



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Second Year MCA :

Trimester IV

Subject Code: MCA 241

Subject Name: Core Java

Lectures per week (hours)	: 3 Lectures + 1 Tutorial
Practicals per week (hours)	: 4
Internal Assessment	: 50 Marks
External Assessment	: 50 Theory + 50 Practical Marks
Total Credits	: 8

Prerequisite: Object-oriented Programming with C++

Aim

Provide strong foundation to design, develop and implement solutions for real world problems using object oriented programming in Java.

Objectives

- To have clear understanding of the basic concepts and features of the Java programming language and its core libraries (API).
- To implement object-oriented programming (OOP) concepts like abstraction, encapsulation, inheritance, polymorphism, aggregation using Java language.
- To make the students familiar with professional programming skills and best practices like sound program design, coding standards and conventions and source code documentation.
- To provide a sound knowledge of Java language, platform and related tools for real life problem solving and software development.

Course Contents:

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to Java platform, Overview of java, Data types, variables, arrays, Classes and objects Comparison of C, C++ and Java, features of Java, Data types, Unicode, Java Environment and tools, JVM, Structure of a Java program, use of CLASSPATH, expressions and statements, arrays, Java string handling library (String and StringBuffer classes), creating classes and objects, methods and variables, pass by value and pass by reference for Java, constructors, finalize method and garbage collection, Method overloading, Overview of Java API, Wrapper classes. Java coding standards, conventions and javadoc comments	9	09



Unit II	Inheritance, Packages and interfaces, Exception handling mechanism, Java Collections Framework Inheritance, method overriding, final variables, methods and class, static variables and methods, Using super to use constructor of a super-class, Method overriding and use of super, Variable shadowing and use of super, abstract classes and methods, Object class as root class in Java API and its methods, defining packages, import statement, Java access protection, defining interfaces, multiple inheritance, runtime polymorphism using interface, Exception, exception handling syntax, use of finally block, use throw and throws keyword, java.util package classes: Date, Calendar and the Gregorian Calendar classes, Collections framework classes, Lists, Sets, Maps, Generics in Collection framework.	9	12
Unit III	Multi-threaded programming, Java input/output system and Java Applets Multithreading, Thread class, creating threads, two approaches to create thread: extending Thread or implementing Runnable, thread life-cycle, thread priority, Thread methods: yield, stop, join and isAlive, Thread synchronization, Java I/O streams, byte stream and character stream classes (FileInputStream, FileOutputStream, FileReader, FileWriter) Filtered byte stream classes (DataInputStream, DataOutputStream), Filter streams, Buffered streams and Object serialization. Applet basics, applet methods, applet life-cycle, HTML applet tag, passing parameters to applets, Colors in Applet	9	14
Unit IV	Java Event Handling, Java GUI Development (AWT and Swing) and Java Database Connectivity Java event delegation model, Basic event sources and event listeners like ActionEvent, KeyEvent and MouseEvent, Overview of AWT Components, creating GUI programs using frames, buttons, labels, textbox, checkbox, choice and textboxes, Containers and layout managers, Window and panel classes, Introduction to Swing, Comparison of AWT and swing features and classes like JComponent, JFrame, JLabel, JButton, JTextField, JOptionPane, Showing Message, confirm and input dialog.	9	15



Java Database Connectivity

JDBC API and architecture, types of drivers, JDBC url syntax for different databases, Loading drivers, making database connection, Executing SQL queries, DDL and Insert, update, delete and select queries, closing connection, JDBC API classes: Connection, Statement, ResultSet, PreparedStatement, Implementing transactions using JDBC.

Total

36

50

Outcomes:

- Ability to solve a complex problem and develop computer applications by applying object oriented approach using the Java Programming Language.
- Proficiency in developing console based, client/server and GUI based applications using the Java Programming Language.
- Ability to develop multi-threaded concurrent applications and applets for web applications.

Reference Books:

- Core Java 2, Volume I – Fundamentals, Cay S. Horstmann and Gary Cornell, Prentice Hall, 8th edition, 2008.
- “Ivor Horton's Beginning Java”, Java 7 Edition, Ivor Horton, Wiley Computer Publishing, 2011.

