Script: Introduction to scripting language, Client side versus Server side scripting, Advantages of Java Script, Features of Java Script, Keywords, Variables, Data Types, Constants, Comments, Java script conditional statements, Different types of loops, Break & continue statement
Java Script Array: Introduction, Array Declaring and Allocating Arrays, Array method, Passing Array to Functions, Multiple Subscripted Arrays, Math & String Methods

Unit- IV
DOM: Introduction, Window, History, Navigator, Form, Frames, Location, Properties and Methods of DOM Objects
Event Handling: Different types of events (Click, Focus, Blur, Key, Mouse etc.), loading events, Event Handlers, Javascript Timers, Form Validation

Reference Books:-
1. M.L. Young: Complete Reference b: Internet; 2nd Edition; Tata Mc Graw Hill,2006.
2. Thomas A. Powel ; Web Design : C.R.; Second Edition; TMH, 2009.
3. Thomas A. Powel ; HTML & XHTML : C.R.; Fourth Edition; TMH, 2008.
4. Harely Hahn: The Internet, Tata Mc Graw Hill.
5. G. Robertson: Hands on HTML, BPB Publications.
6. Joel Sklar: Principles of Web Design, BPB Publications

BSCS402: Software Engineering

Course Outcomes:

CO1: Ability to break down a given project into multiple phases within its lifecycle.

CO2: Select the most suitable process model based on user requirements.

CO3: Demonstrate proficiency in executing diverse lifecycle activities, including analysis, design, implementation, testing, and maintenance.

CO4: Acquire knowledge about the multitude of processes employed throughout each stage of product development.

Unit-I

System Concept: Definition, Characteristics of System, Elements of a System, Open and Closed System, Formal and Informal Information System, System Development Life Cycle: Steps of SDLC, Role of Systems Analyst

Unit-II

System Analysis: Systems Planning and Initial Investigation, Information Gathering, Tools of Structure Analysis- Dataflow Diagram (DFD), Data Dictionary, Decision Trees, Structured English , Decision Table, Feasibility Study

Unit-III

Software Engineering: Overview, Software Process Models: Waterfall, Prototype, RAD, Spiral.
Software Design: Design Principles, Design Concepts, Design Model.

Unit-IV

Software Testing: Testing Objectives, Testing Principles, White Box & Black Box Testing. Software Testing Strategies: Unit Testing, Integration Testing, Validation Testing, System Testing

Reference Books:-

1. Igor Hawryszkiewyez, Introduction to System Analysis and Design, 4th edition, Prentice-Hall.
2. Jeffrey L. Whitten, and Lonnie D. Bentey, Systems analysis and Design Methods 4th edition, Tata McGraw-Hill.
3. Philip L Weaver, Practical SSADM wer4+A Complete Tutorial Guider, Pitman publishing, 1995.
4. Mark Lejk, and David Deeks, an Introduction to System Analysis Techniques Prentice Hall. 5. Don Yeates, Maura Shields and David Helmy, System Analysis and Design Longman group limited, 1994.
6. Roger, S. Pressman, "Software Engineering-A Practitioner's Approach", Fifth Edition, McGraw Hill
7. R.E. Fairley, 'Software Engineering Concepts", McGraw Hill
8. Jalota "An Integrated Approach to Software Engineering", Narosa Publishing House

BSCS403: COMPUTER PRACTICAL -IV

Course Outcomes:
CO1: Creating webpages using basic HTML tags
CO2: Styling Webpages using CSS
CO3: Creating dynamic web pages using Javascript
CO4: Implementation of DOM objects
CO5: Creating web pages implementing event handling, form Validation etc.

To make students familiar with the concept Web Technology tools. Exercises to be framed to cover the topics and tools covered in the theory paper.

