Program Booklet

Department of CSE, BIT Mesra

Master of Computer Application

Institute Vision

To become a Globally Recognized Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research and technological service to the National needs.

Institute Mission

To educate students at Undergraduate, Postgraduate, Doctoral, and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.

- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching and learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

Department Vision

The department strives to be recognized globally for outstanding education and research, leading to excellent professionals and innovators in the field of Computer Science and Engineering, who can positively contribute to the society.

Department Mission

1. To impart quality education and equip the students with strong foundation that could make them capable of handling challenges of the new century.

2. To maintain state of the art research facilities and facilitate interaction with world's leading universities, industries and research organization for constant improvement in the quality of education and research.

Programme Educational Objectives (PEOs) –Master of Computer Application

PEO 1: To excel in software development skills coveted in the IT industry.
PEO 2: To be well prepared for pursuing higher studies in related fields of teaching and research.
PEO 3: To be aware of the requirements of being an ethical and professional leader and inculcating team spirit.
PEO 4: To inculcate the ability to innovate and contribute towards the growth of the nation.

Graduate Attributes (GAs)

GA1: Scholarship of Knowledge

Acquire in-depth knowledge of specific discipline or professional area, including wider and global perspective, with an ability to discriminate, evaluate, analyse and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge.

GA2: Critical Thinking

Analyse complex engineering problems critically, apply independent judgement for synthesising information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.

GA3: Problem Solving

Think laterally and originally, conceptualise and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise.

GA4: Research Skill

Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyse and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.

GA5: Usage of modern tools

Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations.

GA6: Collaborative and Multidisciplinary work

Possess knowledge and understanding of group dynamics, recognise opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.

GA7: Project Management and Finance

Demonstrate knowledge and understanding of engineering and management principles and apply the same to one ‘s own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economical and financial factors.

GA8: Communication

Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

GA9: Life-long Learning

Recognise the need for and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

GA10: Ethical Practices and Social Responsibility

Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.

GA11: Independent and Reflective Learning

Observe and examine critically the outcomes of one ‘s actions and make corrective measures subsequently and learn from mistakes without depending on external feedback.

PROGRAM OUTCOMES (POs) for MCA(MASTER OF COMPUTER APPLICATION)

PO 1: Attain problem solving attitude in systematic and timely manner.

PO 2: Apply knowledge of mathematics, algorithm and computing principles appropriately to solve real-world problems.

PO 3: Identify modern tools and techniques through critical thinking for solving complex problems.

PO 4: Use the computational resources efficiently to develop software for the industry need.

PO 5: Understand and assess societal, environmental, safety, legal and ethical norms for professional computing practices.

PO 6: Function as an individual or as a member in team in the software domain.

PO 7: Recognize the need for self-motivation, learning and unlearning to engage in life-long learning for continual development.

PO 8: Excel in descriptive oral, written communication and presentation skills required for documenting and delivering project artefacts effectively.

PROGRAMME COURSE STRUCTURE (ALL SEMESTERS)

BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI
NEWCOURSE STRUCTURE –*Proposed from Monsoon 2020*
Based on CBCS & OBE model
Recommended scheme of study for MCA Programme

Semester	Course Level	Category of Course	Course Code	Courses	Mode of delivery & credits			Total Credits
					L (periods/ week)	T (periods/ week)	P (periods/ week)	
Theory								
First/ Monsoon	**FOURTH**	Programme Core(PC)	CA403	Computer Organization & Architecture	3	0	0	3
	FOURTH	Programme Core (PC)	CA405	Data Structures and Algorithms	3	0	0	3
	FOURTH	Programme Core (PC)	CA407	Database Design Concepts	3	0	0	3
	FOURTH	Programme Core (PC)	CA409	Object Oriented Design using Java	3	0	0	3
	FOURTH	Programme Core (PC)	CA411	Modern Operating Systems	3	0	0	3
	FIRST	Humanities & Social Sciences	MT123	Business Communication	2	0	2	3
Laboratories								
	FOURTH	Programme Core (PC)	CA406	Data Structures and Algorithms Lab	0	0	3	1.5
	FOURTH	Programme Core (PC)	CA408	Database Design Concepts Lab	0	0	3	1.5
	FOURTH	Programme Core (PC)	CA410	Object Oriented Design using Java Lab	0	0	3	1.5
		Total						**22.5**

Semester	Course Level	Category of Course	Course Code	Courses	Mode of delivery & credits			Total Credits
					L (periods/ week)	T (periods/ week)	P (periods/ week)	
Theory								
Second/ Spring	**FIRST**	HSS	MT114	Fundamentals of management & Organization Behaviour	3	0	0	3
	FOURTH	Programme Core(PC)	CA413	Data Communication & Computer Networks	3	0	0	3
	FOURTH	Programme Core(PC)	CA415	Software Engineering Principles	3	0	0	3
	FOURTH	Programme Core(PC)	CA417	Theory of Computation	3	0	0	3
	FOURTH	Programme Core(PC)	CA419	Analysis of Algorithms	3	0	0	3
	FOURTH	Program Elective	_	Program Elective - I	3	0	0	3

Laboratories								
	FOURTH	Programme Core (PC)	CA414	DCCN Lab	0	0	3	1.5
	FOURTH	Programme Core (PC)	CA416	Software Engineering Lab	0	0	3	1.5
	FOURTH	Programme Core (PC)	CA422	IT Tools & Techniques Lab	0	0	3	1.5
	Total							**22.5**

