

## A. Course Handout (Version 1.0)

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Programming in JAVA	Session	2024-2025
Course Code	23CS005	Semester/Batch	4 <sup>th</sup> /2023
L-T-P (Per Week)	2-0-4	Course Credits	04
Pre-requisite	Basic knowledge of Computer related to programming.	NHEQF Level	05
Course Coordinator	Dr. Shikha	SDG Number	1,2,9

<b>CLO01</b>	Implement the concept of object-oriented techniques and methodologies using Java.
<b>CLO02</b>	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
<b>CLO03</b>	Use Exception Handling concepts for a Robust Application in Java.
<b>CLO04</b>	Ability to work with Utilities and I/O Streams
<b>CLO05</b>	Design event driven GUI and web related applications which mimic the real word scenarios.

### 1. Objectives of the Course

The course provides a wide scope of learning & understanding of the subject. It has been designed to provide students the practical ability in Java language, which can be used for system programming and as an application language. The main objectives of the course are:

- To apply the concepts of object-oriented paradigm to analyse real life problems
- To develop efficient solutions for logical problems using JAVA language.
- Exercise and reinforce prior programming knowledge to effectively code standard problem.
- To identify and remove bugs in a JAVA program.

### 2. Course Learning Outcomes

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

	Course Outcome	POs	CL	KC	Sessions
<b>CLO01</b>	Implement the concept of object-oriented techniques and methodologies using Java.	PO2, PO5, PO8, PO12	K1, K2	Factual Conceptual	<b>25</b>
<b>CLO02</b>	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	PO1, PO3, PO5, PO11	K3, K4	Procedural Conceptual	<b>40</b>
<b>CLO03</b>	Use Exception Handling concepts for a Robust Application in Java.	PO4, PO6, PO10	K3	Conceptual Procedural	<b>20</b>
<b>CLO04</b>	Ability to work with Utilities and I/O Streams	PO5, PO6, PO7, PO11	K4, K5	Conceptual Procedural	<b>30</b>
<b>CLO05</b>	Design event driven GUI and web related applications which mimic the real word scenarios.	PO4, PO6, PO9, PO10	K3, K4	Conceptual Procedural	<b>35</b>

Revised Bloom's Taxonomy Terminology

\* PO's available at (shorturl.at/cryzF)

\*\*Cognitive Level =CL

\*\*\*Knowledge Categories = KC

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01		M			H			M				M
CLO02	H		M		M						L	
CLO03				H		M				M		
CLO04					M	H				H	L	
CLO05				M		M			H	M		

H=High, M=Medium, L=Low

### 3. ERISE Grid Mapping

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	4
Research	3
Innovation	3
Skills	5
Employability	5

### 4. Recommended Books:

**BO1:** Herbert Schildt, Java A Beginner's Guide Ninth Edition, Mc Graw Hill, 2022.

**BO2:** Farrell, J., Java programming. Course Technology Press, 2022.

**BO3:** Horstmann, C. S., Core Java for the impatient. Pearson Education, 2023.

**BO4:** Herbert Schildt, Java The Complete Reference, Thirteenth Edition, Mc Graw Hill, 2023.

**BO5:** Randal E. Bryant and David R. O'Hallaron, Computer Systems: A Programmer's Perspective, 3rd edition, Pearson.

#### Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	<a href="https://www.javatpoint.com/java-tutorial">https://www.javatpoint.com/java-tutorial</a>
2.	<a href="https://www.geeksforgeeks.org/java/?ref=lbp">https://www.geeksforgeeks.org/java/?ref=lbp</a>
3.	<a href="http://www.nptelvideos.com/java">http://www.nptelvideos.com/java</a>
4.	<a href="https://www.udemy.com/course/java-tutorial/">https://www.udemy.com/course/java-tutorial/</a>
5.	<a href="https://www.youtube.com/watch?v=CFD9EFcNZTQ">https://www.youtube.com/watch?v=CFD9EFcNZTQ</a>

