ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)
Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)
U.P. State Government University
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

MCA Semester II

MCACC 201: Object Oriented Programming using Java

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorials: 15 Hours

OBJECTIVES OF THE COURSE:

1. To understand Object Oriented Concepts using Java Language.
2. To develop, debug and document programs in Java using OOP paradigms.
3. Describe the meaning of the object-oriented paradigm and implement real-world entities like inheritance, hiding, polymorphism in programming using the object-oriented design process.
4. To understand and implement core Java concepts as interface, package, exception handling, etc.
5. To understand and develop GUI components using Applets.
6. To understand and develop applications using Servlets/JSPs with database handling.

UNIT-I **Lectures: 09**

Introduction: Object Oriented Programming: objects, classes, Abstraction, Encapsulation, Inheritance, Polymorphism, OOP in Java, Characteristics of Java, The Java Environment, Java Virtual Machine, Comparison to other languages as C++, Java Source File Structure, and Compilation. Fundamental Programming Structures in Java: Defining classes in Java, constructors, methods, access specifiers, static members, Comments, Data Types, Variables, Operators, Control Flow, Arrays.

UNIT-II **Lectures: 09**

Inheritance, Interfaces and Packages: Inheritance: Super classes, sub classes, Protected members, method overloading, constructor overloading, use of this and super keyword, Object class, abstract classes and methods. Interfaces: defining an interface, implementing interface, differences between classes and interfaces and extending interfaces. Packages: Defining Package, CLASSPATH Setting for Packages, Making JAR Files for Library Packages, importing and naming convention for Packages, Networking java.net package. Access control: private access, public access, protected access and package access.

UNIT-III **Lectures: 09**

Exception Handling, I/O, Multithreading: Exceptions: exception hierarchy, checked and unchecked exceptions, throwing and catching exceptions, finally clause, built-in exceptions, creating own exceptions, Stack Trace Elements, catching exceptions. Input / Output Basics: Byte streams and Character streams, Reading and Writing, Console Reading and Writing Files. Multi-threading overview.

UNIT- IV **Lectures: 09**

Applets and Graphics: Why applets, HTML Applet Tag, A simple applet, graphical shapes, colors, fonts, drawing complex shapes, reading text input inside applet. AWT: introduction, labels, buttons, check boxes, events etc.; Layout manager: flow layout, border layout, grid

layout, card layout; Menus: Dialog boxes, File dialog; Applet classes, Applet life cycle. Introduction of Java Swing.

UNIT- V **Lectures: 09**

Database Handling with JDBC, Servlets and JSP: An Overview of DBMS – JDBC Architecture – Working with JDBC, Driver Manager and Connectivity, Statement and Prepared Statement, Result Set. Servlets and JSP: Introduction to Servlet, The Servlet Lifecycle, Retrieving/ Sending Information using Servlets, HTTP Servlet: Request and responses: overview, JSP elements/ directives/ implicit objects, standard action tags.
Multitier Applications using JDBC with Servlet-JSP.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Object Oriented Concepts using Java and understand/implement Java programming basics as data types, variable, constants, operators, control statements, arrays, etc.	K1, K2, K3
2	CO2. To understand and implement concepts of inheritance, hiding, polymorphism, interfaces and packages etc. in Java programming.	K2, K3
3	CO3. To handle exceptions in programs and gain practical experience on using I/O, multithreading, etc.	K2, K3
4	CO4. Explain and implementation approaches for GUI design using Applets.	K2, K3
5	CO5.Design and implement interactive applications using Servlets-JSP and database handling	K2, K3

Suggested Readings:

1. Herbert Schildt, "Java: The Complete reference", McGraw Hill Education, 8th Edition, 2011.
2. Khalid Mughal, "A Programmer's Guide to Java SE 8 Oracle Certified Associate (OCA)", AddisonWesley.
3. Cay S. Horstmann, Gary Cornell, "Core Java Volume –I Fundamentals", Prentice Hall, 9th Edition,2013.
4. Steven Holzner, "Java Black Book", Dreamtech.
5. Balagurusamy E, "Programming in Java", McGraw Hill.
6. Naughton, Schildt, "The Complete reference java2", McGraw Hill.
7. Deitel and Deitel, Java, How to Program, Prentice-Hall.
8. Naughton, Schildt, "The Complete reference java2", McGraw Hill
9. Cay Horstmann, Java Concepts, John Wiley & Sons, Inc.
10. David Flanagan, Java in a Nutshell, O'Reilly.
11. Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education.
12. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH.
13. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications.
14. E. Balagurusamy, "Object Oriented Programming with C++", TMH.

