Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

1/2 M.Tech. FIRST SEMESTER

CSCS1T6 OBJECT ORIENTED PROGRAMMING Credits: 4

Lecture: 4 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Objectives:

The objective of this class is to:

1. Cover issues related to the definition, creation and usage of classes, objects and methods.
2. Discuss the principles of inheritance and polymorphism and demonstrate though problem
3. Analyses how they relate to the design of methods, abstract classes and interfaces.
4. Provide the foundation of good programming skills by discussing keys issues to the design of object-oriented software, including programming design patterns, automatic documentation techniques and programming testing.
5. Cover the basics of creating APIs as well as allow students to explore the Java Abstract Programming Interface (API) and Threads implementation
6. Discuss basic principles and tools of collaborating to program servlets and Data base related programs

Learning Outcomes:

Upon completion of this class, students should be able to:

1. Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
3. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers,
4. Use testing and debugging tools to automatically discover errors of Java programs as well
5. Develop programs using the JDBC API as well as the JEE class library for development of servlets.

UNIT – I

Object Oriented Programming Paradigms: Evolution of a new paradigm, natural way of solving a Problem, Abstraction, Interface and Implementation, Encapsulation, Comparision of Natural and Conventional Programming Methods, OO Programming Paradigms, Classes and Objects, Features of OO Programming, Modularity, Designing a class, Design Strategies in OOP , Comparision of Structured and OO Programming, OO Languages, Requirements of using OOP Approach, Advantages, Limitations and Applications of OOP, Java Platform and Program Structures and Lexical Elements of Java.

UNIT – II

Operators and Expressions: Categories of Operators, Expressions, Binding, Side Effect, Features of Operators, Evaluation of Expressions, Type Conversion, Numeric Promotion Arithmetic Expressions, Relational and Logical Operators, Shift Operators, One's Complement Operator, Explicit Type Conversion, String Concatenation, Operator Precedence and Associativety.

Control Flow Statements: Classification of Statements, if-else control constructs, Switch-Case Control Construct, enum Types and Conditional Statements, Loop Constructs: While, Do-While and for, Unconditional Execution, Block, Declaration and Empty Statements .

Arrays: Classification of Arrays, Creation, Reading and Writing, and Initialization of Arrays, Features of Arrays, Passing Array as a Parameter, Applications of Arrays and Recursive Methods.

UNIT- III

Classes and Objects: Classes, Objects, Constructors, Access Modifiers, Classification of Methods, Instance Methods, Parameter Passing, Invoking Methods, Methods of Overloading, the this Reference, State Fields and Methods, Static Members, Java Program Structure and Nested Classes.

Inheritance: Introduction, Derived Classes, Types of Inheritance, Implementation, Inheritance and Member Accessibility, Constructors in Derived Classes, Overriding and Hiding Fields and Methods, keyword Super, Abstract classes and Methods, The Final Classes and Final Methods, Java Class Hierarchy, Dynamic Binding, Polymorphism, Advantages of Inheritance, Example Programs for Multilevel Inheritance and Hierarchical Inheritance.

UNIT – IV

Interfaces: Introduction, Declaration and Implementations of Interfaces, Polymorphism in Interfaces, Multilevel & Multilevel Inheritance, Explicit Interface Member Implementations, Validating Interfaces, Problems in Interfaces because of Inheritance,

Packages: Putting Classes Together, Java Foundation Packages, Package Naming Conventions, Creating Packages, Accessing Classes from Packages, Using a Package, Adding a Class to an Existing Package, Packages and Name Clashing, Extending a Class from Package, Creating Environment Variables.

Exception Handling: Introduction, Exception Handling, Exception Programming, User- Defined Exceptions and Debugging Java Programs.

UNIT – V

Strings and Collections: Introduction, String Class, String Manipulation, String Buffer, Command-Line Arguments, Java.util, String Tokenizer, Collection Framework and Its Components, Accessing the Collection class, Legacy Collection Types, Wrapper Classes, Generic Data Types and Collections and Frequently used Collections.

Streams and I/O Programming: Introduction to Streams, Java Stream API, File Management, File Processing, Primitive Data Programming, Object Processing and Retrieving Data from Console.

UNIT –VI

Socket Programming: Introduction, Socket Programming and Java.net Class, TCP/IP Socket Programming, UDP Socket Programming, Example Network Application: Math Server and URL Encoding.

Multithreaded Programming: Introduction, Defining Threads, Threads in Java, Thread Life Cycle, A Java Program with Multiple Threads, Thread Priority, Thread Methods, Multithreaded Math Server and Concurrent Issues with Thread Programming.

UNIT-VII

Java AWT, Swing and Applets: Introduction, Graphics Programming, Handling Events, Swing Components, Advanced Swing Components, Model – View-Controller, Java Applet, Building GUI Applications.

UNIT – VIII

JDBC and Servlets: Introduction, Types of JDBC Drivers, Using HSQL Database, JDBC Connection, JDBC Update Operations, JDBC Query Operation, Using Prepared Statement, Stored Procedure and JDBC Transaction Support.

Servlets: Introduction, Apache Tomcat Servlet Container, Servlet Life Cycle, Servlets, in Action – Initializing Servlet, Processing HTTP GET request & HTTP POST request, Resolve view from Properties file, Rendering PDF view, Deployment, Cookies & Session and Filtering Request.

Learning Resources

Text Book:

1. Object-Oriented Programming with JAVA : Essentials and Applications, Rajkumar Buyya, S Thamarai Selvi, Xingchen Chu (2009), Tata McGraw Hill

Reference Books:

1. Java: The complete reference, 7/e, Herbert Schildt, TMH.
2. Java: How to Program, 8/e, Dietal, Dietal, PHI
3. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
4. Introduction to Java programming 6^{th} edition, Y. Daniel Liang, Pearson Education.
5. Core Java 2, Vol 1, Fundamentals, 8/e, Cay.S.Horstmann, Gary Cornell, Pearson.
6. Core Java 2, Advanced Features, 8/e, Cay.S.Horstmann, Gary Cornell, Pearson.