### 5. Recommended Tools and Platforms

Visual Studio Code

## 6. Course Plan:

Lecture Number	Topics	Text Book
1	History and features of Java, Java Virtual Machine (JVM), JRE and JDK	BO1-Chapter1
2-3	Compiling and Interpreting Java Programs, Understanding (public static void main (String [] args) method Command Line Arguments Java Basics: Identifiers, Keywords, Java Data Types & Operators	BO1-Chapter2 BO2-Chapter2
4-5	Control Statements: Decision Constructs, Using Loop Constructs, Jump Statements e.g. break, continue and return	BO1-Chapter3 BO2-Chapter6
6-7	Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays and practice problems	BO1-Chapter5 BO2-Chapter8
8-9	Strings, StringBuffer, StringBuilder & StringTokenizer: Difference between Character Array and String in Java, Creating Strings, Immutable property of String, Methods of String class, String Buffer class & StringBuilder class, toString method, String Tokenizer class Practice Problems involving all String Classes	BO1-Chapter5 BO2-Chapter7
<b>ST1</b>		
10-12	Classes & Objects: Defining Classes, Access Control, Constructing Objects through Constructors, Default constructors, Parameterized constructors, Copy constructors, Wrapper Classes	BO1-Chapter6 BO2-Chapter4
13-14	Class variables (static keyword), Instance variables and methods, this keyword, Method overloading (Constructor overloading), Practice Problems	BO1-Chapter6 BO2-Chapter3
15-16	Inheritance: Working with Inheritance: Inheritance Basics & Types, using super, Method Overriding, Practice Problems	BO1-Chapter7 BO2-Chapter9
17-18	Implementing Polymorphism, Dynamic method dispatch, final keyword, Examples	BO1-Chapter1
19	Abstract Methods & Abstract Classes, Examples	BO1-Chapter7
<b>ST2</b>		
20-21	Packages & Interfaces: Built-In Packages and User Defined Packages, Creating and accessing Packages and their classes	BO1-Chapter8 BO2-Chapter9
22-23	Interfaces: Declaration, Implementation, Difference between Abstract classes and interfaces, Extending Interfaces, implementing multiple inheritance using interfaces	BO1-Chapter8
24-25	Exception Handling: Exception handling fundamentals, Exception types, try and catch, Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exceptions, Practice Problems	BO1-Chapter9 BO2-Chapter10
26	Java Utilities: Regular Expressions (java.util.regex), Practice Problems	BO3-Chapter9
27	Java Utilities: Enum, Examples	BO1-Chapter12
28	Java Utilities: Annotations, Examples	BO1-Chapter12
29	Java Utilities: Data and Time API, Random class	BO3-Chapter12
30	File I/O and Serialization, Reading and writing files, File class and its methods Byte and character streams, Object serialization and deserialization	BO1-Chapter10 BO2-Chapter11

## 7. Delivery/Instructional Resources

Lecture No.	Topics	Web References	Audio-Video
1	History and features of Java, Java Virtual Machine (JVM), JRE and JDK	<a href="https://www.javatpoint.com/difference-between-jdk-jre-and-jvm">https://www.javatpoint.com/difference-between-jdk-jre-and-jvm</a>	<a href="https://www.youtube.com/watch?v=s7UgQ7_1KQY">https://www.youtube.com/watch?v=s7UgQ7_1KQY</a>