Semester	**Course Level**	**Category of Course**	**Course Code**	**Courses**	**Mode of delivery & credits**			**Total Credits**
					L (periods/ week)	T (periods/week)	P (periods/week)	
Theory								
Third/ Monsoon	**FIFTH**	Programme Core (PC)	CA511	Basics of Machine Learning	3	0	0	3
	FIFTH	Programme Core(PC)	CA513	Compiler Design	3	1	0	4
	FIFTH	Programme Core (PC)	CA515	Soft Computing	3	0	0	3
	FIFTH	SIT / Soft Skill Course / Extra OE	CA550	Small Industrial Training/ Small Project/MOOC				6
	FIFTH	Program Elective	_	Program Elective - II	3	0	0	3
	FIFTH	Program Elective	_	Program Elective - III	3	0	0	3
Laboratories								
	FIFTH	Programme Core (PC)	CA512	Basics of Machine Learning Lab	0	0	3	1.5
	FIFTH	Programme Core (PC)	CA514	Compiler Design Lab	0	0	3	1.5
	Total							**25**

Semester	**Course Level**	**Category of Course**	**Course Code**	**Courses**	**Mode of delivery & credits**			**Total Credits**
					L (periods/ week)	T (periods/week)	P (periods/week)	
Project								
Fourth/ Spring	**FIFTH**	Project	CA590	Project				20
	Total							**20**

Total Credits: 90

List of Program Electives							
PE/ LEVEL		**Course Code**	**Name of the PE courses**	**L**	**T**	**P**	**Credit**
4	**PE1**	CA431	Distributed Databases Concepts	3	0	0	3
4		CA433	Intrusion Detection System	3	0	0	3
4		CA435	Modern Artificial Intelligence	3	0	0	3
4		CA437	Information Retrieval	3	0	0	3
4		CA439	Image Processing	3	0	0	3
4		CA441	Data Mining Techniques	3	0	0	3
5	**PE2**	CA519	Mobile Computing	3	0	0	3
5		CA521	Cyber Security	3	0	0	3
5		CA523	Cloud Computing	3	0	0	3
5		CA525	Deep Learning	3	0	0	3
5		CA527	Computer Vision	3	0	0	3
5		CA529	Network Security & Cryptography	3	0	0	3
5	**PE3**	CA539	Parallel Computing	3	0	0	3
5		CA541	Digital Forensic	3	0	0	3
5		CA543	Internet of Things (IOT)	3	0	0	3
5		CA545	Natural LanguageProcessing	3	0	0	3
5		CA547	Big Data Analytics	3	0	0	3
5		CA549	Block Chain Technology	3	0	0	3

MCA Syllabus

Program Core
Semester I

Course code: CA403
Course title: COMPUTER ORGANIZATION AND ARCHITECTURE
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P: 0
Class schedule per week: 03
Class: MCA
Semester / Level: I/4
Branch: Master of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	To provide knowledge of Computer Architecture
2.	Employ knowledge of various Digital Logic Circuits, Data Representation, Register and Processor level Design and Instruction Set architecture
3.	To develop the logical ability to Determine which hardware blocks and control lines are used for specific instructions
4.	Understand memory organization, I/O organization and its impact on computer cost/performance.
5.	Know merits and pitfalls in computer performance measurements.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Describe the merits and pitfalls in computer performance measurements and analyze the impact of instruction set architecture on cost-performance of computer design
CO2	Explain Digital Logic Circuits, Data Representation, Register and Processor level Design and Instruction Set architecture
CO3	Solve problems related to computer arithmetic and Determine which hardware blocks and control lines are used for specific instructions
CO4	Design a pipeline for consistent execution of instructions with minimum hazards
CO5	Explain memory organization, I/O organization and its impact on computer cost/performance.

SYLLABUS

Module I:
INTRODUCTION
Digital Logic Design: Axioms and laws of Boolean algebra, Reduction of Boolean expressions, conversion between canonical forms, Karnaugh map (4 variable), Half Adder, full adder, 4-bit parallel parity bit generator, checker circuit, Decoder, Encoder, Multiplexer, IC RAM, ROM, Memory Organization, Sequential Circuits, State transistors, Flip-flop, RS, JK, D-Latch, Master-slave.

(8L)

Module II:
INSTRUCTION SET ARCHITECTURE
Memory Locations and Addresses: Byte Addressability, Big-Endian and Little-Endian Assignments, Word Alignment, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Subroutines, Additional Instructions, dealing with 32-Bit Immediate Values.

(8L)

Module III:
BASIC PROCESSING UNIT & PIPELINING
Basic Processing Unit: Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control, CISC-Style Processors.
Pipelining: Basic Concept, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Pipeline Performance Evaluation.

(8L)

Module IV:
MEMORY ORGANIZATION
Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Memory Hierarchy, Cache Memories, Performance Considerations, Virtual Memory, Memory Management Requirements, Secondary Storage

(8L)

Module V:
INPUT OUTPUT & PARALLEL PROCESSING
Basic Input Output: Accessing I/O Devices, Interrupts, Input Output Organization: Bus Structure, Bus Operation, Arbitration, Interface, Interconnection Standards.
Parallel Processing: Hardware Multithreading, Vector (SIMD) Processing, Shared-Memory Multiprocessors, Cache Coherence, Message-Passing Multicomputers, Parallel Programming for Multiprocessors, Performance Modeling.

