

BCA – 401: Java Programming

Total Lectures = 50

Unit – I: Overview of Java Language

C++ Vs JAVA, JAVA and internet and WWW, JAVA support systems, JAVA environment.

JAVA program structure, tokens, statements, JAVA virtual machine, constants & variable, data types, declaration of variable, symbolic constants, type casting.

Operators: Arithmetic, relational, logical assignments, increment and decrement, Conditional bitwise, special, expressions & its evaluation

Decision Making and Branching

If statement, if...else statement, Nesting of if...else statements, else...if ladder, switch, ? operators, loops while, do, for, jumps in loop, labelled loops.

Unit – II: Classes, Objects and Methods

Defining a class, adding variables and methods, creating objects, accessing data members, constructors, methods overloading, static members, nesting of methods.

Inheritance: Extending a class, overriding methods, final variables and methods, final classes, finalizer methods, abstract methods and classes, visibility control.

Unit – III: Arrays, String and Vectors

Arrays: One dimensional & two dimensional, Strings, vectors, wrapper classes, defining interfaces, extending interfaces, implementing interfaces, accessing interfaces, variables, system packages, using system packages, naming conventions, creating packages, accessing a package, using package, adding a class to a package, hiding classes.

Unit - IV: Multithreaded programming

Creating threads, extending the threads class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority, synchronization, implementing the runnable interface.

Unit – V: Applet Programming

Local and remote applets, applets Vs applications, writing applets, applets life cycle, creating and executable applet, designing a web page, applet tag adding applet to HTML file, running the applet, passing parameters to applets, aligning the display, DTML tags & applets, getting input from the user.

JDBC- ODBC (Java Database Connectivity)

Text Books:

1. Core Java, Nageshwar Rao, Dreamtech Press
2. Core Java For Beginners, Rashmi Kanta Das, Vikash Publishing House
3. Java - The Complete Reference, Herbert Schildt, TMH
4. Programming With Java: A Primer, Balagurasamy, TMH
5. Java – One Step Ahead, Anita Seth & B.L.Juneja, Oxford University Press.

BCA – 402: Computer Graphics and Multimedia

Total Lectures = 50

Unit- I:

1.1 Introduction, Computer Graphics System, Interactive Graphics.

1.2 Passive Graphics, Application of Computer Graphics.

Unit -II:

2.1 Introduction, Display Devices, Cathode Ray Tube.

2.2 Bit-Mapped Graphics, Graphics Attributes, Refresh Cathode Ray Tubes.

2.3 Random Scan Displays, Raster-Scan Displays , Color CRT Monitors.

2.4 Direct-View Storage Tubes (DVST), Plasma Panel Displays, Thin Film Electroluminescent displays.

2.5 Light Emitting Diode (LED), Liquid Crystal Displays (LCDs), Hard Copy Output Devices.

Unit- III:

3.1 Introduction, Scan Conversion, Digital Differential Analyzer.

3.2 Bresenham's Algorithm, Integer Bresenham's Algorithm.

3.3 General Bresenham's Algorithm, Circle Generation Algorithms, Bresenham's circle generation algorithm, Midpoint Circle Algorithm.

3.4 Ellipse Generation algorithms, Midpoint Ellipse Algorithm, Arc Generation algorithms, Fill Algorithms.

Unit – IV

4.1 Fundamentals of Antialiasing, Dithering, 2-D Graphics Transformations, Geometric and Coordinate Transformations.

4.2 Transformation Composition, 2-D View and Clipping, Exterior and Interior Clipping, Viewport Transformation, Polygon Clipping , Text Clipping.

Unit-V:

5.1 Introduction, 3-D Graphics Transformations.

5.2 Coordinate Transformations, 3-D Projections, Perspective Projection on a Plane with $C(0,0,0)$, Perspective Projection on a Plane with $C(a,b,c)$, Parallel Projections, 3-D Viewing and Clipping, Hidden Lines and Surfaces Scan line Entries (a) (b) (c) (d).

5.3 Importance of Wireframe Models, Demerits of Wireframe Models, Representing a Polygonal Net Model, Bezier Curves and Surfaces, B-Splines.

Unit- VI

6.1 Introduction

6.2 Multimedia Hardware

6.3 Multimedia Software Tools

6.4 Application Areas for Multimedia

6.5 Multimedia Components Hypermedia, Multimedia Technology

BCA – 403: Operating System & Linux

Total Lectures = 50

Unit – I: Overview:

Objectives and Functions, Evolution, Achievement.

Unit – II: Process Management:

Process, State, Description, Control.

Unit – III: Process Synchronization:

Mutual Exclusion, Semaphores, Monitors, Message Passing, Readers/Writers Problem.

Unit – IV: Deadlock:

Deadlock Avoidance & Detection, Dining Philosophers Problem.

Unit – V: Memory Management:

Requirements, Partitioning, Paging Segmentation.

Unit – VI: Scheduling:

Uniprocessor Scheduling Algorithms, Multiprocessor Scheduling, Real-Time Scheduling.

Unit – VII: File Management:

File Organization, Directories, Sharing, Record Blocking, Secondary Storage Management.

Unit – VIII: LINUX & SHELL PROGRAMMING

Linux: File/Folder Structure, User Management, Process Management, Commonly used commands.

Shell Programming: Defining variable, Expression, if else fi, case esac, while, until, for loop.

Text Books:

1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", Pearson Education.
2. H.M.Deitel, "Operating Systems", Pearson Learning Solutions.
3. William Stallings, "Operating Systems", Pearson Education.
4. Sumitabha Das, "Unix Concepts and Applications", TMH.