Additional Reference Books and Resources:

- The Complete Reference Java, Herbert Schildt, Tata McGraw-Hill Publishing Company Limited, 7th edition, 2007.
- Java, How to Program, Deitel and Deitel, Pearson Education, 6th Edition.
- “Big Java”, Cay Horstmann, Wiley Computer Publishing, 3rd edition, 2007.
- SCJP Sun Certified Programmer for Java 6 Study Guide, Katherine Sierra, Bert Bates, McGraw Hill, 2008.
- Java SE 6 Tutorial, Sharan Zakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoeber, Addison-Wesley Pearson Education, Fourth Edition, Available for online reference at <http://download.oracle.com/javase/tutorial/index.html>
- Java Platform Standard Edition 6 API documentation available online at <http://download.oracle.com/javase/6/docs/api>
- Code Conventions for the Java Programming Language available online at <http://www.oracle.com/technetwork/java/codeconv-138413.html>
- “The Java Language Specifications”, James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Addison-Wesley Pearson Education, 3rd edition, <http://java.sun.com/docs/books/jls/download/langspec-3.0.pdf>



Subject Code: MCA 241 Subject Name: Core Java
Practical per week (hours) : 4
Total Marks (Practical Exam) : 50

Topics to be covered in Practical Sessions

Sr. No.	Topics to be Covered	No. of Practical (Hours)
1.0	Introduction to Java platform, Overview of java, Data types, variables, arrays, Classes and objects Java Data types, Java Environment and tools, JVM, Structure of a Java program, use of CLASSPATH, expressions and statements, arrays, Java string handling library (String and StringBuffer classes), creating classes and objects, methods and variables, pass by value and pass by reference for Java, constructors, finalize method and garbage collection, Method overloading, Overview of Java API, Wrapper classes. Java coding standards, conventions and javadoc style comments	07
2.0	Inheritance, Packages and interfaces, Exception handling mechanism, Java Collections Framework Inheritance, method overriding, final variables, methods and class, static variables and methods, Using super to use constructor of a super-class, Method overriding and use of super, Variable shadowing and use of super, abstract classes and methods, Object class as root class in Java API and its methods, defining packages, import statement, Java access protection, defining interfaces, multiple inheritance, runtime polymorphism using interface, Exception, exception handling syntax, use of finally block, use throw and throws keyword, java.util package classes: Date, Calendar and the Gregorian Calendar classes, Collections framework classes, Lists, Sets, Maps, Generics in Collection framework.	09
3.0	Multi-threaded programming, Java input/output system and Java Applets Multithreading, Thread class, creating threads, two approaches to create thread: extending Thread or implementing Runnable, thread life-cycle, thread priority, Thread methods: yield, stop, join and isAlive,	10



Thread synchronization, Java I/O streams, byte stream and character stream classes (FileInputStream, FileOutputStream, FileReader, FileWriter) Filtered byte stream classes (DataInputStream, DataOutputStream), Filter streams, Buffered streams and Object serialization.

Applet basics, applet methods, applet life-cycle, HTML applet tag, passing parameters to applets, Colors in Applet

4.0 **Java Event Handling, Java GUI Development (AWT and Swing) and Java Database Connectivity** 10

Java event delegation model, Basic event sources and event listeners like ActionEvent, KeyEvent and MouseEvent, Overview of AWT Components ,creating GUI programs using frames, buttons, labels, textbox, checkbox, choice and textboxes, Containers and layout managers, Window and panel classes, Introduction to Swing, Comparison of AWT and swing features and classes like JComponent, JFrame, JLabel, JButton, JTextField, JOptionPane, Showing Message, confirm and input dialog.

Java Database Connectivity

JDBC API and architecture, types of drivers, JDBC url syntax for different databases, Loading drivers, making database connection, executing select, insert and update queries, closing connection, JDBC API classes: Connection, Statement, ResultSet, PreparedStatement, Implementing transactions using JDBC.

Total

36



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Master of Computer Applications (M.C.A.)

Second Year MCA :

Trimester IV

Subject Code: MCA 242

Subject: Software Engineering

Lectures per week (hours) : 3 Lectures + 1 Tutorial

Practicals per week (hours) : 0

Internal Assessment : 50 Marks

External Assessment : 50 Marks

Total Credits : 4

Prerequisite: None

Aim:

The course is aimed to help the student understand and appreciate the basic concepts of Software Engineering useful in software development and maintenance.