V Semester

BSCS501: PHP Programming Fundamentals

Course Outcomes:
CO1: Understand the differences between Server-side and Client-Side Scripting
CO2: Learn basic programming constructs of PHP
CO3: Understand differences between get and post methods and use of superglobal variables
CO4: Able to implement cookies and manage session
CO5: Understand various functions of arrays and strings
CO6: Able to understand Database handling concepts

UNIT-I
Introduction to PHP: Server side scripting vs Client Side Scripting, Evaluation of PHP, Features of PHP
Programming Fundamentals of PHP: Basic Syntax, Variables and constants, Data types, Operators and Expressions
Control Statements: Conditional Statements, Looping Statements (while, do…while, for loop, foreach), Nested Loops, Jumping Statement.

UNIT-II
Arrays: Numeric, Associative and Multidimensional Arrays
Functions: Defining a Function, Calling a Function, Parameter passing, Returning value from function
Strings: Creating and Accessing Strings, String Related Library functions, Searching, Replacing, Formatting, Pattern matching

UNIT-III
Form Data Handling: $_GET, $_POST, $_REQUEST Variables
Cookies: Introduction to Cookies, Need of Cookies, Setting up a Cookie, Deleting a Cookie
Session Management: Introduction to Session Management, Creating Session Variables, Retrieving Session Variables
Exception Handling: Understanding Exceptions and errors, Handling Exceptions in PHP, User Defined Exceptions

UNIT-IV
File Handling: Opening and Closing a file, Coping, Renaming and Deleting a file, File opening Modes, Reading and Writing in Files
Database Handling: Connection with MySql Database, Performing basic database Operations (Insert, Delete, Update, Select), Query Handling.

Reference Books:
1. PHP, The CompleteReference, Steven Holzner, TMH
2. Beginning PHP 5.3, Matt Doyle, John Wiley & Sons
3. PHP Beginner's Practical Guide, Pratiyush Guleria, BPB Publications

BSCS502 ELECTIVE-I: Artificial Intelligence

Course Outcomes:

CO1: Understand the concept and significance of Artificial Intelligence (AI) and its various areas of application.

CO2: Learn different search techniques, such as depth-first search and breadth-first search, and their role in problem-solving.

CO3: Understand heuristic search methods and their applications, including hill climbing, best-first method, and graph search.

CO4: Able to gain insight view of knowledge representation schemes, including semantic nets, frames, conceptual dependency, and scripts.

Unit – I

Concept of intelligence, Artificial Intelligence, definition turning test, areas of application. Search techniques i.e. Water jug problem, Tower of Hanoi problem, 8 puzzle problem, Craptarithmetic problem, Monkey banana problem, Travelling and salesman problem.

Unit-II

Problem, Characteristics of problem, depth first, breadth first search methods. Production rules, problem characteristics. Production system characteristic,

Unit –III

Heuristic search method, generate and test, hill climbing, Steepest hill climbing method, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking.

Unit- IV

Introduction to list and string processing, concept of knowledge, Logic, prepositional and predicate calculus, resolution.

Reference Books
1. Elaine rich & Kevin Knight: Artificial Intelligence and Expert System, PHI.
 2. Charniak, E.: Introduction of Artificial Intelligence, Narosa Publishing House.
3. Winton. P.H. : LISP, Narosa Publishing House.
4. Marcellus: Expert System Programming in TURBO PROLOG Prentice-Hall Inc. 1989.
5. Clark, K. L. & McCabe, F.G.: Micro-Prolog Prentice-Hall Inc. 1987.

BSCS502 ELECTIVE-II: DATA WAREHOUSING AND MINING

Course Outcomes:

CO1: Gain an understanding of Data Warehousing, including its introduction, characteristics, and scope.

CO2: Comprehend the technology of Data Cubes and their role in Data Warehousing.

CO3: Learn about the planning process involved in designing a Data Warehouse.

CO4: Explore different approaches to Data Warehouse design.

CO5: Understand the various delivery methods of Data Warehousing.

CO6: Analyze the process architecture of Data Warehousing.

Unit – I

Introduction to Data Warehouse: Data warehouse uses, Data Warehouse Planning stages and Designing approaches. Delivery Process-Data Warehouse Delivery Methods. System Processes; data in Flow Process, Extract and load process, Clean and transform Process, Backup and Archive process and Query Management Process. Process Architecture - Load manager, Warehouse manager, Query manager.