(8L)

Books recommended:

TEXT BOOK

1. Hamacher Carl, et. al, "Computer Organization and Embedded Systems", 6th Edition, Tata McGraw Hill,New Delhi, 2011.**(T1)**
2. Patterson David A., "Computer Organization and Design: The Hardware Software / Interface", 5thEdition, 1994.**(T2)**
3. Mano M. Morris, "Computer System Architecture", Revised 3rdEdition, Pearson Education.**(T3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	2	2	1
CO2	3	3	3	3	1	3	1	1
CO3	3	3	3	3	2	2	2	1
CO4	3	3	3	2	3	2	1	1
CO5	3	1	2	2	1	1	1	1

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

Course code: CA405
Course title: Data Structures and Algorithms
Pre-requisite(s): High Level languages like C, C++, Java or Python
Co- requisite(s): Data Structures Lab
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 3
Class: MCA
Semester / Level: I/4
Branch: MCA

Course Objectives
This course enables the students:

1.	To provide knowledge of practical implementations and usage of Data Structures and Algorithms.
2.	Employ knowledge of various data structures during construction of a program.
3.	To develop the logical ability to store and retrieve data efficiently.
4.	To develop an appreciation of graph theory-based solutions for real life problems.
5.	Design and construct object-oriented software with an appreciation for data abstraction.

Course Outcomes
After the completion of this course, students are expected to

CO1	Identify various data structures and their usages.
CO2	Apply data structures in the modeling of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design.
CO3	Demonstrate the usage of optimal trees, heaps and priority queues.

CO4	Implement sorting algorithms.
CO5	Develop programs using algorithms in graph theory.

SYLLABUS

Module I:
Fundamental Data Structures: Using Arrays, Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists, Asymptotic Analysis.

(8L)

Module II:
Stacks, Queues, Dequeues: The Stack, Queue, Dequeue ADTs, Simple Array Based Stack, Queue, Dequeue Implementation, Implementing Stack, Queue with Singly Linked List, Reversing an Array using Stack, Matching Parenthesis and HTML tags, A Circular Queue.

(8L)

Module III:
Trees: General Trees, Binary Trees, Implementing Trees, Tree Traversal Algorithms, BinarySearch Trees, AVL Trees, B Trees.

(8L)

Module IV:
Sorting: Merge sort, Quick sort, Studying sorting through algorithmic lens, Comparing SortingAlgorithms.
Heap: Priority Queues, Array Implementation of Heaps, Construction of Heaps, Heap Sort.

(8L)

Module V:
Graphs: Data Structures for graphs, Graph Traversals, Transitive Closure, Directed Acyclic Graphs, Shortest Paths, Minimum Spanning Trees. **(8L)**

Text book:

1. Goodrich Michael T., Tamassia Roberto, Goldwasser Michael H. "Data Structures and Algorithms in Java", Wiley, 6th Edition, 2014.
2. Klein Shmuel Tomi, Basic Concepts in Data Structures, Cambridge University Press, 1st Edition, 2016.

Reference books:

1. YedidyahLangsam, Moshe Augenstein J., Tenenbaum Aaron M. "Data Structures using JAVA", Pearson Education, 2009.
2. Brass Peter "Advanced Data Structures", Cambridge University Press, 1st Edition.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	2	1	1
CO2	2	3	3	1	2	2	2	2
CO3	1	1	2	2	3	1	2	1
CO4	3	1	2	1	2	1	1	1
CO5	2	2	1	2	2	1	1	1

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA407
Course title: Database Design Concepts
Pre-requisite(s):
Co-requisite(s):
Credits: 3 L:3 T:0 P:0
Class schedule per week: 4
Class: MCA
Semester / Level: I/4
Branch: MCA

Course Objectives

This course enables the students:

1.	To observe that how the real world data is stored, retrieved, and communicate under the DBMS environment
2.	To design a logical model which having the unique relation between the Data.
3.	To apply the query for the modification of the system.
4.	To develop a conceptual design which allows as to avoid anomalies in superior's data.
5.	To discuss a system which allows to restrict the uncontrolled exaction and provide rigorous variation of the task.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Describe various data models and schemas used in database management systems.
CO2	Explain the fundamental concepts, data definitions and query processing tasks in relational query languages.
CO3	Recognize database design theory, and evaluate functional dependencies and normal forms in databases.
CO4	Formulate the operations of transaction and concurrent query processing tasks to obtain the correct results even under strict time constraints.
CO5	Interpret the foundational concepts of distributed databases. Illustrate several techniques related to transaction management and query processing in distributed database management systems.

SYLLABUS

MODULE I:

Introduction and Conceptual Modelling: Purpose of Database Systems, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database languages, Database Architecture, Classification of DBMS, relational database, Database users and Administrators, Advantages of DBMS. Entities and Entity Sets, Relationships and Relationship Sets, Keys, Mapping, Constraints, ER Diagram, Reducing ER Diagram to tables, Generalization and Specialization, Aggregation.

