PART A: Introduction			
Program: **Diploma**	Class: **B.Sc.**	Year: **II Year**	Session: **2022-23**
Subject: **Computer Science**			

1.	Course Code	**S2-COSC2T**	
2.	Course Title	**Object Oriented Programming with Java**	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Core Course – (Major – II) / Minor / Elective**	
4.	Pre-Requisite (if any)	To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5.	Course Learning Outcomes(CLO)	**After the completion of this course, a successful student will be able to do the following:** 1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity. 2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to a specific problem. 3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. 4. Demonstrate understanding and use of different exception handling mechanisms and concepts of multi-threading for robust faster and efficient application development. 5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events. 6. Identify, Design & Develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.	
6.	Credit Value	**Theory - 4 Credits Practical – 2 Credits**	
7.	Total Marks	Max. Marks : **30+70**	Min. Passing Marks: **33**

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

PART B: Content of the Course		
No. of Lectures (in hours per week): **2 Hrs. per week**		
Total No. of Lectures: **60 Hrs.**		
Module	**Topics**	**No. of Lectures**
I	**OOPS** - Object Oriented Paradigm, Benefits of OOP, Applications of OOP. **Java -** History, Java Features, How Java Differs from C and C++, Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment. **Java Program Structure** - Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style. **Keywords:** OOPS, JVC, WWW, Java Environment	12
II	**Java Basics** -Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values. **Operators** - Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, **Arithmetic Expressions** - Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Mathematical Functions. **Decision Making** with if Statement, Simple if Statement, if…….Else Statement, Nesting of if …else Statement, if-else Ladder, The Switch Statement, The ? Operator. **Loops** - While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops. **Keywords:** Operators, Arithmetic Expressions, Decision Making, Loops	12
III	**Class** - Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, **Constructors** – definition and types, Methods Overloading, Static Members, Nesting of Methods. **Inheritance** - Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Keywords:** Class, Constructors, Inheritance, Final, Abstract Methods,	12

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

	Overloading	
IV	**Java API Packages** - Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, and Hiding Classes. Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the 'Runnable' interface. **Types of Errors** - Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging. **Preparing to Write Applets** - Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet. **Keywords:** API, threads, synchronization, errors, Applets, debugging	12
V	**More About the Applet tag** - Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numbering Values, Getting Input from the user. **The Graphics Class** - Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts. **Concept of Stream** - Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, **Other Useful I/O Classes** - Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output, other Stream Classes. **Keywords:** Stream, files, Graphics class, buffering, HTML tags	12

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks -

- E Balguruswami, Programming with Java, Tata McGraw-Hill Publication.

Reference Books -

- Bruce Eckel, Thinking in Java.
- Herbert Schildt, Java: The Complete Reference .
- Y. Daniel Liang, Introduction to Java Programming .
- Paul Deitel, Harvey Deitel, Java: How To Program .
- Cay S. Horsttnann, Core Java Volume I –Fundamentals .
- Java Projects, BPB Publication.
- Dr. S.S. Kandare, Programming in Java, S Chand Publication .
- Books published by M.P. Hindi Granth Academy, Bhopal

Suggestive digital platform web links

https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf

https://www.tutorialspoint.com/java/java_tutorial.pdf

https://www.youtube.com/watch?v=7s3xDfdqfDw

http://www.mphindigranthacademy.org/

Suggested equivalent online courses

https://nptel.ac.in/courses/106/105/106105191/

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) : 30marks University Exam (UE) 70marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):30	Class Test Assignment/Presentation	
External Assessment : University Exam Section: 70 Time : 03.00 Hours	**Section(A)** : Objective Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	Total 70

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

PART A: Introduction			
Program: **Diploma**	Class: **B.Sc.**	Year: **II Year**	Session: **2022-23**
Subject: **Computer Science**			

1.	Course Code	**S2-COSC2P**	
2.	Course Title	**Java Programming Lab**	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Core Course - (Major- II) / Minor / Elective**	
4.	Pre-Requisite (if any)	To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5.	Course Learning Outcomes(CLO)	**After the completion of this course, a successful student will be able to do the following:** 1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity. 2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to a specific problem. 3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. 4. Demonstrate understanding and use of different exception handling mechanisms and concepts of multi-threading for robust faster and efficient application development. 5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events. 6. Identify, Design & Develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.	
6.	Credit Value	**Practical – 2 Credits**	
7.	Total Marks	Max. Marks : **100**	Min. Passing Marks: **33**

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

PART B: Content of the Course		
No. of Lab. Practicals (in hours per week): **1 Hr. per week**		
Total No. of Lab.: **30 Hrs.**		
	Suggestive List of Practicals	**No. of Labs.**
	(Using any Text editor: Notepad/Eclipse/Netbeans/Sublime etc.) 1. Find greater number between two numbers -using conditional operator. 2. Find the factorial of number if number is given by user using command line argument. 3. Write a program to check if a number is prime or not. 4. Write a program to display tables from 2 to 10. 5. Write a program to print Fibonacci series. 6. Enter a no. and check whether it is even or odd. 7. Write a Program to find sum & average of 10 no. using arrays. 8. Write a program to display reverse of a digit no. using array. 9. Write a program to demonstrate function overloading. 10. Write a program to display grade according to the marks obtained by the student. 11. Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print grass salary of employee. 12. Write a program to convert the given no. of days into months & days using with classes, objects and method. 13. Write a program to convert given string into Uppercase and lowercase and get the length of string using array. 14. Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also write a program to use the package. 15. Write a program to demonstrate use of constructor and destructor. 16. Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100. 17. Write a program using application of single inheritance. Find the area of rectangle & volume of cube. 18. Develop a simple real life application to illustrate the use of multithreading. 19. Write a program using multiple inheritance to calculate area and perimeter of a circle using interface. 20. Write an applet program to draw a Rectangle (color = orange) and a	30

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

	right aligned oval. 21. Develop an applet that receives 3 numeric values as inputs from the user and then displays the largest no. on the screen. 22. Write a Java Program to read data from the inputted text file name, and print its content on the console. 23. Write a Java Program to merge two files into third file 24. Write a Java program to delete duplicate lines in text file 25. Write a Java Program to implement FileInputStream class to read binary data from any image file.	

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks -

- E Balguruswami, Programming with Java, Tata McGraw-Hill Publication, 2nd Edition
- Books published by M.P. Hindi Granth Academy, Bhopal

Reference Books -

- Bruce Eckel, Thinking in Java (4e)
- Herbert Schildt, Java: The Complete Reference (9e)
- Y. Daniel Liang, Introduction to Java Programming (10e)
- Paul Deitel, Harvey Deitel, Java: How To Program (10e)
- Cay S. Horsttnann, Core Java Volume I –Fundamentals (10e)
- Java Projects, BPB Publication.
- Dr. S.S. Kandare, Programming in Java, S Chand Publication

Suggestive digital platform web links

https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf
https://www.tutorialspoint.com/java/java_tutorial.pdf
https://www.youtube.com/watch?v=7s3xDfdqfDw
http://www.mphindigranthacademy.org/

Suggested equivalent online courses

https://nptel.ac.in/courses/106/105/106105191/

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz		Viva Voce on Practical	
Attendance		Practical Record File	
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)		Table work / Experiments	
TOTAL	30		70

Abhilasha Kumar
Chairman, Central Board of Studies, Computer Science