BCA – 404: SOFTWARE ENGINEERING PRINCIPLES

Total Lectures = 50

Unit-I: Introduction to Software Engineering, its emergence; Software characteristics, classification of software; software engineering principles, phases in software engineering.

Software Process, Capability Maturity Model, Process Models: Waterfall, Prototype, Rapid Application Development (RAD), Incremental, Spiral, Component-based Assembly Model, V-Model.

Unit –II: Systems Analysis: Requirements and Specification: Analysis Model, The Requirement Engineering Process, The Software requirement document, Functional & Non functional requirements, Fact Finding Techniques – Meeting (FAST), Interview, Direct Inspection, Documents, Questionnaire, System Requirements Specification (SRS), Data Flow Diagram (DFD), ERD, Cardinality and Modality.

Unit – III: System Design: Design Process, Good Design, Design Principles, Design constraints, Design Quality, System Structuring control models, Modular decomposition, Coupling and Cohesion, Domain Specific architecture, User interface Design. Object Oriented & function oriented design: Objects, object Classes and inheritance, Object identification.

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Unit – IV: Software Coding: Coding guidelines, code document, structured programming, code inspection. Metrics – Definition, objectives and types of metrics, Size-oriented (LOC-based) and Function – oriented (FP-based) metrics. Reliability and Software Quality: concepts, Factors of good quality software, McCall's Quality Factors, Software Quality Assurance (SQA), FTR, Inspection and Walkthroughs.

Unit – V: Software Testing: Testing basics, Guidelines of testing, characteristics of software test, Test Plan and Test case, software testing strategies, Levels of software testing: Unit testing, integration testing, system testing, acceptance testing. Testing techniques: White box, Black box and Gray box testing. Basis path testing, Flow graph notation, cyclomatic complexity, Equivalence Partitioning, verification & Validation (V & V), Debugging.

Unit – VI: Maintenance and its types. Overview of Computer aided software engineering (CASE)

- Text Book:**
1. Software Engineering: Principles and Practices, Rohit Khorana, Vikas Publ., 2010
 2. Software Engineering: Principles and Practices, W.S. Jawadkar, TMH
 3. Software Engineering – A Precise Approach, Pankaj Jalote, Wiley India, 2012
 4. Software Engineering–A Practitioner's Approach, Roger S. Pressman, 7E., McGraw Hill
 5. Software Engineering, Ian Sommerville, 8Ed., Pearson Education
 6. Object Oriented Analysis and Design, John Deacon, Pearson Education
 7. Fundamentals of Software Engineering, Carlo Ghezzi, Jezayeri, Dino Mandrioli, 2 Ed, Pearson.
 8. Software Engineering– Principles and Practices, Deepak Jain, Oxford University Press.
 9. Software Engineering, Jibitesh Mishra and Ashok Mohanty, Pearson Publ.
 10. Fundamentals of Software Engineering, Rajib Mall, PHI

BCA – 405: Lab on Java Programming

Total Lab Class = 60

Exercise - 1 (Basics)

- a). Write a JAVA program to display default value of all primitive data type of JAVA
- b). Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate
- c) Write a case study on public static void main(250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- (d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

- e). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
- f). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

- a). Write a JAVA program to implement constructor overloading.
- b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

- a). Write a JAVA program to implement Single Inheritance
- b). Write a JAVA program to implement multi level Inheritance
- c). Write a java program for abstract class implementation

Exercise - 6 (Inheritance - Continued)

- a). Write a JAVA program give example for “super” keyword.

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- b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

- a).Write a JAVA program that describes exception handling mechanism
- b).Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

- a). Write a JAVA program that implements Runtime polymorphism
- b). Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

- a). Write a JAVA program for creation of Illustrating throw

Exercise – 10 (Threads)

- a). Write a JAVA program that creates threads by extending Thread class .
- b). Write a program illustrating isAlive and join ()

Exercise – 11 (Packages)

- a). Create package and call it in another class.
- b). Write a JAVA program that import and use the defined package in new package.

Exercise - 12 (Applet)

- a).Write a JAVA program to paint like paint brush in applet.
- b) Write a JAVA program to display analog clock using Applet.
- c) Write a Java program that takes input

BCA – 406: Lab on Computer Graphics & Linux

Total Lab Classes = 60

A) Computer Graphics & Multimedia

Unit I:

- i) Write a Programme to draw a colourful Pixel
- ii) Write a Programme to draw a line.

Unit II:

Write Programmes to draw a different shapes

- i.) Rectangles ii.) Cirles iii.) Square iv.) Arrow v.) Zooming of Circles vi.) Zooming of Rectangles

Unit III:

- i) Write a Programme to draw a Indian Flag
- i) Write a Programme to draw Indian Flag
- ii) Write a Programme to draw Chess Board

Unit IV:

- i) Draw a Line Using Bresenham's Algorithm
- ii) Draw a Line Using DDA Algorithm

Unit V:

- i). Write a program to fill a polygon using Scan line fill algorithm.
- ii) Write programs to apply various 2D transformations on a 2D object (use homogeneous coordinates).
- iii) Write programs to apply various 3D transformations on a 3D object (use homogeneous coordinates).

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B) UNIX/LINUX

Use of following UNIX/LINUX commands:

cat, cal, ls, mkdir, rmdir, cd, rm, mv, cp, vi, chmod, chown, echo, bc, expr

Shell programs related to following:

Use of shell variables

Use of if else fi statement

Use of case esac statement

Use of while do done statement

Use of until do done statement

Use of for loop

A Mini Project