**A. Course Handout (Version 1.0)**

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| 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 | Java Programming | Session | 2024-2025 |
| Course Code | 22CS031 | Semester/Batc h | 5th /2022 |
| L-T-P (Per Week) | 2-0-4 | Course Credits | 04 |
| Course Coordinator | Ms. Shivani Wadhwa | | |

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| **CLO01** | Understand the features of Java such as operators, classes, objects, inheritance, packages and exception handling |
| **CLO02** | Learn latest features of Java like garbage collection, Abstract methods, Network interface |
| **CLO03** | Acquire competence in Java using multithreading, Generic, and Collection Framework |
| **CLO04** | Get exposure to advance concepts of Database connectivity like JDBC |

1. **Objectives of the Course**

The scope of the course is to provides the foundation for understanding the key aspects of java programming and implementation obtaining a theoretical understanding of advance programming concepts. The objectives of the course are:

* + to provide a comprehensive understanding of Java's syntax, structure, and fundamental programming concepts
  + to build an understanding of analysing and evaluating real-world problems.
  + to inculcate the skill in students to design, implement, and test Java applications efficiently.
  + to equip students with the knowledge and skills necessary to create efficient, robust, and scalable software solutions using Java

1. **Course Learning Outcomes**

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

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|  | **Course Learning Outcome** | **\*POs** | **\*\*CL** | **\*\*\*KC** | **Sessions** |
| **CLO01** | Understand the features of Java such as operators, classes, objects, inheritance, packages and exception handling | PO1, PO2, PO4,  PO3, PO5, PO6,  PO11 | K1 | Conceptual Procedural | **28** |
| **CLO02** | Learn latest features of Java like garbage collection, Abstract  methods, Network interface | PO1, PO4, PO5, PO12 | K2 | Conceptual Procedural | **15** |
| **CLO03** | Acquire competence in Java using multithreading, Generic, and Collection Framework | PO1, PO2, PO3, PO4, PO5, PO10,  PO11 | K4 | Conceptual Procedural | **32** |
| **CLO04** | Get exposure to advance concepts of Database connectivity like JDBC | PO3, PO4, PO5, PO9, PO10, PO11 | K4 | Procedural | **15** |
| **Total Contact Hours** | |  |  |  | **90** |

Revised Bloom’s Taxonomy Terminology

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

\*\*Cognitive Level =CL

\*\*\*Knowledge Categories = KC

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| **Course**  **Learning**  **Outcomes** | **PO1** | **PO**  **2** | **PO**  **3** | **PO4** | **PO**  **5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| CLO01 | H | H | H | H | H | M |  |  |  |  | H |  |
| CLO02 | H |  |  | H | H |  |  |  |  |  |  | H |
| CLO03 | H | H | H | H | H |  |  |  |  | M | H |  |
| CLO04 |  |  | H | H | H |  |  |  | M | M | H |  |

H=High, M=Medium, L=Low

1. **ERISE Grid Mapping**

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

1. **Recommended Books:**

**Textbooks:**

**B01:** "Head First Java" by Kathy Sierra and Bert Bates, Shroff, 2nd Edition, 2009.

**B02:** "Thinking in Java" by Bruce Eckel President, MindView, Inc., Fourth Edition, 2006.

**B03:**  "Java: A Beginner's Guide" by Herbert Schildt, McGraw-Hill Education, 9th Edition, 2022. **B04:**  "JAVA: THE COMPLETE REFERENCE" by  [Herbert Schildt](https://www.amazon.in/Herbert-Schildt/e/B001H6PSMG/ref=dp_byline_cont_book_1) McGraw Hill Education7TH EDN, 2017

