Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Computer Science

Program: BCA

Object Technologies & Programming using Java (BCA-307)

SCHEME

Course Name	**Object Technologies & Programming using JAVA**	**Course Type**	**Theory**
Course Code	**BCA-307**	**Class**	BCA 5th Sem.
Instruction Delivery	**Per week Lectures: 5, Tutorial:1, Practical: 6** **Total No. Classes Per Sem: 60(L)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr. Pooja Chawla	**Course Instructors**	Dr. Pooja Chawla

COURSE OVERVIEW

Java is a general-purpose, object-oriented programming language developed by Sun Microsystems to offer solutions to some of the problems encountered in modern programming. Java is a compiled and Interpreted language. It is pure object-oriented language designed as a distributed language for creating applications on networks.

PREREQUISITE

Concept of Object-Oriented Programming

COURSE OBJECTIVE

The objective of this course is to introduce students to the Java programming language. To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Understanding of the principles and practice of object-oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
2	Implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
3	Use simple data structures like arrays in a Java program and understand the concept of package, interface, multithreading and File handling in java.
4	Use members of classes found in the Java API (such as the Math class) and implement a hierarchy of Java classes to provide a solution to a given set of requirements.

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COURSE CONTENT

Content
UNIT-I Object Oriented Methodology-1: Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs. Object Oriented Methodology-2: Classes and Objects, Abstraction and Encapsulation, Inheritance, Method Overriding and Polymorphism. **UNIT-II** Java Language Basics: Introduction to Java, Basic Features, Java Virtual Machine Concepts, Primitive Data Type and Variables, Java Operators, Expressions, Statements and Arrays. Object Oriented Concepts: Class and Objects-- Class Fundamentals, creating objects, assigning object reference variables; Introducing Methods, Static methods, Constructors, Overloading constructors; This Keyword; Using Objects as Parameters, Argument passing, returning objects, Method overloading, Garbage Collection, The Finalize () Method. Inheritance and Polymorphism: Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword. **UNIT-III** Packages: Defining Package, CLASSPATH, Package naming, Accessibility of Packages, using Package Members. Interfaces: Implementing Interfaces, Interface and Abstract Classes, Extends and Implements together. Exceptions Handling: Exception, Handling of Exception, Using try-catch, Catching Multiple Exception, using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses. **UNIT-IV** Multithreading: Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter thread Communication. I/O in Java: I/O Basics, Streams and Stream Classes, The Predefined Streams, Reading from, and Writing to, Console, Reading and Writing Files, The Transient and Volatile Modifiers, Using Instance of Native Methods. Strings and Characters: Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using Value Of () Methods, String Buffer Class and Methods.

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Paradigm of Programming languages	Comparison Between Procedural and object- oriented approach	1
2	OOP Concepts- Data Abstraction, Encapsulation		
3	Inheritance and Polymorphism		
4	Message passing, Dynamic binding and benefits of OOPs		
5	Procedure oriented Programming approach		

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6	Applications of OOP		
7	Evolution of OOP methodology	Comparison of various OOP languages. Discussion on important questions related to Unit-1	1
8	Introduction to common OOP languages		
9	Concept of Classes and Objects		
10	Revision of Unit-I and test of important questions	Test of OOPs	
11	Java Programming: History and Features of Java	Java with C and C++	2
12	Java and Internet		
13	Concept of JDK and API		
14	Java Program Structure and Java Tokens	Implementation of Simple Java Program and use of multiple statements	
15	JVM		
16	Command line arguments		
17	Constants and Data types	Program for getting values of variables	
18	Variable- its declaration and Scope		
19	Symbolic Constants and Type Casting		
20	Operators and its types	Practice programs on Operators and expressions	2
21	Precedence of operators and Expressions		
22	Precedence of operators and Mathematical functions		
23	Decision making and branching		

24	Decision making and Looping	Practice of If-else, switch case and Looping statements.	2
25	Jumps in Loops and Labelled Loops		
26	Classes and objects	Practice of creating classes and objects	
27	Constructors, Method Overloading and Nesting of Methods		
28	Concept of Inheritance and Method overriding	Practice of Implementing base class and super class	
29	Abstract Classes, Finalize () method, final classes and variables		
30	Arrays and its types	Program of sorting list of numbers. Discussion on important questions related to Unit-2	2
31	Concept of String- String Methods and StringBuffer Class		
32	Revision of Unit-II and test of important questions	Test of Inheritance	