Objectives:

- (1) To understand the basic concept and importance of Software Engineering
- (2) To understand the process of Software Engineering
- (3) To understand all the activities required to develop software.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to Software Engineering and Processes What is software? – Evolving role of software – Types of software – Software Myths – Process Framework – CMM – Process Assessment – Various Process Models	9	13
Unit II	Software Engineering Practice and System Engineering SE practice – Core Principles – Detailed Practices Communication, Planning, Modeling, Construction and Deployment – System Engineering – System Engineering Hierarchy – Business Process Engineering – Product Engineering.	9	12
Unit III	Requirements Engineering, Analysis and Design Modeling, Creating Architectural Design Requirements Engineering Tasks Inception / Elicitation / Elaboration / Negotiation / Specification / Validation / Management - Requirements Analysis - Analysis Modeling Approaches Conventional / Object Oriented – Data Modeling Concepts – Flow Oriented	9	13



Modeling - Design Process and Design Quality –
Design Concepts Abstraction / Architecture /
Modularity – Information Hiding – Functional
Independence – Design Model – Software Architecture
– Taxonomy of Architectural Styles - Architectural
Design.

Unit IV	Component and User Interface design, Testing strategies and tactics, Metrics for Product and Process	9	12
	Conventional view of component – Designing Conventional Components – Golden Rules for User Interface Design – User Interface Analysis and Design – User Interface Design Issues – UI Design Evaluation – Software Testing Fundamentals – Black Box / White Box Testing – Basis Path Testing – Strategic Approach to Software Testing – Test Strategies for Conventional Software Unit / integration/ System / Acceptance – The Art of Debugging - Software Quality and Metrics – A Framework For Product Metrics – Metrics for Analysis model / design model / Source Code / Testing / Maintenance. Introduction to Agile methodologies for software development.		
	Total	36	50

Outcomes:

Upon the completion of this course, the student will be able to:

- (1) Understand and appreciate the importance of Software Engineering in today's world.
- (2) Understand and perform the various activities required to develop good quality software within time and cost budget.

Reference Books:

- (1) Software Engineering – A Practitioner's Approach, Roger Pressman, TMH, 7th Edition

Additional Reference Books:

- (1) Software Engineering, Sommerville, Pearson Education, 8th Edition



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Second Year MCA :

Trimester IV

Subject Code: MCA 243

Subject: Operations Research

Lectures per week (hours)	: 3 Lectures + 1 Tutorial
Practicals per week (hours)	: 0
Internal Assessment	: 50 Marks
External Assessment	: 50 Marks
Total Credits	: 4

Prerequisite: Knowledge of Matrix Algebra and Coordinate Geometry

Aim:

The course is aimed to help the student understand and appreciate the basic concepts of Quantitative Techniques useful in management decision making.

Objectives:

- (1) To understand and appreciate the basic concept of Quantitative techniques useful in decision making.
- (2) To gain knowledge of some of the important quantitative techniques useful in decision making.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to Operations Research and Linear Programming Introduction to OR – Definition – History of OR – Applications of OR – Model Formulation for Linear Programming – Introduction to Graphical method - Theory of Simplex Method – Simplex Method – Sensitivity Analysis – Introduction to tools like LINDO, CPLEX	11	14
Unit II	Transportation Problem and Queuing Theory Introduction to Transportation problem – Initial feasible solution by Northwest Corner Method, Least Cost Method, Vogel’s Approximation method – Optimization by MODI method – Introduction to assignment problem - Introduction to Queuing theory – Essential features of queuing system – performance measures of queuing system – Probability distributions in Queuing Systems – Classification of Queuing models – Single Server Queuing models.	9	12



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Unit III	Inventory Models Introduction – Factors involved in Inventory problem analysis – Inventory model building – Inventory control models with and without shortages.	8	12
Unit IV	Simulation and Project Management – PERT CPM Introduction – Steps of Simulation process – Advantages and disadvantages of Simulation – Simulation of different types of problems – Role of computers in Simulation – Applications of simulation - Introduction to Project Management – Basic differences between PERT and CPM – Phases of Project Management - PERT/ CPM Network Components and precedence relationship – Finding Critical Path	8	12
	Total	36	50

Outcomes:

Upon the completion of this course, the student will be able to:

- (1) Understand and appreciate the basic concepts of Quantitative techniques useful in decision making.
- (2) Decide which technique to use in different situations.
- (3) Apply the chosen technique in decision making.