**B05:** "Java for Programmers " by P.J.Deitel and H.M.Deitel, PEA (or) Java, Prentice Hall, 2009.

**Reference Books:**

**B03:** "Java: A Beginner's Guide" by Herbert Schildt, McGraw-Hill Education, 9th Edition, 2022.

**E-Resources:**

● https://library.chitkara.edu.in/subscribed-books.php

1. **Other readings and relevant websites:**

|  |  |
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| **Serial No** | **Link of Journals, Magazines, websites and Research Papers** |
| **1.** | https://www.javatpoint.com/method-overloading-vs-method-overriding-in-java |
| **2.** | https://www.javatpoint.com/wrapper-class-in-java |
| **3.** | https://www.geeksforgeeks.org/java-exercises/#pattern-programs-in-java |
| **4.** | https://www.youtube.com/watch?v=sqdOAjjBMFc&list=PLYlskOUYCZsjfHeNJuBd4na3cb xzNWw2Q |
| **5.** | https://www.codecademy.com/resources/blog/advanced-java-code-challenges/ |
| **6.** | https://www.youtube.com/watch?v=yNpRDGGZtO4 |

1. **Recommended Tools and Platforms**

Code Quotient

1. **Course Plan:**

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| --- | --- | --- |
| **Lecture**  **Number** | **Topics** | **Textbook** |
| 1-2 | Introduction to JAVA: Java Introduction, History and goals of Java, Fundamentals of OOPs | B03-Chpater-1 |
| 3-4 | Overview of JDK, JVM, Garbage Collection | B03-Chapter-1 |
| 5-6 | Java Basics: Identifiers, Keywords, Java Data Types & Operators | B03-Chapter-1 |
| 7-8 | Practice Problem: Aggregate and Percentage Marks of a student, Gross salary of an employee, Add one to each  digit of a 4 digit, Add one to each digit of a 4 digit | B03-Chapter-2 |
| 9-10 | Control Statements: Decision Constructs, Using Loop Constructs | B03-Chapter-3 |
| 11-12 | Command Line Arguments | B03-Chapter-3 |
| 13-14 | Practice Problems: The Number is Kaprekar or not, Generate first n Prime numbers, Next Closest Fibonacci Number | B03-Chapter-4 |
| 15-16 | Working with Arrays: Creating and Using Arrays (1D, 2D, Multidimensional) | B03-Chapter-5 |
| 17-18 | Jagged Arrays | B03-Chapter-5 |
| 19-20 | Practice Problems: Matrix Multiplication, spirally traversing a matrix, Rotate a 2-D array by 90 degrees | B03-Chapter-5 |
| 21-22 | Classes & Objects: Classes, objects and methods: defining a class | B03-Chapter-6 |
| 23-24 | Access Control, Method overloading | B03-Chapter-6 |

