**FF No.: 654**

**COURSE CODE: CS2218 COURSE NAME: OBJECT ORIENTED PROGRAMMING**

**Course Prerequisites**:

Basic course on programming

**Course Objectives:**

1. Understand Object Oriented programming concepts
2. Demonstrate Object Oriented programming concepts by writing suitable Java programs
3. Model a given computational problem in Object Oriented fashion
4. To develop problem solving ability using Object Oriented programming constructs like multithreading.
5. Develop effective solutions using for real world problems using the concepts such as file handling and GUI.
6. Implement applications using Java I/O and event-based GUI handling principles

**Credits: 4                                                         Teaching Scheme Theory: 2 Hours/Week**

**Tut:  1 Hours/Week**

**Lab: 2 Hours/Week**

**Course Relevance:**

This is an important course for engineering students. It develops computational problem solving and logic building capability of students. Acquiring programming skills has a high relevance in all branches of Engineering. Once the student gains expertise in coding, this course proves to be beneficial to them to excel in industry demanding coding in specific software.

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| **Introduction:**  What is Object Oriented Programming (OOP)? The need of OOP, Characteristics of OOP.  **Java overview**: Classes and Objects, Java object storage, Access Modifiers, this reference, main method, Static vs. Instance block, Static methods vs. Instance methods in Java.  **Constructors:** Constructors in Java, Default constructor, Parameterized constructor.  **Input and Output:** Byte Stream vs. Character Stream, use of Scanner Class.  **Arrays in Java:** Arrays in Java, initialization, Default Array values, multi-dimensional array, java.util .Arrays class, string class, string buffer, string builder.  **Methods in Java:** Methods, Parameters passing, Returning Multiple values.  **Inheritance:** Inheritance in Java, Types, Constructor in Inheritance, Using final with Inheritance, Accessing superclass member, Parent and Child classes having same data member, Base vs derived class reference. Polymorphism: Method Overloading, Overloading main(), Static vs Dynamic Binding, Method Hiding. Private and final methods, Passing and Returning Objects in Java  **Exception Handling:** Exceptions, types, types of handling exception, Checked vs Unchecked Exceptions, Throw and Throws, User-defined Exception.  **Interfaces and Abstract Classes:** Interface and its usage, Abstract Class and its usage, Difference between Abstract Class and Interface, Nested Interface, Nested Class, Inner class, Anonymous  **Collection in Java:** Collections Class, Using Iterators, Iterator vs. Foreach, Array List, Vector, Map, Set.  **Multithreading:** Thread life Cycle, Thread Priority, Thread Methods.  **File Handling:** File Processing, Primitive Data Processing, Object Data Processing, Connecting Java with database (JDBC/ODBC).  **Java GUI**: Swing, Components. Layout Manager: Flow, Border, Grid and Card. Label, Button, Choice, List, Event Handling (mouse, key). |
| **List of Practical’s:**   1. Implement Student class using following Concepts  * All types of Constructors * Static variables and instance variables * Static blocks and instance blocks * Static methods and instance methods  1. There is a class Adder which has two data members of type 1D int array and int variable. It has two functions: getdata and numsum. Function getdata accepts non-empty array of distinct integers from user in 1D int array data member and a targetsum in another data member. The function numsum adds any two elements from an input array which is equal to targetsum and return an array of resulting two elements, in any order. If no two numbers sum up to the target sum, the function should return an empty array. Note that the target sum is to be obtained by summing two different integers in the array; you can’t add a single integer to itself in order to obtain the target sum. You can assume that there will be at most one pair of numbers summing up to the target sum. Use constructor. Use extra variables if needed   Input:  Array=[3,5,-4,8,11,1,-1,7] targetsum=15  Output: [8,7]  Input:  Array=[3,5,-4,8,11,1,-1,6] targetsum=15  Output: []   1. Write Java program to calculate area of triangle, square & circle using method overloading. Method parameters accept from user (Use Method Overloading concepts and Inheritance). 2. Write a program for following exception, develop a suitable scenario in which the following exceptions occur:    1. divide by zero    2. Array index out of bounds exception    3. Null pointer Exception 3. Write a java program to solve producer-consumer problem where there are two producer threads and one consumer thread OR Write a java program using collection classes. 4. Implement various operations using JDBC Connectivity. 5. Display bank account information ( Use interface and inheritance using java) 6. Develop a GUI in java which reads, update the file. |