Reference Books:

- (1) Operations Research Theory and Applications, J K Sharma, Macmillan, 4th Edition

Additional Reference Books:

- (1) Quantitative Techniques in Management, N D Vohra, TNH, 4th Edition
- (2) Operations Research, Taha-Natarajan-Balasubramanie at el. Pearson, 8th Edition



Subject Code: MCA 244 Subject: Introduction to .NET technology using VB.NET

Lectures per week	: 3 Lectures + 1 Tutorial
Practical Sessions per Week	: 4
Internal Assessment	: 50
External Assessment	: 50 Theory + 50 Practical
Total Credit	: 8

Prerequisite:

Awareness of Object-oriented programming concept

Aim:

The course is aimed to introduce the enterprise application development using VB.NET.

Objectives:

- (1) To understand the concept of object oriented development using VB.NET.
- (2) To develop enterprise applications more efficiently.
- (3) To make students familiar with RAD like Visual Studio 2010.
- (4) To provide knowledge of database connectivity.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Introduction to VB.NET Overview of .NET framework - understanding IDE components - namespaces - coding methods. Programming with VB.NET Variables - operators - subroutines - functions - looping and testing structures - creating forms - page lifecycle - event handling - project types - MDI application. Using controls Textbox - masked textbox - button - checkbox - radio button - combobox - listbox - checked listbox - scrollbar - trackbar - richtextbox - common dialog controls - listview - treeview - menustrip - timer – calendar	9	10



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Unit II	Using OOP concepts Class – get and set properties – object – methods – constructor – inheritance – polymorphism – abstraction – encapsulation Use of basic classes Array – arraylist – hashtable – sortedlist – char class – string class – string builder class - Datetime class – timespan class – directory class - directoryinfo class – path class	9	15
Unit III	Working with Database Applications Architecture of ADO.NET Data objects: Connection – command – dataadapter – dataset – datareader Database operations : add – update- delete – display – navigation Data controls : datagridview – datarepeater	12	15
Unit IV	Exception handling,reports and custom controls Types of errors – exception handling and debugging – crystal reports XI – working with custom controls Working with files File class – fileinfo class - FileStream - streamreader - streamwriter - binaryreader – binarywriter – serialization class	6	10
	Total	36	50

Outcomes:

Upon the completion of this course, the student will be able to:

- (1) Develop object-oriented programming based applications.
- (2) Access and manipulate data by using Microsoft ADO.NET.
- (3) Resolve syntax, run-time, and logic errors by using the debugger and exception handling.
- (4) Understand file operations.
- (5) Creating and using crystal reports XI.
- (6) Creating and using custom controls.

Reference Books:

- (1) Mastering Visual Basic .NET, Evangelos Petroutsos. BPB. 1st Edition
- (2) Visual Basic .NET Programming, Harold Davis. John Wiley and sons. 1st Edition



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Additional Reference Books:

- (1) Microsoft Visual Basic 2008, Michael Halvorson. PHI.
- (2) Professional Visual Basic 2008, Bill Evjen, Billy Hollis, Bill Sheldon, Kent Sharkey. Wrox.
- (3) The Complete Reference Visual Basic .NET, Jeffrey R. Shapiro. Tata McGraw-Hill. 1st Edition
- (4) Programming ADO.NET by Hundhausen, R.Borg, S. John wiley and sons. 1st Edition
- (5) Visual Basic Developer's guide to ADO by Gunderloy, M. BPB.

Subject Code: MCA 224 Subject: Introduction to .NET technology using VB.NET

Topics to be covered in Practical Sessions

Total Marks: 50

Sr. No.	Topics to be Covered	No. of Practicals
1.0	Classes and Files Add class file, Set and Get properties, Class method, Making class object, Accessing class elements using object, Constructor, Inheritance	10
2.0	ADO.NET and Exception Handling Database connectivity, Data Manipulation(add ,update ,delete), Data display and Navigation (Using Textbox, Datagridview, DataRepeater) Exception Handling using try, catch and finally	14
3.0	Crystal Reports and Custom Controls Creating custom controls, Create using basic controls, Create new custom control, Custom Events, Custom Properties	6
4.0	File and FileInfo Classes, Read and Write in Text Files, Read and Write in Binary File, Serialization	6
	Total	36