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| 25-26 | Practice Problems: Convert given number of seconds to days, hours, minutes and second, Class- TimeSpan, class – BankFee | B03-Chapter-6 |
| 27-28 | Constructors, constructor overloading, use of this and static. | B03-Chapter-6 |
| 29-30 | Practice Problems: Class – TollBooth, methods of class: Display of Strings | B03-Chapter-6 |
| 31-32 | Inheritance: Working with Inheritance: Inheritance Basics & Types, Using super, Method Overriding | B03-Chapter-7 |
| 33-34 | Dynamic method dispatch, final keyword | B03-Chapter-7 |
| 35-36 | Practice Problems: class – Box, BookCD, Marketer | B03-Chapter-7 |
| 37-38 | Abstract Methods & Classes, Packages & Interfaces: Built-In Packages and User Defined Packages | B03-Chapter-8 |
| **ST-1 Syllabus (Lecture number 1- 38)** | | |
| 39-40 | Interfaces: Declaration, Implementation, Extending Classes and Interfaces | B03-Chapter-8 |
| 41-42 | Practice Problem: Class - Customer and BankAccount, Class - MovablePoint and MovableCircle, Class: Circle and ResizableCircle | B03-Chapter-8 |
| 43-44 | Strings, StringBuffer, StringBuilder & StringTokenizer: Introduction, Immutable String | B03-Chapter-23 |
| 45-46 | Methods of String class, String Buffer class & StringBuilder class, toString method, StringTokenizer class | B03-Chapter-23 |
| 47-48 | Practice Problem:  Capitalize the first letter of each word, Swap first and last character of each word in a string, Find occurrences of palindrome words in a string | B03-Chapter-23 |
| 49-50 | Exception Handling: Exception handling fundamentals, Exception types, try and catch | B03-Chapter-9 |
| 51-52 | Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exception. | B03-Chapter-9 |
| 53-54 | Practice Problems: Password too short Exception, Valid email address, Valid index of array | B03-Chapter-9 |
| 55-56 | Multithreading: Java thread model, main thread, creating thread by implementing Runnable and extending thread class | B03-Chapter-11 |
| 57-58 | Creating multiple threads, using isAlive() and join(), thread priorities | B03-Chapter-11 |
| 59-60 | Synchronization | B03-Chapter-11 |
| 61-62 | Practice Problems: Multithreading Java: Greetings in reverse, Transcations in Account with and without Synchronization | B03-Chapter-11 |
| 63-64 | Generics: Introduction, Generic Example, Generic Class, Generic Method | B03-Chapter-13 |
| 63-65 | Generic Constructor and Generic Interfaces | B03-Chapter-13 |
| **ST-2 Syllabus (Lecture number 39-65)** | | |
| 66-67 | Collections Framework: Introduction, Collection  Interfaces-List, Queue | B04-Chapter-17 |
| 68-69 | Practice Problems: Duplicate the Queue elements, Number is a Happy number or not | B04-Chapter-17 |
| 70-71 | Collections Interfaces- Set (Overview), Collection Classes: ArrayList, LinkedList | B04-Chapter-17 |
| 72-73 | Collections Interfaces- Iterator, Working with Maps (Overview), Comparable & Comparator | B04-Chapter-17 |
| 74-75 | Practice Problems: Remove duplicates from a vector, Implement Own ArrayList in Java | B04-Chapter-17 |
| 76-77 | Collections Interfaces- Arrays, Vector, Stack | B04-Chapter-17 |
| 78-79 | Practice Problems: Cut the chocolate smartly for maximum pieces, find all pairs with sum K, Product Array - Ignoring the next | B04-Chapter-17 |
| 80-82 | IO Streams: Stream Classes: Byte Streams, Character Streams, StreamTokenizer. | B03-Chapter-10 |
| 83-85 | Practice Problems: Capitalize First Letter of every Word in a File, Strip HTML tags from a file | B03-Chapter-10 |
| 86-88 | JDBC Connectivity: Introduction, Architecture of JDBC Database Connection. | B04-Chapter-31 |
| 89-90 | JDBC Connectivity: Establishing JDBC Database Connection. | B04-Chapter-31 |
| **ETE (Syllabus = (Lecture number 1-90)** | |  |

1. **Delivery/Instructional Resources**

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| **Lecture No.** | **Topics** | **Web References** | **Audio-Video** |
| 1-2 | Introduction to JAVA: Java  Introduction, History and goals of  Java, Fundamentals of OOPs | https://www.geeksfor geeks.org/introductio n-to-java/ | https://www.youtube.co m/watch?v=AEo4KgwKYo U&list=PLqleLpAMfxGCbd aJ6SoExDfHrTfRDeWeG |
| 3-4 | Overview of JDK, JVM, Garbage  Collection | https://www.baeldung .com/jvm-garbagecollectors | https://www.youtube.co m/watch?v=VHbSopMyc4  M&list=PLBlnK6fEyqRjicb  0pe9mrbrXZ36V7WkyJ |
| 5-6 | Java Basics: Identifiers, Keywords, Java Data Types & Operators | https://www.geeksfor geeks.org/java-basicsyntax/?ref=lbp | https://www.youtube.co m/watch?v=EUKsHFJ28W Q |
| 7-8 | Practice Problem: Aggregate and Percentage Marks of a student, Gross salary of an employee, Add one to each digit of a 4 digit, Add one to each digit of a 4 digit | https://www.geeksfor geeks.org/javaprogram-to-illustratetotal-marks-andpercentagecalculation/ | https://www.youtube.co m/watch?v=r4cFT9\_kZIc |