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MCA Semester II
MCACC 202: Operating System

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorial: 15 Hours

OBJECTIVES OF THE COURSE:

1. To develop the understanding of the structure and functioning of Operating System.
2. To learn about Processes, Threads and Scheduling algorithms.
3. To understand the principles of concurrency and Deadlock.
4. To learn various memory management schemes.
5. To study I/O management and File systems.

UNIT-I **Lectures: 09**

INTRODUCTION Evolution of Operating System, Operating System Structure, types of Operating System: Batch Processing, Multiprogramming, Timesharing, Distributed System, Real Time System. Process: Concepts, Process control blocks, concurrency, mutual exclusion, semaphores, Inter-process Communication, Process Synchronization.

UNIT-II **Lectures: 09**

Processor management techniques; Threads, Process Scheduling, Scheduling Criteria types of scheduling, scheduling algorithms, Deadlocks, Deadlocks Prevention, Deadlocks Avoidance, Deadlocks Detection.

UNIT-III **Lectures: 09**

Memory Management: Real storage, Contiguous vs. Non-Contiguous storage allocation, Static and Dynamic Partitioned memory allocation; Virtual memory, management of virtual memory, Paging, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference. Segmentation with Paging, Protection schemes, Paged segmentation.

UNIT-IV **Lectures: 09**

I/O Management: Disk Organization, disk space management, disk scheduling, Files types and operations, File access and security, File storage Management, File Organization. RAID: File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

UNIT-V **Lectures: 09**

Advanced Operating System: Basics of Network Operating System, Server Operating System and Real Time Operating. UNIX: Essential commands and utilities, Unix files, directory structure, file security, Bourne shell programming features, systems calls classification and basics, Linux: System components, Networking software layers, Case Study of UNIX/LINUXOS.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Explain main components, services, types and structure of Operating Systems.	K2
2	CO2. Apply the various algorithms and techniques to handle the various concurrency control issues.	K3
3	CO3. Compare and apply various CPU scheduling algorithms for process execution.	K2, K4
4	CO4. Identify occurrence of deadlock and describe ways to handle it.	K3
5	CO5.Explain and apply various memory, I/O and disk management techniques.	K5

Suggested Readings:

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Addision-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", Tata McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley
4. Richard Peterson, "Linux: The Complete Reference", Osborne Tata McGraw-Hill.
5. SibsankarHalder and Alex A Aravind, "Operating Systems", Pearson Education
6. D M Dhamdhere, "Operating Systems: A Concept based Approach", McGraw Hill.
7. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".
8. Stuart E. Madnick& John J. Donovan. OperatingSystems. McGraw Hill.
9. A. S. Tanenbaum, "Modern Operating Systems", PHI.
10. William Stallings, "Operating Systems – internals and design principles", PHI.

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MCA Semester II
MCACC 203: Database Management System

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorial: 15 Hour

OBJECTIVES OF THE COURSE:

1. To learn the features of a database system and its application and compare various types of data models.
2. To construct an ER Model for a given problem and transform it into a relation database schema.
3. To formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.
4. To understand the need of normalization and normalize a given relation to the desired normal form.
5. To understand different approaches of transaction processing and concurrency control.

UNIT-I **Lectures: 09**

Introduction: Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree.

UNIT-II **Lectures: 09**

Relational data Model and Language: Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

UNIT-III **Lectures: 09**

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

UNIT-IV **Lectures: 09**

Transaction Processing Concept: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System.