(8L)

MODULE II:

Relational Model: Concepts, Constraints, Languages, Design and Programming: Relational database Schemas, Relational Algebra, Relational Calculus (Tuple Relational calculus and Domain Relational calculus), Update operations, Transactions, Dealing with constraint violations. Binary Relational operation: JOIN and DIVISION, SQL, More complex SQL Queries, Security & Integrity violations, authorization and views, integrity constants, encryption, Statistical databases

(8L)

MODULE III:

Database Design Theory and Methodology: Pitfalls in relational database design, Functional Dependencies, Decomposition Using Functional Dependencies. Normalization using functional Dependencies, General Definition of First, Second, Third and Forth Normal Form. Boyce-Codd Normal Form(BCNF), Multivalued and join dependencies, DKNF.

(8L)

MODULE IV:

Transaction Processing Concepts and Concurrency Control Techniques: Transaction Processing, Desirable Properties of Transactions, Transaction State, Characterizing Schedules based on Recoverability and Serializability. Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Deadlock Handling, Recovery and Atomicity, Log-Based Recovery.

(8L)

MODULE V:

Distributed Databases and Client-Server Architectures: Concepts and Types of Distributed databases, data fragmentation, Replication and Allocation Techniques for Distributed Database Design, Query Processing in Distributed Databases, Overview of Concurrency Control and Recovery in Distributed Databases, An Overview of 3-Tier Client-Server Architecture.

(8L)

Text Book:

1. Elmasri Ramez, & Navathe S.B., "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2006.

Reference Book:

1. Silberschatz A., &Korth H., "Database Systems Concepts", 5th Edition, McGraw Hill Higher Education, 2005.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	3	3	2	2	1

CO2	3	3	1	2	1	3	1	2
CO3	2	2	3	3	2	2	2	1
CO4	3	1	2	2	3	2	1	1
CO5	1	2	2	2	1	1	1	2

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA409
Course title: OBJECT ORIENTED DESIGN USING JAVA
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L:3 T:0 P: 0
Class schedule per week: 3
Class: MCA
Semester / Level: I/4
Branch: MCA

Course Objectives
This course enables the students:

1.	The course shall allow students to understand the basic tenets of OOP.
2.	The course will exemplify the basic syntax and constructs of JAVA
3.	The course will help students understand the application OOP principles and Improve their programming skills in core Java
4.	The course will explain basic JAVA characteristics and their working.
5.	The course aims to expose students to Use the Java packages, applets for software development

Course Outcomes
After the completion of this course, students will be:

CO1	Identify the difference between procedural and OO programming.
CO2	Construct programs using various OOP principles.
CO3	Apply the knowledge gained for their project work as well as to develop some GUI applications using JAVA
CO4	Operate on files and strings in real life scenarios.
CO5	Analyze thread performance and inter thread communication issues

SYLLABUS

MODULE I:

Procedure-Oriented Programming, Object-Oriented programming, Benefits of OOP, Applications of OOP, Basics, Evolution of Java, Structure of JAVA Program, Simple Java Program, Tokens, Comments, Identifiers, Operators, Literals, Control Structures. Java Environment Setup, Compiling a Java Program, Java Virtual Machine, Philosophy of Java and Benefits.

(8L)

MODULE II:

Data types and program statements: Primitive and reference data types, variables and constants, enumerated constants, labelled statement, expression and null statements, compound statement, control statement – decision and loops, jump statement, declaration statement, try-throw-catch-finally statement, declaring and creating arrays, accessing array elements, assigning values to array elements, multidimensional arrays.

(8L)

MODULE III:

Functions, Data Abstraction and classes: Declaration, definition and call, main method arguments, reference variables, method overloading, parameter passing by value for primitive types, object references and arrays, scope of variables, return from methods.

Class and object, class members and initialization, access rights of members – public, private and protected access modifiers, constructor and copy constructor, mutability, finalization, dynamic memory management, garbage collection, this keyword, static members, scope of variables, interface – declaration, implementation and extending, package and package visibility.

(8L)

MODULE IV:

Inheritance and Collection classes: multi level and single inheritance, multiple inheritance of interfaces, Object class, access rights in subclasses and packages, constructor calling sequence, super keyword, dynamic binding of methods, abstract class, overriding, shadowing and hiding, finalize, association, aggregation and composition.

String, StringBuffer, Date, Calendar, Math, Object, Class, Exception class.

(8L)

MODULE V:

Input/Output and JAVA Applets: Stream clases – InputStream, OutputStream, Buffered Stream, file classes and handling, pushback streams, reader and writer classes, file reader and writer, serialization.

Applet code example, HTML tags for applet, applet lifecycle, color, font and basic GUI handling, basic graphics, animation.

(8L)

Text books:

E. Balagurusamy - Programming in Java, 2nd Edition; Tata McGraw Hill Publication; New Delhi.

Reference books:

Patrick Naghton & H. Schildt – The Complete Reference Java 2, Tata McGraw Hill Publication, New Delhi.

Dietel,Dietel - Java How to program , 7th edition; Pearson Education , New Delhi.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

Course Outcome	Program Outcomes							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	3	2	2	1	3	2	1
CO2	3	2	3	3	1	3	1	2
CO3	1	3	3	3	2	2	2	1
CO4	2	1	2	2	3	2	1	1
CO5	1	1	2	2	1	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA411
Course title: Modern Operating Systems
Pre-requisite(s): Data Structure, Computer System Architecture, Basic Course on Computer Programming
Co- requisite(s):
Credits: 3 L:3 T:0 P: 0
Class schedule per week: 03
Class: MCA
Semester / Level: I/4
Branch: MCA

Course Objectives
This course enables the students to:

1.	Present the main components of OS and their working
2.	Introduce the concepts of process and thread and their scheduling policies
3.	Introduce the various memory management techniques.
4.	Analyze the different techniques for managing memory, I/O, disk and files.
5.	Introduce the security and protection features of an Operating System.