2-3	Compiling and Interpreting Java Programs, Understanding (public static void main (String [] args) method Command Line Arguments Java Basics: Identifiers, Keywords, Java Data Types & Operators	<a href="https://www.javatpoint.com/command-line-argument">https://www.javatpoint.com/command-line-argument</a> <a href="https://www.geeksforgeeks.org/data-types-in-java/">https://www.geeksforgeeks.org/data-types-in-java/</a>	<a href="https://www.youtube.com/watch?v=kt3wUPIDkx4&amp;pp=ygUyY29tcGlSaW5nIGFuZCBpbmRlcnByZXRpbmcmgamF2YSBwc m9ncmFtcyBpbjB2c2NvZGU%3D">https://www.youtube.com/watch?v=kt3wUPIDkx4&amp;pp=ygUyY29tcGlSaW5nIGFuZCBpbmRlcnByZXRpbmcmgamF2YSBwc m9ncmFtcyBpbjB2c2NvZGU%3D</a>
4-5	Control Statements: Decision Constructs, Using Loop Constructs, Jump Statements e.g. break, continue and return	<a href="https://www.geeksforgeeks.org/loops-in-java/?ref=lbp">https://www.geeksforgeeks.org/loops-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=XHgC6Md8L9o&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=23&amp;pp=iAQB">https://www.youtube.com/watch?v=XHgC6Md8L9o&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=23&amp;pp=iAQB</a>
6-7	Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays and practice problems	<a href="https://www.geeksforgeeks.org/arrays-in-java/?ref=lbp">https://www.geeksforgeeks.org/arrays-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=CfqjAKN-AwI&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=28&amp;pp=iAQB">https://www.youtube.com/watch?v=CfqjAKN-AwI&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=28&amp;pp=iAQB</a>
8-9	Strings, StringBuffer, StringBuilder & StringTokenizer: Difference between Character Array and String in Java, Creating Strings, Immutable property of String, Methods of String class, String Buffer class & StringBuilder class, toString method, String Tokenizer class Practice Problems involving all String Classes	<a href="https://www.geeksforgeeks.org/strings-in-java/?ref=lbp">https://www.geeksforgeeks.org/strings-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=tem1bKt2Osc&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=13&amp;pp=iAQB">https://www.youtube.com/watch?v=tem1bKt2Osc&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=13&amp;pp=iAQB</a>
10-12	Classes & Objects: Defining Classes, Access Control, Constructing Objects through Constructors, Default constructors, Parameterized constructors, Copy constructors, Wrapper Classes	<a href="https://www.geeksforgeeks.org/methods-in-java/?ref=dhm">https://www.geeksforgeeks.org/methods-in-java/?ref=dhm</a>	<a href="https://www.youtube.com/watch?v=VXR3HkRg51w&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=35&amp;pp=iAQB">https://www.youtube.com/watch?v=VXR3HkRg51w&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=35&amp;pp=iAQB</a>
13-14	Class variables (static keyword), Instance variables and methods, this keyword, Method overloading (Constructor overloading), Practice Problems	<a href="https://www.geeksforgeeks.org/constructor-overloading-java/">https://www.geeksforgeeks.org/constructor-overloading-java/</a>	<a href="https://www.youtube.com/watch?v=j-k6ppZZ-ho&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=113&amp;pp=iAQB">https://www.youtube.com/watch?v=j-k6ppZZ-ho&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=113&amp;pp=iAQB</a>
15-16	Inheritance: Working with Inheritance: Inheritance Basics & Types, using super, Method Overriding, Practice Problems	<a href="https://www.geeksforgeeks.org/inheritance-and-constructors-in-java/?ref=lbp">https://www.geeksforgeeks.org/inheritance-and-constructors-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=XSuybcFfLx4&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=45&amp;pp=iAQB">https://www.youtube.com/watch?v=XSuybcFfLx4&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=45&amp;pp=iAQB</a>
17-18	Implementing Polymorphism, Dynamic method dispatch, final keyword, Examples	<a href="https://www.geeksforgeeks.org/difference-between-inheritance-and-polymorphism/?ref=lbp">https://www.geeksforgeeks.org/difference-between-inheritance-and-polymorphism/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=08u8RlXca2I&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=59&amp;pp=iAQB">https://www.youtube.com/watch?v=08u8RlXca2I&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=59&amp;pp=iAQB</a>
19	Abstract Methods & Abstract Classes, Examples	<a href="https://www.geeksforgeeks.org/abstract-keyword-in-java/?ref=lbp">https://www.geeksforgeeks.org/abstract-keyword-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=vqV22AszAdw&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=53&amp;pp=iAQB">https://www.youtube.com/watch?v=vqV22AszAdw&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=53&amp;pp=iAQB</a>
20-21	Packages & Interfaces: Built-In Packages and User Defined Packages, Creating and accessing Packages and their classes	<a href="https://www.geeksforgeeks.org/packages-in-java/?ref=lbp">https://www.geeksforgeeks.org/packages-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=QjwT7GHjC&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=68&amp;pp=iAQB">https://www.youtube.com/watch?v=QjwT7GHjC&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=68&amp;pp=iAQB</a>
22-23	Interfaces: Declaration, Implementation, Difference between Abstract classes and interfaces,	<a href="https://www.geeksforgeeks.org/functional-interfaces-java/?ref=lbp">https://www.geeksforgeeks.org/functional-interfaces-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=D4TYED_gKTE&amp;list=PL">https://www.youtube.com/watch?v=D4TYED_gKTE&amp;list=PL</a>