UNIT-V **Lectures: 09**

Concurrency Control Techniques: Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Describe the features of a database system and its application and compare various types of data models.	K2
2	CO2. Construct an ER Model for a given problem and transform it into a relation database schema.	K5, K6
3	CO3. Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.	K5, K6
4	CO4. Explain the need of normalization and normalize a given relation to the desired normal form.	K2, K3
5	CO5. Explain different approaches of transaction processing and concurrency control.	K2

Suggested Readings:

1. Date, C.J.,"An Introduction to Database Systems", Narosa Publishing House, New Delhi.
2. Korth, Silbertz, Sudarshan, "Database Concepts", Tata Mcgraw-hill Education (India).
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Education New Delhi India.
4. G.K. Gupta, "Database Management System", Tata Mcgraw-hill Education (India) Pvt. Ltd.
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication.
6. Majumdar& Bhattacharya, "Database Management System", Tata Mcgraw-hill Education.
7. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill (India) Pvt Ltd.
8. Chakravarti, "Advanced Database Mnagement System" Wiley Dreamtech Publications.
9. Ullman, J.D.,"Principles of Database Systems", Galgotia Publications, New Delhi.
10. James Mortin- Principles of Database Management Object Oriented Modeling & Design.

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MCA Semester II
MCACC 204: Automata Theory and Formal Languages

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorial: 15 Hour

OBJECTIVES OF THE COURSE:

1. Introduce concepts in automata theory and theory of computation.
2. Identify different formal language classes and their relationships.
3. Design grammars and recognizers for different formal languages.
4. Prove or disprove theorems in automata theory using its properties.
5. Determine the decidability and intractability of computational problems.

UNIT-I **Lectures: 09**

Basic Concepts and Automata Theory: Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output-Moore machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA.

UNIT-II **Lectures: 09**

Regular Expressions and Languages: Regular Expressions, Transition, Graph, Kleen's Theorem, Finite Automata and Regular Expression Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language.

UNIT-III **Lectures: 09**

Regular and Non-Regular Grammars: Context Free Grammar (CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.

UNIT-IV **Lectures: 09**

Push Down Automata and Properties of Context Free Languages: Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata (DPDA) and Deterministic Context free Languages (DCFL),
Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.

UNIT-V **Lectures: 09**

Turing Machines and Recursive Function Theory: Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post Correspondence Problem, Introduction to Recursive Function Theory.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Define various types of automata for different classes of formal languages and explain their working.	K1, K2
2	CO2. State and prove key properties of formal languages and automata.	K1, K3
3	CO3. Construct appropriate formal notations (such as grammars, acceptors, transducers and regular expressions) for given formal languages.	K3, K4
4	CO4. Convert among equivalent notations for formal languages.	K3
5	CO5. Explain the significance of the Universal Turing machine, Church Turing thesis and concept of Un-decidability.	K2

Suggested Readings:

1. J.E. Hopcraft, R. Motwani, and Ullman, "Introduction to Automata theory, Languages and Computation", Pearson EducationAsia,2nd Edition.
2. J. Martin, "Introduction to languages and the theory of computation", McGraw Hill, 3rd Edition.
3. C. Papadimitriou and C. L. Lewis, "Elements and Theory of Computation", PHI.
4. K.L.P. Mishra and N. Chandrasekaran, "Theory of Computer Science Automata Languages and Computation", PHI.
5. Y.N. Singh, "Mathematical Foundation of Computer Science", New Age International.

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MCA Semester II
MCACC 205: Computer Network

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorial: 15 Hour

OBJECTIVES OF THE COURSE:

1. To understand the computer networks and concentrates on building a firm foundation
2. To provide the fundamental knowledge of the various aspects of computer networking
3. To understanding the OSI Reference Model and TCP/IP Model
4. To have a good knowledge of Reference Model Layers and associated protocols.
5. Analyze the requirements for a given organizational structure. Select the most appropriate networking architecture and technologies and appreciate recent developments in the area.

UNIT-I **Lectures: 09**

Introduction: Data Communication& Networking, Data communication Components, data representation and data flow, Network structure and architecture, Types of Connections, Topologies, Protocols and Standards, The OSI reference model and TCP/IP reference model, services, comparison of models, Physical Layer Transmission Media, Switching methods., Delays and Performance of Network, Internetworking-Bridges, Switches, Brouter, Hub, Routers and Gateways; Virtual. LANs.