Course Outcomes

After the completion of the course student will be able to:

CO1	Describe the main components of OS and their working
CO2	Explain the concepts of process and thread and their scheduling policies
CO3	Explain the various memory management techniques.
CO4	Compare the different techniques for managing memory, I/O, disk and files.
CO5	Explains the security and protection features of an Operating System.

SYLLABUS

MODULE I:

Overview of Operating Systems: OS and the Computer System, Efficiency, System Performance and User Convenience, Classes of Operating Systems, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time Operating Systems, Distributed Operating Systems, Modern Operating Systems.

(8L)

MODULE II:

Processes and Threads: Processes and Programs, Programmer view of Processes, OS view of Processes, Threads, Case studies of Processes and Threads.

Scheduling: Preliminaries, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, Scheduling in Practice, Real Time Scheduling, Scheduling in Unix, Scheduling in Linux, Scheduling in Windows, Performance Analysis of Scheduling Policies.

(8L)

MODULE III:

Memory Management: Managing the Memory Hierarchy, Static and Dynamic Memory Allocation, Memory Allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A Review of Relocation, Linking and Program Forms.

Virtual Memory: Virtual Memory Basics, Demand Paging, Page Replacement Policies, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Unix Virtual Memory, Linux Virtual Memory, Virtual Memory using Segmentation.

(8L)

MODULE IV:

File Systems: File System and IOCS, Files and File Operations, Fundamental File Organizations, Directory Structures, File Protection, Interface between File System and IOCS, Allocation of Disk Space, Implementing File Access, File Sharing Semantics, File System Reliability, Virtual File System, Unix File System, Linux File System, Windows File System, Performance of File Systems.

(8L)

MODULE V:

Security and Protection: Overview of Security and Protection, Goals of Security and Protection, Security Attacks, Formal and Practical aspects of Security, Encryption, Authentication and Password Security, Access Descriptors and the Access Control Matrix, Protection Structures, Capabilities, Unix Security, Linux Security, Windows Security.

(8L)

Text Book:

1. Dhamdhere D.M., "Operating Systems: A Concept-Based Approach", 2nd Edition, TMH, New Delhi, 2006.

Reference Books:

1. SilberschatzA.,Galvin Peter B.,Greg Gagne, "Operating System Concepts", 6th Edition, John Wiley, Indian Reprint, 2003.
2. Crowley C., "Operating Systems: A Design-Oriented Approach", TMH, New Delhi, 2002.
3. Deitel H.M., "Operating Systems", 2nd Edition, Pearson Education, 2003.
4. Tanenbaum A.S., "Operating System: Design and Implementation", PHI, New Delhi, 2002.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution

3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	3	2	3	3	3	2	1	1
CO2	2	3	3	1	2	2	2	2
CO3	1	1	2	2	3	1	2	1
CO4	3	1	2	1	2	1	1	1
CO5	2	2	1	2	2	1	1	1

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: MT123
Course title: BUSINESS COMMUNICATION
Pre-requisite(s):
Co- requisite(s):
Credits: 3 L: 2 T: 0 P: 2
Class schedule per week: 03
Class: MCA
Semester / Level: I/1
Branch: Master of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Analyze and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.
2.	Understand the importance of specifying audience and purpose and to select appropriate communication choices.
3.	Interpret and appropriately apply modes of expression, i.e., descriptive, expositive, Narrative, scientific, and self-expressive, in written, visual, and oral communication
4.	Participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding.
5.	Develop the ability to research and write a documented paper and/or to give an oral presentation.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
CO2	Utilize analytical and problem-solving skills appropriate to business communication.
CO3	Participate in team activities that lead to the development of collaborative work skills.
CO4	Select appropriate organizational formats and channels used in developing and presenting business messages
CO5	Communicate via electronic mail, Internet, and other technologies and deliver an effective oral business presentation.

SYLLABUS

Module I:
Introduction to Business Communication:
Importance and Objectives of Business communication, Process of communication, Barriers to effective communication, Techniques of effective communication. Forms of communication (Written, Oral, audio-visual communication).

(8L)

Module II:

Managing Business Communication:

Formal and Informal communication, Non- verbal communication (Body language, Gestures, Postures, Facial expressions). The cross-cultural dimensions of business communication. Techniques to effective listening, methods and styles of reading.

(8L)

Module III:

Other aspects of communication:

Vocabulary:

Single word substitution, Idioms and phrases, Precis writing, Comprehension.

Group Discussions, Extempore, Principles of effective speech and presentations, Role-playing.

(8L)

Module IV:

Introduction to managerial writing:

Business letters: Inquiries, Circulars, Quotations, Orders, Acknowledgement, Claims & adjustments, Collection letters, Sales letters, Drafting of different resumes, Covering letters Applying for a job, Social correspondence, Invitation to speak.

Official Correspondence: Memorandum, Notice, Agenda, Minutes, Circular letters.