	Extending Interfaces, implementing multiple inheritance using interfaces		<a href="https://www.youtube.com/watch?v=u0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=57&amp;pp=iAQB">u0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=57&amp;pp=iAQB</a>
24-25	Exception Handling: Exception handling fundamentals, Exception types, try and catch, Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exceptions, Practice Problems	<a href="https://www.geeksforgeeks.org/exceptions-in-java/?ref=lbp">https://www.geeksforgeeks.org/exceptions-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=u0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=78&amp;pp=iAQB">https://www.youtube.com/watch?v=u0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=78&amp;pp=iAQB</a>
26	Java Utilities: Regular Expressions (java.util.regex), Practice Problems	<a href="https://www.geeksforgeeks.org/regular-expressions-in-java/?ref=lbp">https://www.geeksforgeeks.org/regular-expressions-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=F4jj36I6FSU&amp;list=PLmCsXDGbJHdiSg8PkM-xFPnR2BIYEa9R">https://www.youtube.com/watch?v=F4jj36I6FSU&amp;list=PLmCsXDGbJHdiSg8PkM-xFPnR2BIYEa9R</a>
27	Java Utilities: Enum, Examples	<a href="https://www.geeksforgeeks.org/enum-in-java/">https://www.geeksforgeeks.org/enum-in-java/</a>	<a href="https://www.youtube.com/watch?v=CKfZ45TtkbI&amp;list=PLmCsXDGbJHdjWNC0-C0w3n9aRedEPe1j">https://www.youtube.com/watch?v=CKfZ45TtkbI&amp;list=PLmCsXDGbJHdjWNC0-C0w3n9aRedEPe1j</a>
28	Java Utilities: Annotations, Examples	<a href="https://www.geeksforgeeks.org/annotations-in-java/">https://www.geeksforgeeks.org/annotations-in-java/</a>	<a href="https://www.youtube.com/watch?v=xdleqrmgqDc&amp;list=PLmCsXDGbJHdj8WqMEAkALvPUkVwQj-bwl">https://www.youtube.com/watch?v=xdleqrmgqDc&amp;list=PLmCsXDGbJHdj8WqMEAkALvPUkVwQj-bwl</a>
29	Java Utilities: Data and Time API, Random class	<a href="https://www.geekster.in/articles/date-and-api-in-java-8/#:~:text=Java%20%20Date%20and%20Time%20API%20also%20provide%20various%20utility,%20%2C%20isAfter()%20%2C%20etc.">https://www.geekster.in/articles/date-and-api-in-java-8/#:~:text=Java%20%20Date%20and%20Time%20API%20also%20provide%20various%20utility,%20%2C%20isAfter()%20%2C%20etc.</a>	<a href="https://www.youtube.com/watch?v=PCJRuBQa4Pk&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=96&amp;pp=iAQB">https://www.youtube.com/watch?v=PCJRuBQa4Pk&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=96&amp;pp=iAQB</a>
30	File I/O and Serialization, Reading and writing files, File class and its methods Byte and character streams, Object serialization and deserialization	<a href="https://www.geeksforgeeks.org/java-io-input-output-in-java-with-examples/?ref=lbp">https://www.geeksforgeeks.org/java-io-input-output-in-java-with-examples/?ref=lbp</a> <a href="https://www.geeksforgeeks.org/file-class-in-java/?ref=lbp">https://www.geeksforgeeks.org/file-class-in-java/?ref=lbp</a>	<a href="https://www.youtube.com/watch?v=Vy2I3IGAb2I&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=111&amp;pp=iAQB">https://www.youtube.com/watch?v=Vy2I3IGAb2I&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=111&amp;pp=iAQB</a>