Unit – II

Database Schema: Star flake schema, Designing fact tables and dimension tables, Multi-dimension schemas. Horizontal and vertical partitioning, Hardware partitioning. Data Marts, Designing Data Marts. Metadata transformation and load Managers.

Hardware Architecture: Process, Server, Network and Client hardware. Contents of data warehouse database, Database structures and layout and file systems. OLAP function and tools, OLAP Servers, ROLAP, MOLAP.

Unit – III

Security: Security requirements, Backup strategies and disaster recovery, operations of Warehouse. Capacity Planning (Process Estimate load), Tuning the data warehouse (Aggregate performance, data load and queries). Testing data warehouse-Develop test plan Testing backup recovery, Testing operational environment, testing database, testing of the application. Data warehouse futures.

Unit – IV

Data Mining: Data mining concepts, business, technical and social context for data mining, data mining interface, data mining approaches, data mining methodologies, data preprocessing, data cleaning, data reduction, data transformation, technologies used for data mining, cluster analysis, portioning method.

Reference Books :

1. Data mining & warehousing [concepts and techniques] : Saumya Bajpai.
2. Data mining concepts & techniques : jia wei han, micheline kamber, jian pei.
3. Sam Anahory, Dennis Murray, "Data Warehousing", Pearson Education pub.
4. Michel A. Berry, Gordon S. Linoff, " Mastering Data Mining", Wiley Publishing.
5. Mallach G, Fredn E, "Decision Support System and Data Warehouse Sustems", TMH
6. John Poole, Dan Chang, Dauglas Talbert,"Common Warehourse Metadata Developer's Guide", Wiley publication

BSCS502 ELECTIVE-III: OPEN-SOURCE OPERATING SYSTEM

Course Outcomes:
CO1: Possess a comprehensive understanding of Linux system architecture, including the kernel and shell components.
CO2: Grasp the concepts of process management, signal handling, and system calls.
CO3: Able to create shell scripts, utilize control statements such as if-then-else, case-switch, loops (while, until, for), and handle variables effectively.
CO4: Gain familiarity with various types of shells in Linux and understand the basics of the vi editor
CO5: Have a solid understanding of system administration tasks on Linux systems

Unit – I
Introduction to open source system software, Linux Architecture (Kernel & shell), Linux file system (inode, Super block, Mounting and Unmounting), Essential Commands (cal, date, echo, printf, bc, script, mailx, passwd, who, uname, tty, sty, man), File and Directory types, Managing Files (pwd, cd, mkdir, rmdir,).

Unit – II
Handling ordinary Files, Basic File Attributes (Ownership and Access Permissions of files and directories). Process Management in Linux, Signal Handling, System call. I/O Redirection and Piping. Simple Filters (pr, head, tail, cut, paste, sort, uniq, tr), Filters using Regular Expressions (grep, sed).

Unit – III
Introduction to Shell, Types of Shell, Editors (basics of vi), Shell Programming-Shell scripts, Shell control statements, Variables, if-then-else, case-switch, While, Until, For, Set and Shift, Trap, Find, string handling, Shell Meta characters, Shell Scripts, Shell keywords, Built in Commands, Shell Procedures and Reporting, Handling documents.

Unit – IV
 System Administration– root, administrator privileges, security, Booting and Shutting down, managing disk space, device files, Advanced System Administration (partitions and file system, fdisk, mkfs, mounting and unmounting filesystems)

Reference Books :
1.Linux: The Complete Reference, Sixth Edition by Richard Petersen
2.A Practical Guide to Linux Commands, Editors, and Shell Programming (3rd Edition) by Mark G. Sobell
3. Your UNIX/Linux: The Ultimate Guide by Sumitabha Das

BSCS503: COMPUTER PRACTICAL-V

Course Outcomes:

CO1: Learn installation of Xampp Server and execution of PHP scripts

CO2: Implement different programming constructs of PHP

CO3: Create PHP scripts for arrays and string handling

CO4: Perform file and database handling in PHP

CO5: Implement cookies through PHP scripts

CO6: Manage sessions in PHP

Exercises to be framed to cover all the topics taught in PHP theory paper.