(8L)

Module V:

Report writing and Technical Proposals:

Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft, checklists for reports.

Technical proposals, Definitions, types and format.

(8L)

Books recommended:

TEXT BOOK

1. "Communication Skills", Sanjay Kumar &PushpLata, Oxford University Press. **(T1)**
2. "Business Correspondence and Report Writing", R.C.Sharma, Krishna Mohan, McGraw Hill. **(T2)**
3. "Communication for Business", Shirley Taylor, V. Chandra, Pearson. **(T3)**

REFERENCE BOOK

1. "Business Communication", HorySankar Mukherjee, Oxford University Press. **(R1)**
2. "Basic Business Communication", Lesikar I Flatley, McGraw Hill. **(R2)**
3. "Business Communication Today", Bovee, Thill and Chaterjee, Pearson. **(R3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	1	2	2	1	2
CO2	3	1	2	1	1	2	1	1
CO3	3	3	1	2	1	1	1	1
CO4	2	2	1	2	1	1	2	1
CO5	2	1	1	3	2	2	1	1

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1,CD2,CD3
CD2	Tutorials/Assignments	CO2	CD1,CD2,CD3
CD3	Seminars	CO3	CD1,CD2,CD3
CD4	Mini projects/Projects	CO4	CD1,CD2,CD3,CO4 CD5
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		

CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course code: CA406
Course title: Data Structures and Algorithms Lab
Pre-requisite(s): High Level languages like C, C++, Java or Python
Co- requisite(s): Data Structures Lab
Credits:1.5 L: 0 T: 0 P:3
Class schedule per week: 3
Class: MCA
Semester / Level: I/4
Branch: MCA

Course Objectives
This course enables the students:

1.	To assess how the choice of data structures and algorithm design methods impact the performance of programs.
2.	To choose the appropriate data structure and algorithm design method for a specified application.
3.	To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.
4.	Analyse and compare the different algorithms

Course Outcomes
After the completion of this course, students will be able to:

CO1	Choose an appropriate data structure given a computational problem
CO2	Design and analyze the time and space efficiency of various data structures
CO3	Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and quick sort
CO4	Have practical knowledge on the applications of data structures
CO5	Justify the choice of data structure for a given problem

SYLLABUS

1. Program to Find the Number of Elements in an Array
2. Develop and Implement a menu driven program in C for the following Array operations
    a. Creating Array of N Integer elements.
    b. Display of Array elements with suitable headings.
    c. Inserting an element (ELEM) at a given valid position (POS).
    d. Deleting an element at a given valid position (POS).
    e. Exit

3. Programs for Stack, Queues and Circular Queues using Arrays
4. Program to convert an Infix Expression into Postfix and Postfix Evaluation
5. Program to implement stack using arrays
6. Program to implement stack using linked list
7. Program to implement multiple stack in a single array
8. Program to convert infix notation to postfix notation using stacks
9. Program to implement queue using arrays
10. Program to implement queue using pointers
11. Program to reverse elements in a queue
12. Program to implement circular queue using arrays
13. Program to create add remove & display element from single linked list
14. Program to create add remove & display element from double linked list
15. Program to count number of nodes in linear linked list
16. Program to create add remove & display element from circular linked list
17. Programs to implement stack & queues using linked representation
18. Program to concatenate two linear linked lists
19. Program to accept a singly linked list of integers & sort the list in ascending order.
20. Program to reverse linked list
21. Program to represent polynomial using linked list
22. Program to add two polynomials using linked list
23. Program for the creation of binary tree, provide insertion & deletion in c
24. Program for pre-order, post-order & in-order traversals of a binary tree using non reccursive.
25. Program to count no, of leaves of binary tree
26. Program for implementation of B-tree (insertion & deletion)
27. Program for implementation of multi-way tree in c
28. Program for implementation of AVL tree
29. Program to implement bubble sort program using arrays
30. Program to implement merge sort using arrays
31. Program to implement selection sort program using arrays
32. Program to implement insertion sort program using arrays
33. Program to implement topological sort using arrays
34. Program to implement heap sort using arrays
35. Program to implement heap sort using pointers
36. Program to implement bubble sort program using pointers
37. Program to implement linear search using pointers
38. Program to implement binary search using pointers
39. Program to implement linear search using arrays
40. Program to implement binary search using arrays

Text books:

1. Baluja G S, “Data Structure through C”, Ganpat Rai Publication, New Delhi, 2015.
2. Pai G A V, “Data Structures and Algorithms: Concepts, Techniques and Applications”, 2nd Edn, Tata McGraw-Hill, 2008.
3. Horowitz E., Sahni S., Susan A., “Fundamentals of Data Structures in C”, 2nd Edition,

University Press, 2010.