## 8. Lab Plan

Sr. No.	Lab Number	Experiments	Learning Resource
1	1-4	Setting UP Java Environment for (MacOS/Windows/Linux), Working on Integrated Development Environment (IDE)- eclipse/IntelliJ Idea/NetBeans/Visual Studio Code	<a href="https://code.visualstudio.com/docs/java/java-tutorial">https://code.visualstudio.com/docs/java/java-tutorial</a>
2	5-15	Practice Problems covering All Java Operators	<a href="https://www.geeksforgeeks.org/operators-in-java/?ref=lbp">https://www.geeksforgeeks.org/operators-in-java/?ref=lbp</a>
3	16-25	Practice Problems using loops, Nested Loops and conditional Statements, involving patterns	<a href="https://www.programiz.com/java-programming/nested-loop">https://www.programiz.com/java-programming/nested-loop</a>
4	26-32	Working with Arrays	<a href="https://www.youtube.com/watch?v=CfqjAKN-AwI&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=28&amp;pp=iAQB">https://www.youtube.com/watch?v=CfqjAKN-AwI&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=28&amp;pp=iAQB</a>

5	33-40	Practice Problems involving all String Classes	<a href="https://www.youtube.com/watch?v=tem1bKt2Osc&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=13&amp;pp=iAQB">https://www.youtube.com/watch?v=tem1bKt2Osc&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=13&amp;pp=iAQB</a>
6	41-50	Classes & Objects: Defining Classes, Access Control, Constructing Objects through Constructors, Default constructors, Parameterized constructors, Copy constructors, Wrapper Classes, Method overloading (Constructor overloading), Practice Problems	<a href="https://www.geeksforgeeks.org/constructor-overloading-java/">https://www.geeksforgeeks.org/constructor-overloading-java/</a>
7	51-60	Inheritance: Inheritance Basics & Types, Practice Problems	<a href="https://www.geeksforgeeks.org/inheritance-and-constructors-in-java/?ref=lbp">https://www.geeksforgeeks.org/inheritance-and-constructors-in-java/?ref=lbp</a>
8	61-70	Implementing Polymorphism, Dynamic method dispatch, final keyword, Examples	<a href="https://www.geeksforgeeks.org/difference-between-inheritance-and-polymorphism/?ref=lbp">https://www.geeksforgeeks.org/difference-between-inheritance-and-polymorphism/?ref=lbp</a>
9	71-80	Packages & Interfaces: Built-In Packages and User Defined Packages, Creating and accessing Packages and their classes	<a href="https://www.geeksforgeeks.org/packages-in-java/?ref=lbp">https://www.geeksforgeeks.org/packages-in-java/?ref=lbp</a>
10	81-90	Interfaces: Declaration, Implementation, Extending Interfaces, implementing multiple inheritance using interfaces	<a href="https://www.youtube.com/watch?v=D4TYED_gKTE&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=57&amp;pp=iAQB">https://www.youtube.com/watch?v=D4TYED_gKTE&amp;list=PLu0W_9lII9agS67Uits0UnJyrYiXhDS6q&amp;index=57&amp;pp=iAQB</a>
11	91-100	Exception Handling: Exception handling fundamentals, Exception types, try and catch, Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exceptions, Practice Problems	<a href="https://www.geeksforgeeks.org/exceptions-in-java/?ref=lbp">https://www.geeksforgeeks.org/exceptions-in-java/?ref=lbp</a>
12	101-103	Java Utilities: Regular Expressions (java.util.regex), Practice Problems	<a href="https://www.geeksforgeeks.org/regular-expressions-in-java/?ref=lbp">https://www.geeksforgeeks.org/regular-expressions-in-java/?ref=lbp</a>
13	104-106	Java Utilities: Enum, Examples	<a href="https://www.geeksforgeeks.org/enum-in-java/">https://www.geeksforgeeks.org/enum-in-java/</a>
14	107-108	Java Utilities: Annotations, Examples	<a href="https://www.geeksforgeeks.org/annotations-in-java/">https://www.geeksforgeeks.org/annotations-in-java/</a>
15	109-110	Java Utilities: Data and Time API, Random class	<a href="https://www.geekster.in/articles/date-and-api-in-java-8/#:~:text=Java%20%20Date%20and%20Time%20API%20also%20provide%20various%20utility,()%20%2C%20isAfter()%20%2C%20etc.">https://www.geekster.in/articles/date-and-api-in-java-8/#:~:text=Java%20%20Date%20and%20Time%20API%20also%20provide%20various%20utility,()%20%2C%20isAfter()%20%2C%20etc.</a>
16	111-120	File I/O and Serialization, Reading and writing files, File class and its methods Byte and character streams, Object serialization and deserialization	<a href="https://www.geeksforgeeks.org/java-io-input-output-in-java-with-examples/?ref=lbp">https://www.geeksforgeeks.org/java-io-input-output-in-java-with-examples/?ref=lbp</a> <a href="https://www.geeksforgeeks.org/file-class-in-java/?ref=lbp">https://www.geeksforgeeks.org/file-class-in-java/?ref=lbp</a>