UNIT-II **Lectures: 09**

Data Link Layer: Error Handling: Error Detection and Error Correction, Introduction–Block coding, Hamming Distance, CRC, Flow Control and Error control: Stop and Wait, Sliding Window protocols: Go-Back–N ARQ, Selective Repeat ARQ, Piggybacking, Medium Access sub layer, Channel Allocations, Multiple Access protocols, Random Access protocols: ALOHA CSMA, CSMA/CD, CDMA/CA protocols, Overview of IEEE standards.

UNIT-III **Lectures: 09**

Network Layer: Overview, Point-to-Pont Networks, IP addressing and subnetting, IPv4-IPv6 address, IP packet, ICMP, IGMC, Address mapping–ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols, Routing Algorithms: Distance Vector Routing; Link State Routing.

UNIT-IV **Lectures: 09**

Transport Layer: Process-to-Process Delivery, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP, Congestion: Congestion Control techniques and policies, TCP Congestion Control, TCP- Window Management, Quality of Service (QoS) concept, Techniques for achieving QoS.

UNIT-V **Lectures: 09**

Application Layer: Domain Name Space (DNS), TELNET-Virtual Terminals, Electronic-mail architecture and components, File transfer protocol (FTP), TFTP, DHCP, WWW-HTTP, SNMP, Electronic mail and other applications, Cryptography – Basic concepts.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand computer network basics, network architecture, TCP/IP and OSI reference models and other concepts.	K1, K2
2	CO2. Understand error handling concepts, data link protocols, flow-error control, multi-channel access protocols and Standards.	K1, K2
3	CO3. Describe network layer protocols, IP addressing, IPV4 addressing scheme, Routing algorithms, etc.	K1, K2
4	CO4.Describe functionality of Transport layer and related protocols; concept of QoS and techniques.	K1, K2
5	CO5. Define various application layer protocols such as DNS, Electronic Mail, FTP, HTTP, Telnet and understand network security	K2

Suggested Readings:

1. Forouzen, "Data Communication and Networking", TMH A.S.
2. Tanenbaum, Computer Networks, Pearson Education
3. W. Stallings, Data and Computer Communication, Macmillan Press
4. Anuranjan Misra, "Computer Networks", Acme Learning
5. G. Shanmugaratnam, "Essential of TCP/ IP", Firewall Media

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MCA Semester II (Minor Elective)
MCAME01 - Fundamental of Computers & Emerging Technologies

Credit: 04, IA Marks: 30, ESE Marks: 70
Lectures: 45 Hours, Tutorial: 15 Hours

OBJECTIVES OF THE COURSE:

1. To demonstrate the knowledge of the basic structure, components, features and generations of computers.
2. To describe the concept of computer languages, language translators and construct algorithms to solve problems using programming concepts.
3. To Compare and contrast features, functioning & types of operating system and computer networks.
4. To demonstrate architecture, functioning & services of the Internet and basics of multimedia.
5. To illustrate the emerging trends and technologies in the field of Information Technology.

UNIT-I **Lectures: 09**

Introduction to Computer: Definition, Computer Hardware & Computer Software
Components: Hardware – Introduction, Input devices, Output devices, Central Processing Unit, Memory- Primary and Secondary. Software - Introduction, Types– System and Application.
Computer Languages: Introduction, Concept of Compiler, Interpreter & Assembler
Problem solving concept: Algorithms – Introduction, Definition, Characteristics, Limitations, Conditions in pseudo-code, Loops in pseudo code.

UNIT-II **Lectures: 09**

Operating system: Definition, Functions, Types, Classification, Elements of command based and GUI based operating system.
Computer Network: Overview, Types (LAN, WAN and MAN), Data communication, Topologies.

UNIT-III **Lectures: 09**

Internet: Overview, Architecture, Functioning, Basic services like WWW, FTP, Telnet, Gopher etc., Search engines, E-mail, Web Browsers.
Internet of Things (IoT): Definition, Sensors, their types and features, Smart Cities, Industrial Internet of Things.