| **List of Course Projects:**   |  | | --- | | 1. Airline reservation system | | 1. Course management system | | 1. Data visualization software | | 1. Electricity billing system | | 1. e-Healthcare management system | | 1. Email client software | | 1. Library management system | | 1. Network packet sniffer | | 1. Online bank management system | | 1. Online medical management system | | 1. Online quiz management system | | 1. Online Survey System | | 1. RSS feed reader | | 1. Smart city project | | 1. Stock management system | | 1. Supply chain management system | | 1. Virtual private network | | 1. Pocket Tanks  Game Java Project | | 1. Internet Banking | | 1. Hospital Management Java Project | | 1. Teachers Feedback Form Java Project | | 1. Online Job Portal Java Project | | 1. Online Examination Java Project | | 1. Alumini Database Java Project | | 1. Virtual Classroom Java Project | | 1. Lan Chat and File Sharing Java Project | | 1. Payroll System Java Project | | 1. Online Exam Java Project | | 1. Java Game mini Project | | 1. Online Shopping Java Project | | 1. Online Library Management System | | 1. Feedback Collection System java project | | 1. Text Editor in Java Project | | 1. Moving Balls using Java Applet | | 1. Online Reservation System Project | | 1. Web skeletonizer service | | 1. Web Enabled Manufacturing Process Project | | 1. Album Manager Project | | 1. Global Communication Network | | 1. Library System project | | 1. Link Handler System Project | | 1. Crypto system Project | | 1. Scheduling and Dispatching project | | 1. Intranet Mailing System | | 1. Online Examination System Project | | 1. Business to Customer System Project | | 1. University Admission & Maintenance System | | 1. Campaign Management System Project | | 1. Content Management System Project | | 1. Digital Library System Project | | 1. Contract Labour Management System Project | | 1. Pay Roll System Project using Java | | 1. Revenue Recovery System Project | | 1. Online medical Booking Store Project | | 1. Client Management System Project | | 1. Tele Dormitory System Project | | 1. Reusable CAPTCHA security engine Project | | 1. Mobile Service Provider System | | 1. Forestry Management System | | 1. Distributed Channel management System | | 1. Online Tenders Management System | | 1. Noble Job Portal System | | 1. Energy Audit Processing System | | 1. Collector Monthly Review System | | 1. Grievance Handling System | | 1. Student Project Allocation and Management Project | | 1. Web Based Reporting System | | 1. Vehicle Identification System | | 1. Diamond Shipping System | | 1. Visa Processing System | | 1. Enterprise Fleet Management System | | 1. Global Communication Media | | 1. HR Help Desk System | | 1. SQL Workbench Project | | 1. Remarketing System project | | 1. Cargo Express Courier project | | 1. Automated Sports Club Project | | 1. Multi Banking System Project | | 1. Java Application World | | 1. Cricket Game Java Project | | 1. Email Program System | | 1. Employee Information and Payroll System | | 1. Complete Mailing System | | 1. Complete Banking System | | 1. College Library Application System | | 1. Colleges Enrollment System | | 1. Car Sales System | | 1. Bus Booking System | | 1. Bug Tracking System | | 1. University Admission Management System Java Project | | 1. Beat It Game in Java | | 1. Civilization Game Project | | 1. Airways Reservation System | | 1. Airstrike System Game | | 1. Pong Game Java Project | | 1. Faculty Book System | | 1. Bank Application System | | 1. ATM Database System | | 1. Advanced Payroll System | | 1. Virtual Private Network Java Project | | 1. ISP Automation System | | 1. Life Insurance Management System | | 1. Help Desk Management System | | 1. Datamart Management System | | 1. Automated Sports Club System | | 1. University Search Engine Project | | 1. Online Exam Suite Project | | 1. Forensic Management System | | 1. Student Registration System | | 1. E Mail Scanning Project | | 1. Criminal Face Detection System | | 1. Web Server Management System Java Project | | 1. Stores Management System | | 1. Bug Tracking System Java Project | | 1. Career Information Management System Java Project | | 1. Course Management System Java Project | | 1. Data Visualization Software Java Project | | 1. Digital Steganography Java Project | | 1. E Health Care Management System Java Project | | 1. Electricity Billing System Java Project | | 1. Email Client Software Java Project | | 1. Event Management System Java Project | | 1. Farmers Buddy Java Project Java Project | | 1. File Transfer and Chat Java Project | | 1. Knowledge Evaluator Software Java Project | | 1. Library Management System Java Project | | 1. Mail Server Java Project | | 1. Network Packet Sniffer Java Project | | 1. Number Guessing Game Java Project | | 1. Online Attendance Management System Java Project | | 1. Online Bank Management System Java Project | | 1. Online Book Store | | 1. Online Customer Care