GUJARAT TECHNOLOGICAL UNIVERSITY

OBJECT ORIENTED PROGRAMMING USING JAVA
SUBJECT CODE: 2150704
B.E. 5th SEMESTER

Type of course: Core

Prerequisite: none

Rationale: Java is a general-purpose computer programming language that is a class-based, object-oriented. It is intended to let application developers "write once, run anywhere" meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. UML (Unified Modeling Language) is a modeling language used by software developers. UML can be used for modeling a system independent of a platform language. UML is a graphical language for visualizing, specifying, documenting information of software systems. UML is a standard way to write a system model that covers conceptual ideas.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	Weightage (Out of 100%)
1	**Basics of Java:** Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.	2	5
2	**Array and String:** Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.	2	5
3	**Classes, Objects and Methods:** Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.	6	15
4	**Inheritance and Interfaces:** Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword,Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class,Comparison between Abstract Class and interface, Understanding of System.out.println –	6	10

	statement.		
5	**Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control	2	3
6	**Exception Handling:** Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.	5	10
7	**Multithreaded Programming:** Use of Multithread programming, Thread class and Runnable interface , Thread priority, Thread synchronization, Thread communication, Deadlock	4	5
8	**IO Programming:** Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader	5	10
9	**Collection Classes :** List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introuduction to Java.util package	1	2
10	**Networking with java.net** InetAddress class,Socket class, DatagramSocket class, DatagramPacket class	2	5
11	Introduction to Object orientation, Modeling as a Design Technique Modeling Concepts ,abstraction, The three models, Class Model, State model and Interaction model.	1	2
12	Class Modeling Object and class concepts, link and association, Generalization and Inheritance	3	5
13	Advanced class Modeling Advanced Object and class concepts, Association Ends, N-ary associations, aggregation, abstract classes, multiple inheritance, Metadata, Constraints, Derived data, Packages.	3	5
14	State modeling **E**vents, states, Transition and conditions, state diagram, state diagram behavior	2	8
15	Interaction Modeling Use case Models, sequence models, activity models	4	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	45	10	5	-	-

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1) Java Fundamentals A comprehensive introduction By Herbert Schildt, Dale Skrien, McGraw Hill Education.
2) Programming with Java A Primer – E.Balaguruswamy,Mc Grawhill
3) The Complete Reference, Java 2 (Fourth Edition),Herbert Schild, - TMH.
4) Core Java Volume-I Fundamentals Horstmann & Cornell, - Pearson Education. - Eight Edition
5) Object Oriented Modeling and Design with UML
   Michael Blaha and James Rambaugh – PEARSON second edition
6) UML Distilled: A Brief Guide to the Standard Object Modeling Language (3rd Edition) by Martin Fowler

Course Outcome:

After learning the course the students should be able to:

i. Undertand object oriented programming concepts and implement in java.
ii. Comprehend building blocks of OOPs language, inheritance, package and interfaces.
iii. Identify exception handling methods.
iv. Implement multithreading in object oriented programs.
v. Prepare UML diagrams for software system

List of Experiments:

1. Write a program to convert rupees to dollar. 60 rupees=1 dollar.
2. Write a program that calculate percentage marks of the student if marks of 6 subjects are given.
3. Write a program to enter two numbers and perform mathematical operations on them.
4. Write a program to find length of string and print second half of the string.
5. Write a program to accept a line and check how many consonants and vowels are there in line.
6. Write a program to count the number of words that start with capital letters.
7. Write a program to find that given number or string is palindrome or not.
8. Create a class which ask the user to enter a sentence, and it should display count of each vowel type in the sentence. The program should continue till user enters a word "quit". Display the total count of each vowel for all sentences.
9. Write an interactive program to print a string entrered in a pyramid form. For instance, the string "stream" has to be displayed as follows:

```
    S
   S t
  S t r
 S t r e
S t r e a
S t r e a m
```

10. Write an interactive program to print a diamond shape. For example, if user enters the number 3, the diamond will be as follows:

```
    *
   * *
  * * *
   * *
    *
```

11. Create a class called Student. Write a student manager program to manipulate the student information from files by using FileInputStream and FileOutputStream
12. Refine the student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter

13. Refine the student manager program to manipulate the student information from files by using the DataInputStream and DataOutputStream. Assume suitable data
14. Prepare a class diagram for given group of classes using multiplicity, generalization, association concepts. And add at least 5-7 attributes and 3-5 operations for particular class Page, Shape, Point, Line, Arc, Ellipse, Rectangle, Circle
15. Prepare a class diagram for given group of classes using multiplicity, generalization, association concepts. And add at least 5-7 attributes and 3-5 operations for particular class. City, Airport, Airline, Pilot, Flight, Plane, Seat, Passenger
16. Categorize the following relationships into generalization, aggregation or association.
    [A] A country has a capital city
    [B] A dining philosopher uses a fork
    [C] A file is an ordinary file or a directory file
    [D] Files contains records
    [E] A polygon is composed of an ordered set of points
    [F] A drawing object is text, a geometrical object, or a group
    [G] A person uses a computer language on a object
    [H] Modems and keyboards are input/output devices
    [I] Classes may have several attributes
    [J] A person plays for a team in a certain year
    [K] A route connects two cities
    [L] A student takes a course from a professor
17. Prepare a state diagram for an interactive diagram editor for selecting and dragging objects
18. Prepare a use case diagram and sequence diagram for a computer email system
19. Prepare an activity diagram for computing a restaurant bill, there should be charge for each delivered item. The total amount should be subject to tax and service charge of 18% for group of six and more. For smaller groups there should be a blank entry. Any coupons or gift certificates submitted by the customer should be subtracted
20. Prepare a sequence diagram for issuing a book in the library management system

Design based Problems (DP)/Open Ended Problem:

1) Remove duplicate lines from a large text or given document.
2) Write a program to compute if one string is a rotation of another. For example, pit is rotation of tip as pit has same character as tip.

Major Equipment:

Computer ,Laptop

List of Open Source Software/learning website:

i. Java Development Kit: http://www.oracle.com/technetwork/java/javase/downloads/index.html
ii. http://docs.oracle.com/javase/specs/jls/se7/html/index.html
iii. http://docs.oracle.com/javase/tutorial/java/index.html
iv. http://www.javatpoint.com/
v. http://www.tutorialspoint.com/java/
vi. http://www.learnjavaonline.org/
vii. http://www.c4learn.com/javaprogramming/
viii. http://www.learn-java-tutorial.com/
ix. http://www.tutorialspoint.com/uml/
x. http://www.uml.org/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.