Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Computer Applications

Name of the Program: BSC (Data Science) / BCA (BDA- IBM)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSCDS201	Major / Minor	Data Structures	2	0	2	3	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical;   C - Credit;
Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/project/Participation in class
(Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- Allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs.

- To choose the appropriate data structure and algorithm design method for a specified application.

- To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.

- To efficiently implement the different data structures and solutions for specific problems.

Course Outcomes (Cos): students will be able to

- Analyze the concepts of algorithm evaluation and find time and space complexities for searching and sorting algorithms.

- Implement linear data structure such as stacks, queues, linked lists and their applications.

- Implement basic operations on binary trees.

- Demonstrate the representation and traversal techniques of graphs and their applications on data.

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UNIT - I

Introduction, searching and sorting: Algorithm specification: Introduction, Recursive algorithms, Data Abstraction, Performance Analysis: Space complexity, time complexity, asymptotic notation, Searching: Linear and Binary search algorithms, Sorting: Bubble sort, Selection sort, Insertion sort, quick sort, merge sort.

UNIT - II

Stacks and Queues: Stacks, stacks using dynamic arrays, queues, circular queues usingdynamicarrays, Evaluation of an expression: Expressions, evaluating postfix expression, conversion of infix expression to postfix expression.

UNIT –III

Linked Lists: Single linked lists, Representing chains, operations for chains, operations for circularly linked lists, doubly linked lists, Polynomials: Representation, adding polynomials, sparse matrix representation, linked stacks and queues.

UNIT-IV

Trees: Introduction: Terminology, representation of trees, binary trees: abstract data type, Properties of binary trees, binary tree representation, binary tree traversals: Inorder, preorder, postorder, Binary search trees: Definition, searching BST, insert into BST, delete from a BST, Height of a BST.

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UNIT-V

The Graph ADT: Introduction, definition, graph representation, elementary graph operations: BFS, DFS, Spanning trees, minimum cost spanning tree: Prim's, Kruskal's algorithms.

Text Books:

1. Fundamental of Data Structures in C – 2ndEdition, Horowitz, Sahani, AndersonFreed, University Press

2. TremblyandSORRENSON,"Introduction to Data Structure with Applications".

3. TennenBaum A.M.,"Data Structures using C & C++"; PHI

4. YashwantKanetkar, "Understanding Pointers in C", BPB.

Reference Books:

1. Data Structures and Algorithm Analysis in C – 2ndEdition, Mark Allen Weiss, Pearson

2. Classic Data Structures – 2nd Edition, Debasis Samantha, PHI

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List of Programs:

1. Write a program to create a two dimensional array and perform add, subtract and multiplication operations.
2. Write a program to create a two dimensional array using dynamic memory allocation.
3. Write a program to implement stack.
4. Write a program to convert infix expression into postfix expression.
5. Write a program to check balanced parentheses for a given infix expression.
6. Write a program to evaluate postfix expression.
7. Write a program to implement queue.
8. Write a program to implement circular queue.
9. Write a program to implement link list with insert, delete, search, view, anddelete function.
10. Write a program to implement ordered link list.
11. Write a program to add two polynomials.
12. Write a program to create doubly link list.
13. Write a program to implement tree with insert, delete and search function.
14. Write a program for in order, post order and preorder traversal of tree.
15. Write a program for binary search and sequential search using recursion.
16. Write a program for bubble sort and sequential search.
17. Write a program for insertion sort and quick sort.

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BSCDS202	Major	Java Programming	2	0	2	3	60	20	20	30	20

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Course Education Objectives (CEOs):

- To familiarize the students with Object Oriented Methodology.

- Students must be able to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

- Students must have the ability to write a computer program to solve specified problems.

- Students must be able to use the Java SDK environment to create, debug and run simple Java programs.

- Students must learn the concepts of JDBC and concepts of OOPs using Java.

Course Outcomes (COs):

- Understand different programming paradigms, Evolution of programming languages, Programming styles.

- Differentiate and compare structured and object oriented approach. Also understand OO design and analysis concepts.

- Design efficient solutions for real world problems.

- Explain the concept of class and objects with access control to represent real world entities.

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- Demonstrate the behaviour of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- Use overloading methodology on methods and constructors to develop application programs.
- Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
- Describe the backend connectivity process in java program by using JDBC drivers. 14. Develop Java application to interact with database by using relevant software component (JDBC Driver).

Syllabus:

UNIT – I

OOPS OVERVIEW: Introduction to OOPs, Features of OOPs, Advantages of OOPs, Different types of programming approaches.

INTRODUCTION TO JAVA: What is java, History of java, Java features, Introduction to Eclipse IDE, Explanation about java compiler, JVM, JRE, JDK, Bytecode, How to run Eclipse ide.

JAVA COMPONENTS : Constant, variable, token, literal, Identifiers, datatypes, keywords, All types of operators, Command line arguments, Taking user input

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UNIT - II

CONTROL STRUCTURE: Conditional statements-if, if else, nested if, ladder else if, Unconditional statements- switch case, Looping statements.

CLASS AND OBJECT: What is class and object, Data members and methods, Inner classes and types.

CONSTRUCTORS: What is constructor, Advantages, Types with examples.

UNIT – III

ARRAY: What is array, Array declaration with syntax, Types-1d, 2d and 3d with examples each.

STRING HANDLING: String introduction, String class with methods with examples, StringBuilder class with methods and examples, StringBuffer class with examples.

INHERITANCE: Introduction, Types with examples, Interface with example, Use of super, Use of abstract with example.

UNIT – IV
POLYMORPHISM: What is polymorphism, Types of polymorphism.
EXCEPTION HANDLING: What is exception, Types, Predefined exceptions, User-defined exceptions.

MULTI-THREADING:Introduction, Advantages. Multi-threading concept, Lifecycle of Thread, Thread priority, Thread interface, Thread synchronization.

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UNIT – V

PACKAGE: What is package, Benefits of using package, Types, Predefined package, User-defined package.

FILE HANDLING: Java I/O, Pre-defined file i/o methods, Stream and types, File classes, File operations with examples.

JDBC: Introduction to java database, what is JDBC, JDBC Connectivity.

Reference Books:

1. E. Balagurusamy, "Programming with Java: A Primer", TMH.
2. Patrick Naughton and HerbertzSchildt, "Java-2: The Complete Reference", TMH.
3. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
4. Daniel Liang, "Introduction to Java Programming", Pearson.
5. Decker and Hirshfield, "Programming Java: A Introduction to Programming Using JAVA", Vikas Publication.
6. N.P. Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI.

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List of Experiments:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that Integer.

2. Write a Java program for sorting a given list of names in ascending order.

3. Write a Java program that checks whether a given string is a palindrome or not.

Ex: MADAM is a palindrome.

4. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use String Tokenizer class).

5. Write a Java program that displays the number of characters, lines and words in a text file.

6. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

7. Write a Java program that illustrates how run time polymorphism is achieved.

8. Write a Java program for creating multiple threads a) Using Thread class. b) Using Runnable interface.

9. Write a java program that illustrates the following a) Handling predefined exceptions. b) Handling user defined exceptions.