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| 9-10 | Control Statements: Decision  Constructs, Using Loop Constructs | https://www.geeksfor geeks.org/decisionmaking-javaif-elseswitch-breakcontinuejump/?ref=lbp | https://www.youtube.co m/watch?v=OUZkdKFeuK 0&list=PLlhM4lkb2sEgQm  NKO43i7v60no4bdc3lI |
| 11-12 | Command Line Arguments | https://www.javatpoi nt.com/commandline-argument | https://www.youtube.co m/watch?v=Up17-azeuyE |
| 13-14 | Practice Problems: The Number is Kaprekar or not, Generate first n Prime numbers, Next Closest  Fibonacci Number | https://www.geeksfor geeks.org/kaprekarnumber/ | https://www.youtube.co m/watch?v=nR4gjD4193 Q |
| 15-16 | Working with Arrays: Creating and  Using Arrays (1D, 2D,  Multidimensional) | https://www.geeksfor geeks.org/arrays-injava/?ref=lbp | https://www.youtube.co m/watch?v=kWJHzambtN o |
| 17-18 | Jagged Arrays | https://www.geeksfor geeks.org/jaggedarray-in-java/ | https://www.youtube.co  m/watch?v=6A5SRl1Vwb  E |
| 19-20 | Practice Problems: Matrix  Multiplication, spirally traversing a matrix, Rotate a 2-D array by 90 degrees | https://www.javatpoi nt.com/java-programto-multiply-twomatrices | https://www.youtube.co m/watch?v=BtDPVc7H1Zs |
| 21-22 | Classes & Objects: Classes, objects and methods: defining a class | https://www.geeksfor geeks.org/objectorientedprogramming-oopsconcept-injava/?ref=lbp | https://www.youtube.co m/watch?v=W-  D71ZeMixQ&list=PLBlnK6 fEyqRiwWLbSXKFtdGV8O  Vqr9dZr |
| 23-24 | Access Control, Method  overloading | https://www.geeksfor geeks.org/methodoverloading-in-java/ | https://www.youtube.co m/watch?v=KpwBVAYbP DA |
| 25-26 | Practice Problems: Convert given number of seconds to days, hours, minutes and second, Class-  TimeSpan, class – BankFee | https://www.w3resou rce.com/javaexercises/basic/javabasic-exercise-55.php | https://www.youtube.co m/watch?v=ESSxoH-Rq1o |
| 27-28 | Constructors, constructor overloading, use of this and static. | https://www.geeksfor geeks.org/copyconstructor-injava/?ref=lbp | https://www.youtube.co m/watch?v=HbQ2ASDc0L w |
| 29-30 | Practice Problems: Class –  TollBooth, methods of class: Display of Strings | https://www.geeksfor geeks.org/java-stringexercise/ | https://www.youtube.co  m/watch?v=sCdgYAcQD5  o |
| 31-32 | Inheritance: Working with  Inheritance: Inheritance Basics & Types, Using super, Method  Overriding | https://www.geeksfor geeks.org/inheritanceand-constructors-injava/?ref=lbp | https://www.youtube.co m/watch?v=XSuybcFfLx4 |

