GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Biomedical Engineering (03)
SUBJECT NAME: Introduction to JAVA & Visual C++
SUBJECT CODE: 2170309
B.E. 7th SEMESTER

Type of course: Department Elective - I

Prerequisite: Computer Programming Utilization (C/C++ Language)

Rationale: The purpose of this course is to learn the fundamentals of JAVA and Visual C++ to develop the algorithms & applications related to biomedical engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	VIVA (V)	PA (I)	
3	0	2	5	70	30	30	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning.

Content:

Sr. No.	Content	Total Hrs	% Weightage
	Introduction to JAVA		
1	**The Basic Java Application**: Variables and Types, Objects and Subroutines, Text Input and Output, Details of Expressions, Programming Environments, Blocks, Loops, and Branches, Algorithm Development, Coding, Testing, Debugging, while and do..while, For, if and switch Statements, Exceptions and try..catch, Subroutines.	10	25
2	**Objects and Classes**: Objects and Instance Methods, Constructors and Object Initialization, Programming with Objects, Inheritance and Polymorphism, Abstract Classes, this and super, Interfaces, Nested Classes, and Other Details.	10	25
3	**Introduction to GUI Programming**: The Basic GUI Application, JFrame and JPanel, Components and Layout, Events and Listeners, Applets and HTML, JApplet, Applets on Web Pages, Graphics and Painting, Mouse Events, Timers, KeyEvents, and State Machines, JButton, JLabel, JCheckBox, JTextField and JTextArea, JComboBox, JSlider, Basic Layout Managers, Borders, SliderAndComboBoxDemo, A Simple Calculator, Using a null Layout, Menus and Dialogs.	15	30
	Introduction to Visual C++		
4	**Programming with Visual C++**: The Structure of a C++ Program, Defining Variables, Decisions and Loops, Arrays, Strings, and Pointers, Class Inheritance and Virtual Functions, Inheritance in Classes, Access Control Under Inheritance, Virtual Functions, Casting Between Class	5	10

	Types, Nested Classes.		
5	**Drawing in a Window:** Basics of Drawing in a Window, The Drawing Mechanism in Visual C++, Drawing a Line, Bounding Rectangles, Rectangle, Circle.	5	10
Total		45	

Reference Books:

1. Programming with Java: A Primer, E. Balagurusamy, Tata McGraw-Hill Education.
2. Introduction to Programming Using JAVA, David J. Eck, SoHo books.
3. Introduction to Java Programming: Comprehensive Version, Y. Daniel Liang, Prentice Hall.
4. Object Oriented Programming In Java, Dr. G.T.Thampi, John Wiley & Sons.
5. An Introduction to Java Programming and Object-Oriented Application Development, Richard Johnson, Thomson course technology.
6. Practical Java: Programming Language Guide, Peter Haggar, Addison-Wesley Professional.
7. Introduction to Java Programming, K. Somasundaram, Jaico Pulblishing House.
8. Programming for Everyone in Java, Per B. Hansen, Springer.
9. Beginning Java Programming: The Object-Oriented Approach, Bart Baesens, Aimee Backiel, Seppe vanden, John Wiley & Sons
10. Beginning Visual C++, Ivor Horton, Wiley Publishing, Inc.
11. Visual C++ Generic Programming, Namir Clement Shammas, Windcrest/McGraw-Hill.
12. Introduction to Windows and Graphics Programming with Visual C++.NET, Roger Mayne, World Scientific
13. Programming with Visual C++: Concepts and Projects, James Allert, Cengage Learning.
14. Visual C++ Programming, Steven Holzner, Brady.
15. Visual C++ Object-oriented Programming, Mark Andrews, SAMS Pub.

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	**U Level**	**A Level**	**N Level**	**E Level**
10%	**35%**	**30%**	**15%**	**10%**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate 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.

Course Outcome:

After learning the course, the students should be able to:

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java and Visual C++, including defining classes, invoking methods, using class libraries, etc.
3. Implement, compile, test and run Java and Visual C++ programs comprising more than one class, to address a particular software problem.
4. Design and test various GUI applications based on given problem statements.

List of Experiments: (Outlines)

Write a program to..

1. Find the average, sum, min and max of the N numbers Using user Input.
2. Test the Prime number.
3. Create a Simple class to find out the Area and perimeter of rectangle and box using super and this keyword.
4. Design a class account using the inheritance and static that show all function of bank (withdrawal, deposit) and generate account number dynamically.
5. Design a class Shape (Implement Runtime polymorphim) using abstract Methods and Classes.
6. Design a String class that perform String Method (Equal, Reverse the string, change case, trim etc.)
7. Implement Custom Exception.
8. Draw the line, Rectangle, oval, text etc using the graphics method.
9. Implement Smiley Face Using applet.
10. Create Frame that display the student information.

Design based Problems (DP)/Open Ended Problem:

To Develop or implement algorithms for Hospital Management and Information System, Patient Database Management System, Software based Image Enhancement and Filtering, Image Archival and Retrieval System etc.

Active Learning Assignments: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding of theory and practical work. The faculty will assign topics from which students can grasp knowledge about current scenario of the biomedical image processing. 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.