## 9. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
<ul style="list-style-type: none"> <li>Remedial Classes on Saturdays</li> <li>Encouragement for improvement using Peer Tutoring</li> <li>Use of Audio and Visual Materials</li> <li>Use of Real-Life Examples</li> </ul>	<ul style="list-style-type: none"> <li>Workshops</li> <li>Formative Exercises used to highlight concepts and notions</li> <li>E-notes and E-exercises to read ahead of the pedagogic material.</li> </ul>	<ul style="list-style-type: none"> <li>Engaging students to hold hands of slow learners by creating a Peer Tutoring Group</li> <li>Design solutions for complex problems</li> <li>Design solutions for complex problems</li> </ul>



		<ul style="list-style-type: none"> <li>Presentation on topics beyond those covered in CHO</li> </ul>
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## 10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 1	Testpad module progress and completion	-	10%	Online
Component 2	Sessional Test	03*	40%	Online
Component 3	End Term Examinations	01**	50%	Online
<b>Total</b>		<b>100%</b>		

\* Students will have to appear in all Sessional Tests.

\*Makeup Examination will compensate for either ST-1 or ST-2 (Only for genuine cases, based on the Dean's approval).

\*\*As per Academic Guidelines, a minimum of 75% attendance is required to become eligible for appearing in the End Semester Examination.

## 11. Syllabus of the Course:

S.N o.	Topic (s)	No. of Sessions	Weightage %
1	History and features of Java, Java Virtual Machine (JVM), JRE and JDK Setting UP Java Environment for (MacOS/Windows/Linux), Working on Integrated Development Environment (IDE) - Eclipse/IntelliJ/Idea/NetBeans/Visual Studio Code Compiling and Interpreting Java Programs, Understanding (public static void main (String [] args) method Command Line Arguments Java Basics: Identifiers, Keywords, Java Data Types & Operators Practice Problems covering All Java Operators Control Statements: Decision Constructs, Using Loop Constructs, Jump Statements e.g. break, continue and return Practice Problems using loops, Nested Loops and conditional Statements, involving patterns Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays and practice problems Strings, StringBuffer, StringBuilder & StringTokenizer: Difference between Character Array and String in Java, Creating Strings, Immutable property of String, Methods of String class, String Buffer class & StringBuilder class, toString method, String Tokenizer class Practice Problems involving all String Classes	45	30%
<b>Sessional Test-1</b>			
2	History and features of Java, Java Virtual Machine (JVM), JRE and JDK Setting UP Java Environment for (MacOS/Windows/Linux), Working on Integrated Development Environment (IDE) - Eclipse/IntelliJ/Idea/NetBeans/Visual Studio Code Compiling and Interpreting Java Programs, Understanding (public static void main (String [] args) method Command Line Arguments Java Basics: Identifiers, Keywords, Java Data Types & Operators Practice Problems covering All Java Operators Control Statements: Decision Constructs, Using Loop Constructs, Jump Statements e.g. break, continue and return Practice Problems using loops, Nested Loops and conditional Statements, involving patterns Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays and practice problems	90	60%