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| 33-34 | Dynamic method dispatch, final keyword | https://www.scaler.co m/topics/runtimepolymorphism-in-java/ | https://www.youtube.co m/watch?v=sg9a0bFbiwo |
| 35-36 | Practice Problems: class – Box, BookCD, Marketer | https://coderanch.co  m/t/662496/java/boo  k-library-class | https://www.youtube.co m/watch?v=LuEtPdgkYG4 |
| 37-38 | Abstract Methods & Classes,  Packages & Interfaces:  Built-In Packages and User Defined Packages | https://www.geeksfor geeks.org/abstractmethods-in-java-withexamples/?ref=lbp | https://www.youtube.co m/watch?v=9xLGd6EGvIE |
| 39-40 | Interfaces: Declaration,  Implementation, Extending Classes and Interfaces | https://www.geeksfor geeks.org/differencesbetween-interfaceand-class-injava/?ref=lbp | https://www.youtube.co m/watch?v=sC2DMPzIPF  o |
| 41-42 | Practice Problem: Class - Customer and BankAccount, Class -  MovablePoint and MovableCircle,  Class: Circle and ResizableCircle | https://www.javatpoi nt.com/bankingapplication-in-java | https://www.youtube.co  m/watch?v=mp1\_F7lfmN  E |
| 43-44 | Strings, StringBuffer, StringBuilder  & StringTokenizer: Introduction,  Immutable String | https://www.digitaloc ean.com/community/t  utorials/string-vsstringbuffer-vsstringbuilder | https://www.youtube.co m/watch?v=GnpEm89Y0f g&list=PLd3UqWTnYXOlr dBwt2DTnF3u3W-1Kozk0 |
| 45-46 | Methods of String class, String Buffer class & StringBuilder class, toString method, StringTokenizer class | https://www.geeksfor geeks.org/stringbuffer -class-in-java/ | [https://www.youtube.co m/watch?v=GnpEm89Y0f g&list=PLd3UqWTnYXOlr dBwt2DTnF3u3W-1Kozk0](https://www.youtube.com/watch?v=GnpEm89Y0fg&list=PLd3UqWTnYXOlrdBwt2DTnF3u3W-1Kozk0) |
| 47-48 | Practice Problem:  Capitalize the first letter of each word, Swap first and last character of each word in a string, Find occurrences of palindrome words in a string | https://www.geeksfor  geeks.org/swap-thefirst-and-lastcharacter-of-a-stringin-java/ | https://www.youtube.co m/watch?v=aamS7jTsa4k |
| 49-50 | Exception Handling: Exception handling fundamentals, Exception types, try and catch | https://www.geeksfor geeks.org/exceptionsin-java/?ref=lbp | https://www.youtube.co m/watch?v=y-  NlcLcxiKY&list=PLlhM4lkb  2sEjaU-JAASDG4TdwpfJFARN |
| 51-52 | Multiple catch clauses, nested try, throw, throws and finally, Creating custom Exception. | https://www.geeksfor geeks.org/try-catchthrow-and-throws-injava/?ref=lbp | https://www.youtube.c  om/watch?v=To6tsfRAD  L4 |
| 53-54 | Practice Problems: Password too short Exception, Valid email  address, Valid index of array | https://www.geeksfor geeks.org/javaprogram-to-check-thevalidity-of-apassword-using-userdefined-exception/ | https://www.youtube.c  om/watch?v=h0lGGZbK  9zE |

