Course Title: **Java Programming**

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+48)

1. **Introduction:**
   This course covers object oriented paradigm of computer programming. It aims to provide ideas 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.
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2. **Course Objectives:**
   After the completion of this course, the students should be able to:
   - explain the Java programming environment
   - describe 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)

• understand 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
	    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
		7+13

	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 the principles of the object-oriented programming
• Create programs with methods, constructors, nested and inner classes
• Understand garbage collection and variable length arguments
• Realize static fields and methods, this keyword
	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
	  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
		6+8

• Learn inheritance, polymorphism, abstract classes and interfaces • Understand access control, super and final keyword	**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+8**
• Deploy error handling gracefully in java • Deploy multithreading	**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 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	**3+3**
• 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**

	Unit 6: Introducing Swing and Java Database Connectivity (JDBC)	8+12
• Handle the events • Generate layout with layout managers • Build GUI with Swing components. • Connect the data and java interface using 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 • Design layout using swing • Write java program that establish connection with database and execute CRUD operations using JDBC	

4   Instructional Techniques

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, brain storming are used in all units.

4.2 Specific Instructional Techniques

Demonstration is an essential instructional technique for all units in this course during teaching learning process. Specifically, demonstration with practical works will be specific instructional technique in this course. The details of suggested instructional techniques are presented below:

Laboratory Work: The laboratory work includes writing programs to understand all the programming concepts of Java including data types, operators, control statements, objects and classes, inheritance, interface, multithreading, exception handling, input/output handling, event handling, swing and JDBC.

5   Evaluation

Internal Assessment	External Practical Exam/Viva	Semester Examination	Total Marks
40 Points	20 Points	40 Points	100 Points

Note: Students must pass separately in internal assessment, external practical exam and semester examination.

a.   Internal Evaluation (40 Points):

Internal evaluation will be conducted by subject teacher based on following criteria:

1) Class Attendance   5 points
2) Learning activities and class performance   5 points
3) First assignment (written assignment)   10 points
4) Second assignment (Case Study/project work with presentation) 10 points
5) Terminal Examination   10 Points

Total	40 points

b.   Semester Examination (40 Points)

Examination Division, Dean office will conduct final examination at the end of semester.

1) Objective question (Multiple choice 10 questions x 1mark) 10 Points
2) Subjective answer questions (6 questions x 5 marks)   30 Points

Total points	40

c. External Practical Exam/Viva (20 Points):

Examination Division, Dean Office will conduct final practical examination at the end of semester.

6   Recommended books and References materials (including relevant published articles in national and international journals)

Prescribed Text Book:

Java: A Beginner's Guide (2022), 9ᵗʰ Ed., Herbert Schildt, MC Graw Hill

Recommended books:

Core java Volume I – Fundamentals, Ninth Edition, Cary S. Horstmann and Gary Cornell

Core java Volume II – Advanced Features, Ninth Edition, Cary S. Horstmann and Gary Cornell

Java: The Complete Reference, Ninth Edition, Herbert Schildt

Effective Java, Third Edition, Joshua Bloch

Head First Java, 2nd Edition, Kathy Sierra and Bert Bates