First Year MCA :

Trimester IV

Subject Code: MCA 245 **Subject Name:** Advances in Operating Systems with Linux

Lectures per week (hours) : 3 Lectures + 1 Tutorial
Practicals per week (hours) : 4
Internal Assessment : 50 Marks
External Assessment : 50 Theory + 50 Practical Marks
Total Credits : 8

Prerequisite: Basic knowledge of fundamentals of Operating System

Aim:

The course is aimed to provide higher level concepts of various Operating Systems.

Objectives:

- (1) To understand the concepts of Memory and I/O management
- (2) To familiarize students with I/O and Processor Scheduling.
- (3) To understand Linux commands and shell programming
- (4) To present the concepts of User Management in Linux.

Unit No.	Topics to be Covered	No. of Lectures	Marks per Unit
Unit I	Memory Management Requirement, Memory Partitioning, Fixed and Dynamic ,Paging and Segmentation Virtual Memory Locality and Virtual Memory, Virtual Paging, TLB, Virtual Segmentation, OS System Software, Linux and Windows Memory Management	8	12
Unit II	Uniprocessor Scheduling Types of Processor Scheduling, Scheduling Algorithm – Scheduling Criteria, Alternative Scheduling Policies (FCFS, RR, Overview of SPN & SRT) Real-Time and Linux Scheduling	8	12
Unit III	I/O Management and Disk Scheduling I/O Devices, DMA, I/O Buffering, Disk Scheduling RAID File Management File Architecture, File Organization and Access Secondary Storage Management ,Free Space Management, Unix and Windows File Management	10	12



AHMEDABAD UNIVERSITY

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Master of Computer Applications (M.C.A.)

Unit IV	Security Security Threats, Overview of Protection, Intruders Single Host Administration in Linux The /etc/passwd file – Login name, Encrypted password, UID, GID number, GECOS Field, Login Shell, The /etc/shadow file, The /etc/Group file Adding Users, Removing Users, Disabling Logins, Managing Accounts	10	14
	Total	36	50

Outcomes:

Upon the completion of this course, the students will be able:

1. Familiar with the concepts of Memory and I/O management of various Operating Systems.
2. Students can perform User Management.
3. To generate and execute the shell scripts.

Reference Books:

- (1) Operating Systems: Internals and Design Principles, William Stallings, PHI, 6th edition.
- (2) Unix Concepts and Applications, Sumitabha Das, Tata McGraw-Hill, 4th Edition

Additional Reference Books:

- (1) Operating Systems Design and Implementation, Andrew Tananbaum, Pearson Education, 4th Edition
- (2) Operating Systems Concepts and Design, Milan Milenkovic, Tata McGraw-Hill, 2nd Edition.
- (3) Unix Shell Programming, Yashavant Kanetkar, BPB Publications. 1st Edition.



AHMEDABAD UNIVERSITY

AES INSTITUTE OF COMPUTER STUDIES

Master of Computer Applications (M.C.A.)

Subject Code: MCA 131 Subject Name: Operating Systems
Practicals per week (hours) : 4
Total Marks (Practical Exam) : 50

Topics to be covered in Practical Sessions

Sr. No.	Topics to be Covered	No. of Practical
1	Understanding Unix Commands Locating Commands, Internal and External Commands, Arguments option and file names General Purpose Utilities Banner, cal , date ,who, tty, uname, passwd, echo, tput, bc, script, spell, ispell File Systems Parent child relationship, concept of path, various directories, ls, mkdir, cd, rmdir, pwd, and path.	8
2	Handling ordinary Files cat, ap, rm, mv, more, file, wc, od, split, cmp, comm, and diff. The Shell sh command, pattern matching, wild card characters , escaping, quoting, redirection, special files, pipes and tees The vi editor	8
3	Basic File Attributes Listing file attributes, directory attributes ,file permission, chmod, chgrp, chown, ln Simple Filters Head, tail , cut , paste, sort, uniq, nl , tr Regular Expression and grep family	8
4	Shell Programming Shell scripts, read, command line argument, exit status, logical operators, if, case, expr, while, for. User Administration	12
	Total	36