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| 55-56 | Multithreading: Java thread model, main thread, creating thread by implementing Runnable and  extending thread class | https://www.javatpoi  nt.com/multithreading  -in-java | https://www.youtube.c om/watch?v=YDH7f9dT  XAs |
| 57-58 | Creating multiple threads, using isAlive() and join(), thread priorities | https://www.studyton ight.com/java/joininga-thread.php | https://www.youtube.c om/watch?v=b3C3ODu mC24 |
| 59-60 | Synchronization | https://www.javatpoi nt.com/synchronizatio n-in-java | https://www.youtube.c om/watch?v=Qf1DuRM PbOA |
| 61-62 | Practice Problems: Multithreading  Java: Greetings in reverse, Transcations in Account with and without Synchronization | https://www.geeksfor geeks.org/reverse-astring-in-java/ | https://www.youtube.c  om/watch?v=0nDYk8sV  \_jQ |
| 63-64 | Generics: Introduction, Generic Example, Generic Class, Generic Method | https://www.geeksfor geeks.org/genericclass-in-java/ | https://www.youtube.c om/watch?v=5t9oOYBImc |
| 63-65 | Generic Constructor and Generic  Interfaces | https://www.geeksfor geeks.org/genericconstructors-andinterfaces-in-java/ | https://www.youtube.c  om/watch?v=zpXFoplKfr c |
| 66-67 | Collections Framework:  Introduction, Collection Interfaces-  List, Queue | https://www.javatpoi nt.com/collections-injava | https://www.youtube.c om/watch?v=VphowcSk BX4 |
| 68-69 | Practice Problems: Duplicate the Queue elements, Number is a  Happy number or not | https://www.geeksfor geeks.org/handleduplicate-elements-ina-priorityqueue-whilemaintaining-order-injava/ | https://www.youtube.c om/watch?v=SDqXsIVu5c |
| 70-71 | Collections Interfaces- Set (Overview), Collection Classes: ArrayList, LinkedList | [https://www.geeksf orgeeks.org/arraylist -in-java/?ref=lbp](https://www.geeksforgeeks.org/arraylist-in-java/?ref=lbp) | https://www.youtube.c om/watch?v=VphowcSk BX4 |
| 72-73 | Collections Interfaces- Iterator, Working with Maps (Overview),  Comparable & Comparator | https://www.javatpoi nt.com/java-map | https://www.youtube.c om/watch?v=rI3VkItC0e A&list=PLd3UqWTnYXOk  VR3OR9UZGyEt9RFUbaT  MZ |
| 74-75 | Practice Problems: Remove duplicates from a vector,  Implement Own ArrayList in Java | https://www.geeksfor geeks.org/how-toremove-duplicateelements-from-thevector-in-java/ | https://www.youtube.c om/watch?v=QmNsqVi0  B8U |
| 76-77 | Collections Interfaces- Arrays,  Vector, Stack | https://www.javatpoi nt.com/java-vector | https://www.youtube.c om/watch?v=rI3VkItC0e A&list=PLd3UqWTnYXOk  VR3OR9UZGyEt9RFUbaT  MZ |
| 78-79 | Practice Problems: Cut the chocolate smartly for maximum pieces, Find all pairs with sum K, Product Array - Ignoring the next | https://www.geeksfor geeks.org/print-allpairs-with-given-sum/ | https://www.youtube.c om/watch?v=5L9Jrehvo ew |
| 80-82 | IO Streams: Stream Classes: Byte Streams, Character Streams, StreamTokenizer. | https://www.clear.rice .edu/comp212/00-  fall/tutorials/09/io.ht ml | https://www.youtube.c  om/watch?v=Uifd8FATQ iY |
| 83-85 | Practice Problems: Capitalize First Letter of every Word in a File, Strip  HTML tags from a file | https://www.geeksfor geeks.org/javaprogram-to-capitalizethe-first-letter-ofeach-word-in-a-string/ | https://www.youtube.c om/watch?v=xz8j1esbO  AQ |
| 86-88 | JDBC Connectivity: Introduction, Architecture of JDBC Database Connection | https://www.geeksfor geeks.org/introductio  n-to-jdbc/ | https://www.youtube.c om/watch?v=Lpg6UJSxtk |
| 89-90 | JDBC Connectivity: Establishing JDBC Database Connection. | https://www.geeksfor geeks.org/establishing -jdbc-connection-injava/ | https://www.youtube.c om/watch?v=7v2OnUti2 eM |

