- **Sem.** :1

- **Subject Code** :05MC0103

- **Subject** : Object Oriented Programming using JAVA ▪ **Course Objectives** :

    1. To understand the fundamentals of Java Programming Language

    2. To implement the concepts of Object-Oriented Programming and learn interface

    3. To develop proficiency in java using the concepts of Package and Exception Handling

    4. To interpret the concepts of Generics, Collections and Lambda in Java

    5. To develop Java based Applications using the concepts of Multithreading and Files

- **Prerequisites** : Knowledge of C, C++ Programming Language

Unit No	Topics Covered	No of lectures required

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1	**Basics of Java:**	10
	• History of Java • Features of OOP • Java Buzzwords • Installing Java • Programming Structure of Java • Java data-types • Keywords and Identifiers • Java Operators • Type Casting • Looping Control (for, while, do-while etc) • Control Statements (if, nested if, else-if ladder, switch etc) • Escape Sequences • Operator precedence in java	

	• Arrays • Initializer block • Class-Initializer block	
2	**Class Fundamentals, Inheritance and Interface:**	10
	• Defining class and methods • Working with class and methods • Members of Class • Method Overloading • Method Overriding • this keyword • Inheritance Basics • Types of Inheritance • Abstract Class • super keyword • Interface Basics • Use of Interface • final keyword • static keyword	

3	**Package and Exception Handling:** • Access modifiers in java • Introduction to Packages • Built-In packages • User-Defined Packages • String Class • StringBuffer and StringBuilder • Wrapper Class • Exception Handling ○ Exception Hierarchy ○ Use of try, catch and finally keywords ○ Checked and Unchecked exceptions ○ U9se of throw and throws ○ Custom Exceptions • Nested classes in java • Use of varargs • Scanner class	10
4	**Collection Framework, Generics and Lambda:** • Introduction of Collection Framework • Collection interface • List interface • Set interface • Map interface • ArrayList and LinkedList classes • List iterator interface • HashSet and TreeSet classes	10
	• Generics Fundamentals • Generics class • Generics methods • A Generic class with type parameters • Bounded types with Generics in java • Rules for Generic types • Introduction to Lambda Expression □ Why Lambdas? • Syntax of Lambda Expression • Functional interfaces, method reference • Constructor reference, variable scope • Processing Lambda expression and inner classes	

5	**Files, Thread and Multithreading:**	10
	• Introduction to Files • File Class • Byte Stream classes and Character Stream classes • Working with files • Paths • reading and writing files, • creating files and directories • copying, moving and deleting files • getting file information • Random Access File • Reading and writing files using Byte Streams • Reading and Writing files using Character Streams • Introduction to Thread • Thread Life-Cycle • Runnable Interface • Thread Class • Thread Priorities • Synchronization in thread • Daemon Thread • Multithreading concept with example	

Course Outcomes:

1. Design console-based applications using basics of Java.
2. Demonstrate how to implement features of OOP and interface
3. Determine how to use Package and Exception Handling in Java
4. Develop a Java application using Generics, Collections and Lambda
5. Build their ability to develop java-based applications using Files and Multithreading concepts

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Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	M		H			L	H		H
CO2					H			H		L	
CO3					H			H			M
CO4	H					L	M				H
CO5			H	H		H			M		

Text Book:

1. **Java: A Beginner's Guide,Herbert Schildt,McGraw-Hill Education, SixthEdition**
2. **Core Java, Volume I – Fundamentals, Cay S. Horstmann, Pearson Education, SeventhEdition**

Reference Books:

1. **The Complete Reference Java, Herbert Schildt, McGraw-Hill Education, Sixth Edition**
2. **Programming with Java, E Balagurusamy- McGraw-Hill, Fifth Edition**
3. **Java Programming, Hari Mohan Pandey, Pearson Education, First Edition**

Web References:

1. **https://docs.oracle.com/en/java**
2. **https://www.tutorialspoint.com/java/index.htm**

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References:

1. **Learn Java Programming Tutorial**
2. **Java Programming**

Syllabus Coverage from text /reference book & web/app reference:

Unit #	Text Book	Chapter Numbers
1	1	1,2,3,5
2	1	4,6,7,8
3	1	8,9
4	1	13,14
5	1	10,11

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PRACTICALS

Unit No	List of Practicals
1	1. Write a simple java program to display message. 2. Write a java program to get a name from user and display on screen. 3. Write a java program to get personal information from user and display on screen. 4. Write a java program to perform different arithmetic operations. (Using Command Line args) 5. Write a java program to get different values from user at runtime using Scanner. 6. Write a java program to get the name from user and print 10 times using loop. 7. Write a java program to use IF Condition. 8. Write a java program to find ODD or EVEN number using command line argument. 9. Write a java program to find out students result/grade using IF condition. 10. Write a java program of 1D array.
2	11. Write a java program to use Interface in java 12. Write a java program to extend one interface into another interface 13. Write a java program to perform simple inheritance. 14. Write a java program to use multilevel inheritance. 15. Write a java program to use Hierarchical inheritance 16. Write a java program to use Abstract class 17. Write a java program to use interface 18. Write a java program to use Multiple inheritance using interface. 19. Write a java program to use method overriding 20. Write a java program to perform overriding of abstract class 21. Write a java program to demonstrate encapsulation

3	22. Write a java program to implement simple exception handling
	23. Write a java program to implement ArithmeticException
	24. Write a java program to use Finally block in Exception Handling
	25. Write a java program to use Multiple Catch Block
	26. Write a java program to use Throw Keyword
	27. Write a java program to use Throws Keyword
	28. Write a java program to implement custom exception
	29. Write a java program to implement Exception Propagation
	30. Write a java program to implement Exception Chaining
	31. Write a java program to use simple inner class in your program
	32. Write a java program to use Static Inner Class
	33. Write a java program to use Local Inner Class
	34. Write a java program to use Nested Interface
	35. Write a java program to display date in different format
	36. Write a java program to display different calendar information using calendar class
	37. Write a java program to add, subtract a days/month into current date and time
	38. Write a java program to use Gregorian calendar to display calendar information

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4	39. Write a java program to store multiple elements using an ArrayList
	40. Write a java program to add multiple elements into LinkedList
	41. Write a java program to store multiple values in a Vector and fetch it using an Enumeration
	42. Write a java program to store multiple values in a Queue and perform different operation on it
	43. Write a java program to add Book IDs and Book Names (Pairs) using a HashSet
	44. Write a java program to demonstrate PriorityQueue
	45. Write a java program to store different mapped values (Key Value) using a TreeMap Class
	46. Write a java program to add multiple elements using a SortedSet of collection
	47. Write a java program to add multiple elements and perform operation based on LIFO method using a Stack Class of collection interface
	48. Write a java program to add different values in a pair (key-value) into a TreeMap and perform different operations on it
5	49. Write a java program to write a simple message into a file using a FileOutputStream
	50. Write a java program to read a message (data) from a file by using FileInputStream
	51. Write a java program to write data into a file characterwise by using a FileWriter class of IO
	52. Write a java program to read data characterwise from a file by using a FileReader class
	53. Write a java program to create a thread using Thread Class
	54. Write a java program to create a thread using Runnable class
	55. Write a java program to set Thread name and priority & test it
	56. Write a java program to create two threads and make them Synchronized (Thread Safe)
	57. Write a java program to join two threads which perform loop operations

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