ICT.Ed.455 : Java Programming Language

Course No. : ICT.Ed.455 | Nature of course: Theoretical + Practical
Level: Bachelor. | Credit Hour: 3 hours (2T+1P)
Semester: Fifth | Teaching Hour: 80 hours (32+32)
Program: BICTE

1. **Introduction:**

   This course covers object-oriented dimensions of computer programming. It aims to provide students with knowledge and skills on programming terminologies including features of object oriented, data type, operators, variables, constants, control statements, arrays, classes and objects, inheritance and interfaces, exception handling, multithreading programming, I/O handling, event handling, swing and java database connectivity.

2. **Course Objectives:**

   After the completion of this course, the students should be able to:

   - explain the Java programming environment
   - describe and apply the concepts of programming elements using Java and object-oriented programming concepts
   - make use of multithreading programming, exception handling and input/output handling in Java
   - apply the event handling, GUI programming using swing, and Java database connectivity

3. **Course Outlines:**

Specific Objectives	Contents	Teaching Hours (T+P)
• Describe the basic concept of Java Programing • Make use of different data types and variable. • Use control structure to control execution of programs	**Unit 1: Java Fundamentals, Data Types, Operators and Control Statements** 1.1. History and Philosophy of Java 1.2. Object Oriented Programming 1.3. Java Development Kit 1.4. A First Simple Java Program 1.5. Packages in Java 1.6. Java's Data Types 1.6.1 Integers 1.6.2 Characters 1.6.3 Floating Point Types 1.6.4 Strings	7+7

	1.6.5 Arrays 1.6.6 The Boolean Types 1.7. Literals 1.7.1. Hex, Octal and Binary 1.7.2. Character Escape Sequences 1.7.3. String Literals 1.8. Variables and Constants 1.9. Operators 1.10. Type Casting 1.11. Control Statements 1.11.1. if statement 1.11.2. switch statement 1.11.3. loop statement 1.11.4. continue statement 1.11.5. break statement **Practical Work** • Installation of Java SE and Editors (Notepad++ or NetBeans or Eclipse) on local machine • Writing, Compiling and Executing the first program • Realize different data types in programs • Make use of variables and constants • Write programs to realize different types of operators • Write expression to deploy type conversion • Apply Decision Making and Loop Control • Apply String manipulation and array manipulation	
• Explain and apply the principles of the object-oriented programming • Create programs with methods, constructors, nested and inner classes	**Unit 2: Introducing Classes, Objects and Methods** 2.1 Class Fundamentals 2.2 Object Creation 2.3 Methods 2.4 Command Line Arguments 2.5 Constructors 2.6 Garbage Collection 2.7 This keyword	**6+6**

• Explain garbage collection and variable length arguments • Analyze and apply static fields and methods, this keyword • Demonstrate skills to write. Program to illustrate class and objects, and implement command line arguments in Java • Able to write program with multiple methods	2.8 Static Fields and Methods 2.9 Nested and Inner Classes 2.10 Variable Length Arguments **Practical Work** • Write program to illustrate Class and objects. • Implement command line arguments in java • Write program with multiple methods • Write program that contains constructors • Write program to make use of static methods and members	
• comprehend inheritance, polymorphism, abstract classes and interfaces • Describe and apply access control, super and final keyword • Demonstrate skills for writing program to illustrate simple hierarchical and multilevel inheritance, and implement polymorphism. • Design abstract class, and create and make use of interface	**Unit 3: Inheritance and Interfaces** 3.1 Inheritance Basics 3.2 Inheritance and Constructors 3.3 super keyword 3.4 Method Overriding 3.5 Polymorphism 3.6 Dynamic Binding 3.7 final Keyword 3.8 Abstract Classes 3.9 Access Specifiers 3.10 Interfaces **Practical Work** • Write program to illustrate simple, hierarchical and multilevel inheritance. • Write program to implement polymorphism. • Design abstract class. • Create and make use of interface.	**4+4**
• Explain how to deploy error handling gracefully in java • Describe process of deploy multithreading • Describe and apply skills for writing program to implement exception handling in program, and	**Unit 4: Exception Handling and Multithreading** 4.1 The Exception Hierarchy 4.2 Exception handling fundamentals 4.3 Throwing, Re-throwing and Catching Exceptions 4.4 try, catch, throw, throws, and finally keywords 4.5 Multithreading fundamentals	**3+3**

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apply try, catch, throws and finally • Apply of theoretical knowledge to Write program to create threads and multiple threads	4.6 Thread class and Runnable Interface **Practical Work** • Write program to implement exception handling in program. • Apply try, catch, throws and finally • Write program to create threads and multiple threads	
• Identify different I/O streams in Java • Read and Write File effectively • Access files randomly	**Unit 5: Using I/O** 5.1 Console and File I/O 5.2 Opening and closing files 5.3 Scanner Class 5.4 Byte Streams and Character Streams 5.5 Reading and Writing Byte Streams 5.6 Reading and Writing Character Streams 5.7 Random Access Files **Practical Work** • Write program to apply different input and output classes. • use various methods for file I/O	**4+4**
• Describe philosophy and contents of Swing, layout manager and events handling. • Describe process of swing event handling and generate layout with layout managers • Build GUI with Swing components. • Connect the data and java interface using JDBC	**Unit 6: Introducing Swing and Java Database Connectivity (JDBC)** 6.1 Design philosophy of Swing 6.2 Components and Containers 6.3 Layout Managers 6.4 Swing Event Handling 6.5 Basic Swing Components: JButton, JTextField, JCheckBox, JList 6.6 Use Anonymous Inner Classes to Handle Events 6.7 The Design of JDBC 6.8 Executing SQL Statements 6.9 Query Execution **Practical Work** • Write program to apply event handling classes	**8+8**