Year	I	**Course Code:** 21BCA2C5L	**Credits**	03
Sem.	II	**Course Title:** Object Oriented Programming with JAVA	**Hours**	40
Course Pre-requisites, if any		Knowledge of Programming		
Formative Assessment Marks: 30		Summative Assessment Marks: 70	Duration of ESA: 03 hrs.	
Course Outcomes		At the end of the course the student should be able to: 1. Understand the features of Java and the architecture of JVM 2. Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done 3. Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance 4. The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language 5. Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files		
Unit No.		**Course Content**		**Hours**
Unit I		**Introduction to Java:** OOPs concepts, Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Arrays in java. **Objects and Classes:** Basics of objects and classes in java, Methods and objects,Instance of operator, Visibility modifiers, Method Overloading, Constructors, Static Members, Inbuilt classes like String, Character, String Buffer, this reference.		12
Unit II		**Inheritance and Polymorphism:** Inheritance in java, Super and sub class, Types of inheritance, Overriding, Polymorphism, Dynamic binding, Abstract class, Interface in java, Packages in java - defining and importing user defined packages.		08
Unit III		**Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout,		10

	Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, TextFields, Text Areas, Combo Boxes, Lists, Windows, Menus.	
Unit IV	**Multithreading in java:** Thread life cycle and methods, Runnable interface, Thread priorities, Exception handling mechanism with try catch-finally, Introduction to JavaBeans.**I/O programming:** Java Input Output: Java IO package, File, Byte/Character Stream, File reader / writer	10
Recommended Learning Resources		
Print Resources	**Reference Books:** 1. Java, By E Balagurusamy – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited. 2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, PrenticeHall 3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S., Manjunatha,K.S 4. Java 2 - The Complete Reference – McGraw Hillpublication. 5. Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hill publication.	

<table>
<tr><td>Year</td><td>I</td><td>Course Code: 21BCA2C5P</td><td>Credits</td><td>02</td></tr>
<tr><td>Sem.</td><td>II</td><td>Course Title: Lab: JAVA</td><td>Hours</td><td>40</td></tr>
<tr><td colspan="2">Course Pre-requisites, if any:</td><td colspan="3">Knowledge of Programming</td></tr>
<tr><td colspan="2">Formative Assessment Marks: 25</td><td>Summative Assessment Marks: 25</td><td colspan="2">Duration of ESA: 02 hrs.</td></tr>
<tr><td colspan="2"></td><td colspan="3"><u>Practice Labs</u>
1. Program to print the following triangle of numbers
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
2. Program to simple java application, to print the message, “Welcome to java”
3. Program to display the month of a year. Months of the year should be held in an array.
4. Program to find the area of rectangle.
5. program to demonstrate a division by zero exception
6. Program to create a user defined exception say Pay Out of Bounds.</td></tr>
<tr><td colspan="2"></td><td colspan="3"><u>Part A</u>: Programming Lab – Java Fundamentals – OOPS in JAVA
1. Program to assign two integer values to X and Y. Using the ‘if’ statement the output of the program should display a message whether X is greater than Y.
2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint: Fact of 4 = 4*3*2*1)
3. Program to find the area and circumference of the circle by accepting the radius from the user.
4. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
5. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class</td></tr>
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	to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations. 6. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values. 7. Program to create a student class with following attributes; Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The passing mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details. 8. Write a program to demonstrate multiple inheritance and use of Implementing Interfaces 9. Illustrate creation of thread by a) Extending Thread class. b) Implementing Runnable Interfaces 10. Write a program to demonstrate multiple inheritance and use of iimplementing Interfaces. 11. Create a package 'BCA' in your current working directory. a. Create a class student in the above package with the following attributes: Name, age, gender. Include appropriate constructor and a method for displaying the details. b. Import above package and access the member variables and function contained in a package.
	PART B: Exception Handling & GUI Programming 1. Program to catch Negative Array Size Exception. This exception is caused when the array size is initialized to negative values. 2. Program to demonstrate exception handling with try, catch and finally. 3. Program which create and displays a message on the window 4. Program to draw several shapes in the created window 5. Programto create a 4×4 grid and fills it in with 15 buttons, each 1. labeled with its index.

	6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother button similar details of mother also appear. 7. Create a frame which displays your personal details with respect to a button click 8. Program to create a window with TextFields and Buttons. The "ADD" button adds the two integers and display the result. The "CLEAR" button shall clear all the text fields. 9. Program to create a window, when we press M or m, the window displays "good morning", A or a, the window display's Good Afternoon" , E or e, the window displays "good morning", N or n, the window displays "good morning" 10. Demonstrate the various mouse handling events using suitable example. 11. Program to create menu bar and pull-down menus.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

Evaluation Scheme for Data Structures and Java Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Writing the Program	03
	Execution and Formatting	07
Program -2 from Part B	Writing the Program	03
	Execution and Formatting	07
Viva Voice		05
Total		**25**