and Service Center Java Project | | 1. Online Document Management System Java Project | | 1. Online Examination Management System Java Project | | 1. Online Medical Management System Java Project | | 1. Online Quiz System Java Project | | 1. Online Survey System Java Project | | 1. Photo Lab Management System Java Project | | 1. RSS Feed Reader Java Project | | 1. Smart City Project Java Project | | 1. Stock Management System Java Project | | 1. Student Result Processing System Java Project | | 1. Supply Chain Management System Java Project | | 1. Telephone Billing System Java Project | | 1. Travel Management System Java Project | | 1. Currency Converter | | 1. Career Information Management System | | 1. Digital Steganography | | 1. Event Management System | | 1. Farmers Buddy | | 1. File Transfer and Chat | | 1. Knowledge Evaluator Software | | 1. Mail Server | | 1. Number Guessing Game | | 1. Online Attendance Management System | | 1. Online Customer Care and Service Center | | 1. Online Document Management System | | 1. Online Examination Management System | | 1. Online Quiz System | | 1. Photo Lab Management System | | 1. Student Result Processing System | | 1. Travel Management System | | 1. University Admission Management System | | 1. Web Server Management System | | 1. Address Book Management System | | 1. Affiliate Manager | | 1. Ajax Browser | | 1. Application Installer Software | | 1. Application Re-installer Software | | 1. ATM Simulator System | | 1. Automatic File Update | | 1. Bookmark Sync | | 1. Bus Ticket Reservation System | | 1. Calendar Icon Maker Application | | 1. CSS Colour and Image Annotator | | 1. Cybercafé Management System | | 1. Data Encryption | | 1. Database Explorer | | 1. Directory and File Explorer | | 1. Domain Search Engine | | 1. E-Acquisition | | 1. E-Advertisement | | 1. E-Learning | | 1. Enterprise Scheme Planner | | 1. Face Identification | | 1. File and Folder Explorer | | 1. Font Detector/Finder | | 1. HTML Color Code Finder | | 1. HTML Spell Checker | | 1. Image Compressor Application | | 1. Image to Text Converter | | 1. Internet Credit Card System | | 1. Internet Usage Monitoring System | | 1. Intrusion Detection in Wireless Sensor Network | | 1. Keyword Finder and Number Calculator | | 1. Language Emulator | | 1. Mac Ethernet Address | | 1. Malware Scanner | | 1. MP4 Video Converter | | 1. Online Auction | | 1. Online Magazine | | 1. Password Protector and Reminder | | 1. PDF Converter | | 1. Pharmacy Management System | | 1. Port Scanner | | 1. Process Analysis in Asynchronous System | | 1. Remote Desktop Administrator | | 1. Resource Planner and Organizer | | 1. Search Engine | | 1. Security System for DNS using Cryptography | | 1. SmartFTP Uploads | | 1. Synchronous Conferencing System | | 1. Text to HTML Converter | | 1. Unicode Font | | 1. Voice Chatting and Video Conferencing | | 1. Voice Compressor Software | | 1. Windows Fixer | | 1. XML Compactor | |
| **Reference Books:**  *1. Bruce Eckel, “Thinking In Java – The Definitive Introduction to Object-Oriented Programming in the Language of the World-Wide Web”, Fourth Edition, Pearson Education, Inc.*  *2. R. Morelli and R. Walde, “Java, java, Java – Object-Oriented Problem Solving”, 3rd edition, Pearson Education, Inc.*  *3.* “JAVA- The Complete Reference”, Herbert Schildt, 11th Edition, McGraw Hill Education |
| **Moocs Links and additional reading material:**  Programming using Java| Java Tutorial | By Infosys Technology  https://infyspringboard.onwingspan.com/en/app/toc/lex\_auth\_01304972186110361645\_shared/overview  An Introduction to Programming through C++ – Prof A.G. Ranade- NPTEL- computer science and engineering – NOC https://nptel.ac.in/courses/106/101/106101208/# |
| **Course Outcomes:**  The student will be able to –  1. Understand object-oriented programming features.  2. Apply the knowledge of Java IO and arrays to design real world problem.  3. Analyze and implement the complex real world problem using OOP concepts such as classes, inheritance and polymorphism.  4. Solve computing problems by applying the knowledge of Exception handling and Multithreading  5. Design solutions by choosing suitable data structures such as Array, Vector, Map etc  6. Implement applications using Java I/O and event-based GUI handling principles |
| **Future Courses Mapping:**  1.     Advanced Data Structures, Advanced Java, Spring Frame Work, Grails Frame Work |
| **Job Mapping:**  1.     Java Programmer, Application Developer, Design Engineer, Senior Software Developer |
| CO-PO-PSO Mapping   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | | CO1 | 3 | 2 |  |  |  | 2 |  |  |  |  |  |  | 3 |  |  |  | | CO2 | 3 |  | 3 |  | 3 | 3 | 2 | 2 | 2 |  |  |  |  |  | 3 | 3 | | CO3 | 3 |  | 3 |  | 3 | 3 | 2 | 2 | 3 |  |  |  | 2 |  | 3 | 3 | | CO4 | 3 | 2 | 3 |  | 3 | 3 | 2 | 2 | 3 |  |  | 2 |  | 3 |  |  | | CO5 | 3 |  | 3 |  | 3 | 2 | 2 | 2 | 2 |  |  |  |  |  | 3 |  | | CO6 | 3 | 2 | 3 | 2 | 3 | 2 |  | 2 | 3 |  | 2 | 2 |  |  |  | 3 | |