33	Interfaces: Extending, Implementing Interfaces	Practice of creating Packages and Interfaces	3
34	Implementing Multiple Inheritance		
35	Packages: Defining, creating and accessing a package		
36	Exception Handling- Dealing with errors, benefits of exception handling	Practice of multiple try and catch statements Discussion on important questions related to Unit-3	3
37	Usage of try, catch, throw and finally		
38	Built in exceptions and creating own exceptions		
39	Revision of Unit-III and test of important questions	Test of Interface	
40	Multithreading- Difference between multitasking and multithreading	Practice of yield (), stop () and sleep () methods.	4
41	Creating Threads, extending thread class		
42	Life cycle of thread, usage of thread methods		
43	Threads priority and Runnable Interface		
44	Files- Streams, Byte streams, Character Streams	Discussion on important questions related to Unit-4	
45	The Transient and Volatile Modifiers		
46	Using Instance of Native Methods		
47	Revision of Unit-IV and test of important questions		
48	Problems will be taken and important questions will be discussed		

Text Book

E. Balagurusamy, Programming with Java, A Premier Fourth edition, McGrawHill.

Reference Books

1. K. Arnold and J. Gosling – The Java Programming Language – 4thEdition., Pearson Edu,2005
2. Object-Oriented Programming through Java, P. Radha Krishna, Universities Press
3. Let Us JAVA, Yashwant Kanetkar, 6th Edition

Web/Links for e-content

- https://www.softwaretestinghelp.com/java-basics-and-core-java-concepts/
- https://www.mygreatlearning.com/blog/oops-concepts-in-java/

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PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem (Practical Questions)
1	Create, Compile and Run Command line arguments.
2	Compute and print the square root of a number.
3	Implementation of creation and casting of variables.
4	Program to construct mathematical expressions using arithmetic operators.
5	Implementation of relational and assignment operators.
6	Program to illustrate Increment and Decrement operators.
7	Program to construct conditional expression using conditional operator.
8	Implementation of Instanceof and dot operator.
9	Program to implement arithmetic expression.
10	Find out whether the given numbers are even or odd using If-Else statement.
11	Program to find out the greatest of three numbers.
12	Program to find the position of students using else if ladder.
13	Program to find out the grade by implementing switch case statement.
14	Create Multiplication table using while loop and Do-While loop.
15	Program to calculate average of numbers (from array elements) using for loop
16	Program to create pattern in Java.
17	Use of Continue and break statement.
18	Implementation of Classes and Objects in Java.
19	Program to implement Constructor and default constructor.
20	Usage of polymorphism using method overloading.
21	Program to define and use static members.

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22	Implementation of Single Inheritance using base and super class.
23	Program to invoke overriding of methods.
24	Program to sort list of numbers using arrays.
25	Creation of Multiplication table using two dimensional arrays.
26	Manipulation of strings using String and StringBuffer Methods.
27	Program to implement Interfaces in Java.
28	Implementing multiple inheritance using the concept of Interface.
29	Program to create and access own package in Java.
30	Implementation of Compile time and Run time errors.
31	Usage of try and catch statements for exception handling.
32	Implementation of multiple try and catch statements.
33	Program to throw our own exception using throw keyword.
34	Program to create threads using the Thread class.
35	Implement yield (), stop (), and sleep () methods of thread class.
36	Program to find out the priority of threads.
37	Implementation of Runnable Interface.
38	Program to find sum of Natural numbers in Java.
39	Program to check whether the given number is positive or negative.
40	Program to find quotient and remainder in Java.

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PRACTICE QUESTIONS (QUESTION BANK)

S No	Important Questions (Theory)
	UNIT-I
1	What do you mean by the Paradigm of programming languages?
2	Explain the evolution of OO methodology.
3	Explain the basic concept of OOP approach.
4	Compare and contrast Procedure-oriented approach and Object-Oriented approach.
5	Explain the Features, benefits and applications of OOPs.
6	Explain some of the common OO languages.
	UNIT-II
7	Explain the features of Java programming language.
8	Describe the following: a) JVM b) JDK
9	What is variable? Explain the scope and lifetime of variable.
10	What do you mean by operators? Explain various operators of Java programming language.
11	Explain Constructors and its types with example.
12	Explain the following with example: a) Method Overloading b) Method Overriding
13	Explain if-else, elseif ladder and nested if-else and switch case statements with example.
14	Explain While-do, Do-while, for loop with example.
15	What is Inheritance? Explain different types of Inheritance.
16	Explain the following: a) Abstract classes b) Finalize () method c) Final classes & variables
17	What is Array? Explain types of arrays with example.
18	Explain String and StringBuffer class with its methods.

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	UNIT-III
19	Define the term Package. Explain how we can create and access our own package.
20	What do you mean by Interface? How we can implement Multiple inheritance in Java?
21	Explain Compile-time and Run-time errors.
22	Explain the term Exceptions with its syntax.
23	Explain the use of try and catch for exception handling, Multiple try and catch statements, Throwing our own exception.
	UNIT-IV
24	What is Thread? Differentiate between Multithreading and Multitasking.
25	Explain creating threads and extending thread class with example.
26	Explain the life cycle of thread using thread methods.
27	How we can implement Runnable Interface in Java.