1. **Action plan for different types of learners**

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| --- | --- | --- |
| **Slow Learners** | **Average Learners** | **Fast Learners** |
| * Remedial Classes on Saturdays * Encouragement for improvement using Peer Tutoring * Use of Audio and Visual Materials * Use of Real-Life Examples | * Workshops * Formative Exercises used to highlight concepts and notions * E-notes and E-exercises to read ahead of the pedagogic material. | * Engaging students to hold hands of slow learners by creating a Peer Tutoring Group * Design solutions for complex problems * Design solutions for complex problems * Presentation on topics beyond those covered in CHO |

1. **Evaluation Scheme & Components:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Evaluation**  **Component** | **Type of Component** | **No. of Assessments** | **Weightage of Component** | **Mode of Assessment** |
| Component 2 | Subjective Test/Sessional Tests (STs) | 02\* | 40% | Online oncampus |
| Component 3 | End Term Examinations | 01\*\* | 60% | Online oncampus |
| **Total** |  |  | **100%** |  |

\*Best 1 Sessional Test will be counted for final assessment.

\*\*As per Academic Guidelines, a minimum of 75% attendance is required to appear for the End Term Examination.

1. **Syllabus of the Course:**

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| --- | --- |
| **Subject: Java Programming / 22CS031** |  |

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| --- | --- | --- | --- | --- |
| **S. No.** | **Topic (s)** |  | **No. of Sessions** | **Weightage %** |
| 1 | **Introduction to JAVA:** Java Introduction, History and goals of Java, Fundamentals of OOPs, Overview of JDK, JVM, Garbage Collection, Java Basics: Identifiers, Keywords, Java Data Types & Operators, Control Statements: Decision Constructs, Using Loop Constructs, Command Line Arguments, Working with  **Arrays:** Creating and Using Arrays (1D, 2D, Multidimensional), Jagged Arrays, Classes & Objects: Classes, objects and methods: defining a class, Access Control, Method overloading, constructors, constructor overloading, use of this and static, **Inheritance:** Working with Inheritance: Inheritance Basics & Types, Using super, Method Overriding, Dynamic method dispatch, final keyword, Abstract Methods & Classes,  **Packages & Interfaces:** Built-In Packages and User Defined Packages. |  | **38** | **40%** |
|  | **ST-1 (Covering 40% syllabus)** | |  |  |
| 2 | **Interfaces:** Declaration, Implementation, Extending Classes and Interfaces.  **Strings, StringBuffer, StringBuilder & StringTokenizer:** Introduction, Immutable String, Methods of String class, String Buffer class & StringBuilder class, toString method, StringTokenizer class.  **Exception Handling:** Exception handling fundamentals, Exception types, try and catch, multiple |  | **27** | **40%** |

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|  | catch clauses, nested try, throw, throws and finally, Creating custom Exception.  **Multithreading:** Java thread model, main thread, creating thread by implementing Runnable and extending thread class, creating multiple threads, using isAlive() and join(), thread priorities.  Synchronization  **Generics:** Introduction, Generic Example, Generic Class, Generic Method, Generic Constructor and Generic Interfaces. |  |  |
| **ST-2 (Covering 40% syllabu** | | **s)** |  |
| 3 **Collections Framework:** Introduction, Collection Interfaces-List, Queue, Set (Overview), Collection Classes: ArrayList, LinkedList, Iterator, Working with Maps (Overview), Comparable & Comparator, Arrays, Vector, Stack.  **IO Streams:** Stream Classes: Byte Streams, Character Streams, StreamTokenizer.  **JDBC Connectivity:** Introduction, Architecture of JDBC Database Connection, Establishing JDBC Database Connection. | | **20** | **20%** |
| **End Term 100% syllabus** | |  |  |

**This Document is approved by:**

|  |  |  |
| --- | --- | --- |
| **Designation** | **Name** | **Signature** |
| **Course Coordinator** | Ms. Shivani Wadhwa |  |
| **Head-Academic Delivery** | Dr. Susheela Hooda |  |
| **Dean** | Dr. Rupali Gill |  |
| **Dean Academics** | Dr. Monit Kapoor |  |
| **Date** | 23.07.2024 |  |

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