	<p>Strings, StringBuffer, StringBuilder &amp; StringTokenizer: Difference between Character Array and String in Java, Creating Strings, Immutable property of String, Methods of String class, String Buffer class &amp; StringBuilder class, toString method, String Tokenizer class Practice Problems involving all String Classes</p> <p>Classes &amp; Objects: Defining Classes, Access Control, Constructing Objects through Constructors, Default constructors, Parameterized constructors, Copy constructors, Wrapper Classes</p> <p>Class variables (static keyword), Instance variables and methods, this keyword, Method overloading (Constructor overloading), Practice Problems</p> <p>Inheritance: Working with Inheritance: Inheritance Basics &amp; Types, using super, Method Overriding, Practice Problems</p> <p>Implementing Polymorphism, Dynamic method dispatch, final keyword, Examples</p> <p>Abstract Methods &amp; Abstract Classes, Examples</p>		
<b>Sessional Test -2 (ST1 syllabus also included)</b>			
3	<p>History and features of Java, Java Virtual Machine (JVM), JRE and JDK</p> <p>Setting UP Java Environment for (MacOS/Windows/Linux), Working on Integrated Development Environment (IDE) - Eclipse/IntelliJdea/NetBeans/Visual Studio Code</p> <p>Compiling and Interpreting Java Programs, Understanding (public static void main (String [] args) method Command Line Arguments</p> <p>Java Basics: Identifiers, Keywords, Java Data Types &amp; Operators</p> <p>Practice Problems covering All Java Operators</p> <p>Control Statements: Decision Constructs, Using Loop Constructs, Jump Statements e.g. break, continue and return</p> <p>Practice Problems using loops, Nested Loops and conditional Statements, involving patterns</p> <p>Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays and practice problems</p> <p>Strings, StringBuffer, StringBuilder &amp; StringTokenizer: Difference between Character Array and String in Java, Creating Strings, Immutable property of String, Methods of String class, String Buffer class &amp; StringBuilder class, toString method, String Tokenizer class Practice Problems involving all String Classes</p> <p>Classes &amp; Objects: Defining Classes, Access Control, Constructing Objects through Constructors, Default constructors, Parameterized constructors, Copy constructors, Wrapper Classes</p> <p>Class variables (static keyword), Instance variables and methods, this keyword, Method overloading (Constructor overloading), Practice Problems</p> <p>Inheritance: Working with Inheritance: Inheritance Basics &amp; Types, using super, Method Overriding, Practice Problems</p> <p>Implementing Polymorphism, Dynamic method dispatch, final keyword, Examples</p> <p>Abstract Methods &amp; Abstract Classes, Examples</p> <p>Packages &amp; Interfaces: Built-In Packages and User Defined Packages, Creating and accessing Packages and their classes</p> <p>Interfaces: Declaration, Implementation, Difference between Abstract classes and interfaces, Extending Interfaces, implementing multiple inheritance using interfaces</p> <p>Exception Handling: Exception handling fundamentals, Exception types, try and catch, Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exceptions, Practice Problems</p> <p>Java Utilities: Regular Expressions (java.util.regex), Practice Problems</p> <p>Java Utilities: Enum, Examples</p> <p>Java Utilities: Annotations, Examples</p> <p>Java Utilities: Data and Time API, Random class</p>	150	100%



	File I/O and Serialization, Reading and writing files, File class and its methods Byte and character streams, Object serialization and deserialization.		
<b>Sessional Test-3 (ST1 &amp; ST2 syllabus also included)</b>			
<b>End Term Examination (100% syllabus)</b>			

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. Shikha	
Head-Academic Delivery	Dr. Mrinal Paliwal	
Dean	Dr. Rishu Chhabra	
Date	28.09.2024	