VI Semester

BSCS601: Python Programming

Course Outcomes
CO1: Understand and use Python control flow statements with ease, as well as the language's basic syntax and semantics.
CO2: Ability to understand of how to handle strings and functions.
CO3: Learn how to use data structures like lists, dictionaries, tuples, and sets to develop and manipulate Python programs.
CO4: Determine the regular expression and file system operations that are most frequently used.
CO5: Understand the Python-specific terms for Object-Oriented Programming, such as encapsulation, inheritance, and polymorphism.

Unit – I
Introduction and Overview
Introduction: Comments, Keywords and Identifiers, Variables and Assignment statements, Standard Types, Other Built-in Types, Internal Types, Operators, Built-in Functions. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Sequences: Strings, Sequences, Strings, String-only Operators, String Built-in Methods, Special Features of Strings, Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement

Unit – II
Lists and Dictionaries
Functions, Lists, List type built in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples, Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Sets, Comparing Sets, Mathematical set operations, set comprehensions.
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Unit – III
Regular Expression and Exception Handling
Regular Expression: Introduction, Special Symbols and Characters for REs, REs and Python, Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions

Unit – IV
OOPs in Python
Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification

Reference Books:
1. Python, The Complete Reference , Martin C Brown, Mac Graw Hill
2. Core Python Programming, Dr. R Nageshwara Rao, Dreamtech Press India Pvt. Ltd
3. Python Programming: Using Problem Solving Approach, Reema Thareja
4. Let us python, Yashvant kanetkar, Aditya Kanetkar, BPB Publications

BSCS602 ELECTIVE-I: CLOUD COMPUTING

Course Outcomes
CO1: Possess a solid understanding of cloud computing and its origins.
CO2: Able to explain the various cloud deployment models, including private, public, hybrid, and community clouds.
CO3: Having an in-depth understanding of different cloud service models.
CO4: Analyze virtual machine provisioning, migration services, and scheduling techniques for resource reservation.
CO5: knowledgeable about cloud applications, challenges, security, and privacy issues.

Unit 1
Introduction: Introduction to Cloud Computing, Roots of Cloud Computing: Fundamental concepts of Distributed Systems, Cluster Computing, Grid Computing, and Mobile Computing.

Unit 2
Cloud Models Basics of Cloud Computing Concepts, Characteristics of Cloud Computing, Need for Cloud, Cloud Deployment models: private, public, hybrid and community cloud, Cloud Services: Resource-as-a-Service (RaaS), Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), Examples of each service.

Unit 3
Cloud Services RaaS: Usage of Physical resources like servers, networks, data center etc, IaaS: Virtualization,. PaaS: Integrated lifecycle platform: Google App Engine, Microsoft Azure, Anchored life cycle platform: Salesforce platform, SaaS: Characterizing SaaS, Salesforce's software environment.

Unit 4
Resource Scheduling for Cloud Computing: - Introduction, Virtual Machine provisioning and Migration Services, Scheduling techniques of Virtual machines for resource reservation, Cloud Service Scheduling hierarchy, Economic models for Resource-allocation scheduling , Heuristic Models for task –execution scheduling : Static Strategies , Dynamic Strategies , Heuristic Schedulers. Cloud Applications Cloud Applications, Cloud challenges, Cloud Security and privacy issues, Mobile Cloud Computing, Integration of Cloud with Wireless Sensor Network and its application.

Reference Books:
1. Cloud Computing Bible by Barrie Sosinsky, Wiley Publication, 2011.
2. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, The McGraw-Hill Publication, 2010.
3. Cloud Computing: Concepts, Technology and Architecture by Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, 1st Edition, Prentice Hall.
4. Cloud Computing: Data-Intensive Computing and Scheduling by Frederic Magoules , Jie Pan, and Fei Teng. CRC Press. Taylors & Francis Group.