Reference books:

4. Tremblay J. P., Sorenson P. G, "An Introduction to Data Structures with Applications", 2nd Edn, McGraw-Hill, Inc. New York, NY, USA.
5. Lipschutz Seymour, "Data Structures", 6th Edn, 9th Reprint 2008, Tata McGraw-Hill.
6. Drozdek Adam, "Data Structures and Algorithms in C++", Thomson Learning, New Delhi – 2007.
7. Feller J., Fitzgerald B., "Understanding Open Source Software Development", Pearson Education Ltd. New Delhi

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	60
Semester End Examination	40

Continuous Internal Assessment	% Distribution
Day to day performance & Lab files	30
Quiz (es)	10
Viva	20

Semester End Examination	% Distribution
Examination Experiment Performance	30
Quiz	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars

CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	2	1	2	1
CO2	3	3	3	3	2	1	2	2
CO3	3	3	3	3	2	1	2	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA408
Course title: Database Design Concepts Lab
Pre-requisite(s):
Co-requisite(s):
Credits: 1.5 L: 0 T: 0 P:3
Class schedule per week: 3
Class: MCA
Semester/Level: I/4
Branch: MCA

Course Objectives

This course enables the students:

1.	To observe that how the real world data is stored, retrieved, and communicate under the DBMS environment
2.	To design a logical model which having the unique relation between the Data.
3.	To apply the query for the modification of the system.
4.	To develop a conceptual design which allows as to avoid anomalies in superior's data.

5.	To discuss a system which allows to restrict the uncontrolled exaction and provide rigorous variation of the task.

Course Outcomes

After the completion of this course, students will be able to:

CO1	Describe various data models and schemas used in database management systems.
CO2	Explain the fundamental concepts, data definitions and query processing tasks in relational query languages.
CO3	Recognize database design theory, and evaluate functional dependencies and normal forms in databases.
CO4	Formulate the operations of transaction and concurrent query processing tasks to obtain the correct results even under strict time constraints.
CO5	Interpret the foundational concepts of distributed databases. Illustrate several techniques related to transaction management and query processing in distributed database management systems.

SYLLABUS

For the Tables given below:

emp(empno,ename,job,mgr,hiredate,sal,comm,deptno,gr),

dept(deptno,dname,loc)

Write the following queries:

1. List all information about all department from emp table.
2. List all employee names along with their salaries from emp table.
3. List all department numbers, employee numbers and their managers numbers in descending order of deptno from emp table.
4. List department names and locations from the dept table.
5. List the employees belonging to the department 20.
6. List the name and salary of the employees whose salary is more than 1000.
7. List the names of the clerks working in the department 20.
8. List the names of analysts and salesmen.
9. List the details of the employees who have joined before the end of September 81.
10. List the names of employees who are not managers.
11. List the names of employees whose employee number are 7369, 7521, 7839, 7934, 7788.
12. List the employee details not belonging to the department 10, 30, and 40.
13. List the employee name and salary, whose salary is between 1000 and 2000.
14. List the employee names, who are not eligible for commission.(salary having >15,000 eligible for commission)
15. List the employees who are eligible for commission.

16. List the details of employees, whose salary is greater than 2000 and commission is NULL.
17. List the employees whose names start with an “S” (not”s”).
18. List the name, salary and PF amount of all the employees(PF is calculated as 10% of salary).
19. List the empno, ename, sal in ascending order of salary.
20. List the employee name, salary, job and Department no descending order of Department No and salary.
21. List the employee details in ascending order of salary.
22. List the employee details in descending order of salary
23. Display name, and sal and commission of all employees whose monthly salary is greater than their commission.
24. Select SMITH HAS WORKED IN THE POSITION OF CLERK IN DEPT 20.Display result in this format.
25. Generate a statement which prompts the user at runtime. The intention is to display employees hired between 2 given dates.
26. Define a variable representing an expression used to calculate total annual remuneration. Use the variable in a statement which finds all employees who earn $30000 a year or more.
27. List all the employees name and salaries increased by 15% and expressed as a whole number of dollars.

28. Produce the following

EMPLOYEE AND	**JOB**
SMITH	CLERK
ALLEN	SALESMAN

29. Produce the following output:

SMITH (Clerk)

ALLEN (Salesman)

30. Do a case sensitive search for a list of employees with a job that the user enters.
31. It has been discovered that the sales people in dept. 30 are not all male. Please produce thefollowingoutput.

ENAME	**DEPTNO**	**JOB**
ALLEN	30	Sales Person

32. Display each employees name and hiredate of dept 20.
33. Display each employees name, hiredate and salary review date. Assume salary review date

is one year fromhiredate. Output should be in ascending review date.

34. Print list of employees displaying just salary, if more than 1500. If exactly 1500 display " On Target". If less than 1500 display " Below 1500".
35. Write a query which returns DAY of the week (i.e. MONDAY) for any date entered in the format DD/MM/YY.
36. Write a query to calculate length of service of each employee.
37. Find the minimum salary of all employees.
38. Find the maximum, minimum, and average salaries of all employees.
39. List the maximum and minimum salary of each job type.
40. Find how many managers are in each dept.
41. Find the average salary and average total remuneration of each job type. Remembers sales man earn commission.
42. Find out the difference between highest and lowest salary.
43. Find all department s which have more than three employees.
44. Check whether all employee nos are unique. (No Duplicate)
45. List lowest paid employee working for each Manager. Exclude any groups where the minimum salary is less than 1000. Sort the output by salary.
46. Produce a list showing employees 'salary grade'.(> 10000 A, >10000 &<20000 B, >20000 C)
47. Show only employee on Grade C.
48. .Show all employee in Dallas.
49. List the employees name, job, salary, grade and department for everyone in the company except clerks. Sort on salary, displaying the highest first.
50. List the following details of employees who earn $36000 a year or who are clerks.