UNIT-IV **Lectures: 09**

Block chain: Introduction, overview, features, limitations and application areas fundamentals of Block Chain.
Crypto Currencies: Introduction, Applications and use cases
Cloud Computing: Nature and benefits of Cloud Computing, AWS, Google, Microsoft & IBM Services.

UNIT-V **Lectures: 09**

Emerging Technologies: Introduction, overview, features, limitations and application areas of Augmented Reality, Virtual Reality, Grid computing, Green computing, Big data analytics, Quantum Computing and Brain Computer Interface.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Demonstrate the knowledge of the basic structure, components, features and generations of computers.	K1, K2
2	CO2. Describe the concept of computer languages, language translators and construct algorithms to solve problems using programming concepts.	K2, K3
3	CO3. Compare and contrast features, functioning & types of operating system and computer networks.	K4
4	CO4. Demonstrate architecture, functioning & services of the Internet and basics of multimedia.	K2
5	CO5. Illustrate the emerging trends and technologies in the field of Information Technology.	K1, K2

Suggested Readings:

1. Rajaraman V., "Fundamentals of Computers", Prentice-Hall of India.
2. Norton P., "Introduction to Computers", McGraw Hill Education.
3. Goel A., "Computer Fundamentals", Pearson.
4. Balagurusamy E., "Fundamentals of Computers", McGraw Hill
5. Thareja R., "Fundamentals of Computers", Oxford University Press.
6. Bindra J., "The Tech Whisperer- on Digital Transformation and the Technologies that Enable it", Penguin.

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MCA Semester II
MCACC 207: Lab-OOP using JAVA

Credit: 02, IA Marks: 30, Final Marks: 70

OBJECTIVES OF THE COURSE:

1. To learn and implement OOP concepts using Java programming language.
2. To apply object-oriented techniques to analyze, design and develop a complete solution for a given problem.

Use Java compiler and eclipse platform to write and execute java program:

- Creating simple java programs,
- Understand OOP concepts and basics of Java programming.
- Create Java programs using inheritance and polymorphism.
- Understand the use of java packages.
- Implement error-handling techniques as exception handling, IO/file-handling, concept of multithreading.
- Develop GUI applications like a simple calculator using Java Applets, swing components.
- Develop a client Server networking application.
- Develop simple dynamic web-application using Servlets/JSP with database connectivity and perform basic CRUD operations.

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Use Java compiler and eclipse platform to write and execute java program.	K3
2	CO2. Create Java programs using inheritance and polymorphism.	K3
3	CO3 Implement error-handling techniques using exception handling, IO/ file-handling techniques, multithreading.	K3
4	CO4. Develop a Client Server Application and develop GUI applications using Swing components.	K3
5	CO5. Develop interactive web application using Servlets/JSP and JDBC for database connectivity.	K3

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MCA Semester II
MCACC 208: Lab-DBMS

Credit: 02, IA Marks: 30, Final Marks: 70

OBJECTIVES OF THE COURSE:

1. To write SQL commands to query a database.
2. To develop database and writing queries using MySQL, SQL Server.
3. To write, debug and implement SQL programs in MySQL, SQL Server.
4. To learn programming in SQL.

- Installing SQL Server/MYSQL.
- Creating Entity-Relationship Diagram using case tools.
- Writing basic SQL statements.
- Restricting and sorting data.
- Displaying data from multiple tables.
- Aggregating data using group function.
- Manipulating data.
- Creating and managing tables.
- Normalization.
- Creating procedure and functions etc.
- Design and implementation of Payroll processing system.
- Design and implementation of Library Information System.
- Design and implementation of Student Information System.
- Automatic Backup of Files and Recovery of Files.

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1Creating Entity-Relationship Diagram using case tools.	K3
2	CO2. Write SQL commands to query a database and displaying data from multiple tables.	K3
3	CO3.Analyze front end tools to design forms, reports and menus.	K3
4	CO4.Aggregating data using group function. Manipulating data.	K3
5	CO5.Develop a Client Server Application.	K3