BSCS502 ELECTIVE-II: BUSINESS INFORMATICS

Course Outcomes:
CO1: Determine the constituent elements of electronic commerce.
CO2: Recognize the advantages of conducting online sales.
CO3: Acquire knowledge on optimizing and ensuring safety during online selling.
CO4: Develop a comprehensive e-commerce strategy tailored to your business.
CO5: Comprehend the risks associated with cyber security in online trading and business transactions.
CO6: Familiarize yourself with methods to safeguard your online business, including securing your accounts and being vigilant about cybercrime**.**

Unit-I
Business Environment and Dependence on IT: Introduction to Business Informatics, Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT in Management Functions.

Unit-II
E-Commerce: Definition, Objectives, Components, Advantages and disadvantages, Scope, ECommerce Models, E-Commerce Opportunities for Industries, Growth of ECommerce, e-Commerce Applications-E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.

Unit-III
E-Payments and Security issues in E-Commerce: Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, ECheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets), Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics

Unit-IV
ERP: Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Units, ERP Success & Failure Factors

Reference Books
1. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012. 2.
2. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013. 3.
3. Enterprise Resource Planning Systems System, Lifecycle, Electronic Commerce and Risk by Daniel E.O. Leary, 2011

BSCS602 ELECTIVE-III: Big Data Technologies

COURSE OUTCOMES:
CO1: Identify Big Data and its Business Implications.
CO2: List the components of Hadoop and Hadoop Eco-System
CO3: Access and Process Data on Distributed File System
CO4: Manage Job Execution in Hadoop Environment
C05: Develop Big Data Solutions using Hadoop Eco System

Unit-I
Introduction to Big Data: Types of Digital Data, Characteristics of Data, Evolution of Big Data
Definition of Big Data, Challenges with Big Data, 3Vs of Big Data, Non-Definitional traits of Big Data,
Business Intelligence vs. Big Data, Data warehouse and Hadoop environment
Big Data Analytics: Classification of analytics, Data Science, Terminologies in Big Data

Unit-II
Introduction to Hadoop: Features, Advantages, Versions, Overview of Hadoop Eco systems, Hadoop
distributions, Hadoop vs. SQL, RDBMS vs. Hadoop, Hadoop Components, Architecture, HDFS
Map Reduce: Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression.

Unit-III
Hadoop Eco systems: Hive, Architecture, data type, File format, HQL, SerDe, User defined functions,
Pig: Features, Anatomy, Pig on Hadoop, Pig Philosophy, Pig Latin overview, Data types, Running pig,
Execution modes of Pig, HDFS commands, Relational operators, Eval Functions, Complex data type,
Piggy Bank, User defined Functions, Parameter substitution, Diagnostic operator.
Jasper Report: Introduction, Connecting to Mongo DB

Unit IV
NoSQL: Introduction to NoSQL, Types of Databases, Advantages, NewSQL, SQL vs. NoSQL vs
NewSQL.
Mongo DB: Introduction, Features, Data types, Mongo DB Query language, CRUD operations, Arrays
Functions: Count, Sort, Limit, Skip, Aggregate, Map Reduce. Cursors, Indexes, Mongo Import, Mongo
Export.

Reference Books
1. Michele Chambers, Michael Minelli, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging
   Business
2. Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
3. Anil Maheshwari, " Big Data", McGraw-Hill; Second edition, 2019
4. Subhashini Chellappan Seema Acharya, "Big Data and Analytics", Wiley, 2019

BSCS603-COMPUTER PRACTICAL-VI

Course Outcomes

CO1: Understand core programming basics and program design using Python language.

CO2: Write, Test and Debug Python Programs.

CO3: Implement Conditionals and Loops for Python Programs.

CO4: Use functions and represent Compound data using Lists, Tuples and Dictionaries.

CO5: Understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.

Exercises to be designed to cover all the topics taught in Python theory paper.