Ename Job Annual Sal Dept no Dname Grade

51. Display all employees who earn less than their managers.
52. Display all employees by name and eno along with their managers name and number.
53. Modify above spoliation to display KING who has no MANAGER.
54. Find the job that was files in the first half of 1983 and the name job that was filled in the same period in 1984.
55. Find all employees who have joined before their manager.

EMPLOYEE HIREDATE MANAGER HIREDATE

56. Find the employees who earn the highest salary in each job, type, sort in descending order

of salary.

57. Find the employees who earn the minimum salary for their job, Display the result in descending order of salary

58. Find the most recently hired employees in the department. Order by hiredate.
59. Show the details of any employee who earns a salary greater than the average for their department. Sort in department number order.

60. List all department where there are no employees.

Text book:

1. SQL, PL/SQL the programming Language of Oracle, Ivan Bayross, 4th edition

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	60
Semester End Examination	40

Continuous Internal Assessment	% Distribution
Day to day performance & Lab files	30
Quiz (es)	10
Viva	20

Semester End Examination	% Distribution
Examination Experiment Performance	30
Quiz	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	2	2	3	1	3	2	2	1
CO2	3	3	1	2	1	1	1	2
CO3	2	2	3	1	2	3	3	1
CO4	1	1	1	2	3	2	1	1
CO5	3	2	1	2	1	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA410
Course title: Object Oriented Design using Java Lab
Pre-requisite(s):
Co- requisite(s):
Credits:1.5 L: 0 T: 0 P:3
Class schedule per week: 3
Class: MCA
Semester / Level:I/4
Branch: MCA

Course Objectives
This course enables the students to:

1.	Introduce the concepts ofobject-oriented programming and features of object-oriented programming languages.
2.	To learn advanced features of the JAVA programming language as a continuation of the previous course.
3.	To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods
4.	To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity.
5.	To enhance problem solving and programming skills in JAVA with extensive programming projects

Course Outcomes
After the completion of this course, students will be able to:

CO1	Explain basic concepts of object-oriented programming.
CO2	Use the characteristics of an object-oriented programming language in a program.
CO3	Use the basic object-oriented design principles in computer problem solving
CO4	Develop their own Applications /Projects using JAVA
CO5	Simulate the problem in the subjects like Operating system, Computer networks and real world problems.

SYLLABUS

List of Programs as Assignments:

Objective: To Understand and Implement basic OOP features

1.Write a Program to design a class having static member function named showcount() which has the property of displaying the number of objects created of the class.

2. Write a Program which creates & uses array of object of a class.(for eg. implementing the list of Managers of a Company having details such as Name, Age, etc..).

Objective: To Understand and Implement special types of functions like friend function

3. Write a Program to swap private data members of classes named as class_1, class_2 using friend function.

4.Write an inline function to find largest of three number

Objective: To Understand and Implement the concept of constructors

5. Write a Program using copy constructor to copy data of an object to another object.

6. Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imag parts to equal values and third which takes two argument is used to initialized real and imag to two different values.

Objective: To Understand and Implement the concept of Polymorphism

7. Write a program for overloading operator++ and operator—using friend functions

8. Write a program for developing a matrix class which can handle integer matrices of different dimensions. Also overload the operator for addition, multiplication & comparison of matrices.
9.Write a program to compute area of right angle triangle, equilateral triangle, isosceles triangle using function overloading concept.

Objective: To Understand and Implement the concept of Inheritance
10.Write a Program to design a student class representing student roll no. and a test class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sports and test class should be inherited by a result class having the functionality to add the scores and display the final result for a student.

11.Write a Program illustrating how the constructors are implemented and the order in which they are called when the classes are inherited. Use three classes named alpha, beta, gamma such that alpha, beta are base class and gamma is derived class inheriting alpha & beta.
Objective: To Understand and Implement exception handling
12. Write a program to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

Objective: To Understand and Implement File Operations
13.Write a program to read the class object of student info such as name , age ,sex ,height and weight from the keyboard and to store them on a specified file using read() and write() functions. Again the same file is opened for reading and displaying the contents of the file on the screen.
14.Write a program to perform the deletion of white spaces such as horizontal tab, vertical tab, space ,linefeed ,new line and carriage return from a text file and store the contents of the file without the white spaces on another file.

Books recommended:

Text books:
E. Balagurusamy - Programming in Java, 2nd Edition; Tata McGraw Hill Publication; New Delhi.

Reference books:
Patrick Naghton & H. Schildt – The Complete Reference Java 2, Tata McGraw Hill Publication, New Delhi.

Dietel,Dietel - Java How to program , 7th edition; Pearson Education , New Delhi.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	60
Semester End Examination	40

Continuous Internal Assessment	% Distribution
Day to day performance & Lab files	30
Quiz (es)	10
Viva	20

Semester End Examination	% Distribution
Examination Experiment Performance	30
Quiz	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	✓	✓	✓	✓	✓
Semester End Examination	✓	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Program Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8

CO1	1	2	3	3	2	1	1	1
CO2	3	3	3	2	1	2	2	2
CO3	2	3	3	1	1	2	1	1
CO4	2	3	2	3	3	1	2	1
CO5	2	3	2	3	3	1	2	1

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD2,CD3,CD6
CO2	CD1, CD6,CD3
CO3	CD6, CD7, CD3,CD1
CO4	CD1, CD3,CD6,CD7