

Chaudhary Ranbir Singh University

(Established by the Haryana State Legislature Act 28 of 2014)

(Recognised u/s 2(f) and 12(B) of UGC Act, 1956)



Syllabus for

Post Graduate Programme

Master of Computer Applications (MCA)

as per NEP-2020

Curriculum and Credit Framework for Postgraduate Programme

with Multiple Entry-Exit, Internship and CBCS-LOCF
with effect from the session 2024-25 (in phased manner)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
FACULTY OF PHYSICAL SCIENCES

CHAUDHARY RANBIR SINGH UNIVERSITY
JIND - HARYANA - INDIA - 126102

Disks

Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Server Side Web Technology
Course Code	M24-CAP-201
Course Type	CC-5
Level of the course (As per Annexure-I)	400-499
Pre-requisite for the course (if any)	

Course Objectives	This course aims to provide a comprehensive understanding of back-end development using the Node JS, Dot NET, C#, PHP and Ruby basics. Students will learn about Node JS and Dot NET for building dynamic server side scripting and programming, including components, state management, and event handling. The course also explores advanced topics such as PHP and Ruby for advanced hooks for managing side effects and context.
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Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	<p>CLO-1. Gain an understanding of the web development process and the components of the Node JS.</p> <p>CLO-2 To learn PHP for development of Dynamic Websites.</p> <p>CLO-3 To learn .NET to provide a runtime environment and a set of libraries and tools for building and running applications on Windows operating systems.</p> <p>CLO-4 To learn Ruby for DevOps, automation and Website Deployment</p>
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Credits	Theory	Practical	Total
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
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Wished

Node JS: Introduction to Node JS, REPL Terminal, Node.js Modules, Module Types, Core Modules, Local Modules, Module Experts 15

Node Packet Manager (NPM), Installing Packages Locally, Adding dependency in Packages, Installing Packages Globally, Updating packages. Creating Web Server, Handling http requests, sending requests.

Buffers, Streams, Files, reading, writing, updating files, synchronous and asynchronous.

Events in Node JS, significance of the events, writing own events, Event Emitter class, inhering events.

Express framework to create web applications: Configuring Routes, Working with Express. How to serve Static HTML pages to the browser, and serving other file formats and restricting certain files.

Database Connectivity: MySQL Database, Creating Connection

II Dot NET: The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In-Time Compilation, Framework Base Classes. 15

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion. C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

.Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.

III PHP: Variables, Constant, Data types, Operator and Expression Handling, Making Decisions, Iterations, Function, Call by value, Call by reference, Recursive function, Strings, Arrays, Index based and Associative array, each() and foreach(), Working with file and Directories, State management , Regular expression, Pattern matching, Introduction to OOPS, Objects, Class, Constructor Destructor, \$this variable, Public ,private, protected properties, Inheritance, code reusability, Polymorphism Parent:: & self:: keyword, Instance of operator, Abstract method and class Interface, Final Exception Handling Understanding Exception and error Try, catch, throw. 15

IV Ruby: Introduction to Ruby, Ruby Command Line Option, Ruby Environment Variables, Whitespace, Identifier, Reserve Words, Begin, End Statement, Comments, Creating Objects, Member Functions, Variables, Constants and Literals, Operators, Conditional Control, Loop Control, Methods, Blocks, Modules and Mixins, Strings, Arrays, Hashes, Ranges, Iterators, File I/O, Exceptions, DBI, Web Applications. 15

Total Contact Hours 60

Suggested Evaluation Methods

Internal Assessment: 30		End Term Examination: 70	
<input type="checkbox"/> Theory	30	<input type="checkbox"/> Theory	70
● Class Participation:	5	Written Examination	
● Seminar/presentation/assignment/quiz/class test etc.:	1		
	0		
● Mid-Term Exam:	1		
	5		

Part C-Learning Resources

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Reference Books:

- 1) Mario Casciaro (2020). *Node.JS Design Patterns*. Packt Publishers.
- 2) David Harron (2020). *Node.JS Web Development*. Packt Publishers.
- 3) Vikram Vaswani (2017). *PHP – A Beginner's Guide*. McGraw Hill Education (Indian Edition)
- 4) Mark J. Price (2023). *C# 12 and .NET 8*. Packt Publishers.
- 5) Noel Rappin, Dave Thomas (2024). *Programming Ruby 3.3*. Pragmatic Bookshelf.



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Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Programming in Java
Course Code	M24-CAP-202
Course Type	CC-6
Level of the course (As per Annexure-I)	400-499
Pre-requisite for the course (if any)	-

Course Objectives
 This course provides a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business. It will cover the need to explore advanced topic of Java programming for solving problems, Design and develop GUI applications using Swings, Enhance knowledge to manipulate and store data, To provide foundations on Java Beans, Struts and JSON.

Course Learning Outcomes (CLO)
 After completing this course, the learner will be able to:

CLO-1 To learn why Java is useful for the design of desktop and web applications.
 CLO-2 To learn how to implement object-oriented designs with Java.
 CLO-3 To identify Java language components and how they work together in applications.
 CLO-4 To design and program stand-alone Java applications.
 CLO-5 To learn how to design a graphical user interface (GUI) with Java Swing.
 CLO-6 To understand how to use Java APIs for program development.
 CLO-7 To learn how to extend Java classes with inheritance and dynamic binding.
 CLO-8 To learn how to use exception handling in Java applications.
 CLO-9 To understand how to design GUI components with the Java Swing API.
 CLO-10 To learn Java generics and how to use the Java Collections API.
 CLO-11 To understand how to design applications with threads in Java.
 CLO-12 To learn how to read and write files in Java.

Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

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	Topics	Contact Hours
I	Introduction: Java Features, Java Virtual Machine (JVM), Byte code, Java API, Java Development Kit (JDK), Garbage Collection. Language Basics: Keywords, Constants, Variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping. Introducing Classes, Objects and Methods: Defining a Class, Methods Declaration, Creating Objects and accessing Class members, Constructors, Methods Overloading, Wrapper Classes, Inheritance, Methods Overriding, Final Class, variables and methods, Abstract Class and Methods, Interfaces.	15
II	Arrays, Strings and Vectors: Creating and using Arrays, String operations, String Buffer, String Builder, and StringTokenizer class, Vector class. Packages and Exceptions: Java API packages, Creating and using packages, static import, Exceptions handling, Types of Exceptions, multiple catch statements, 'throw' and 'throws', using 'finally' statement, Creating your own exceptions.	15
III	Multithreaded Programming: Single threaded and multi-threaded program, Creating threads using Thread class, Life cycle of a Thread, Stopping and blocking a Thread, getting and setting the Thread Priority, Synchronization, implementing the Runnable interface. Managing Input/Output Streams: Concept of streams, Byte and Character streams, Reading and Writing from Console and Files. Input output exceptions.	15
IV	Applet Programming: How Applets differs from Java Application, Applet Life Cycle, APPLET Tag, Running an Applet, Passing Parameters to Applet. Event Handling: Mechanism, The Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and inner classes. GUI Programming: Working with Frame Window, Graphics and Text, AWT Controls and classes. Layout Managers, working with Menus.	15
Total Contact Hours		60

Suggested Evaluation Methods

Internal Assessment: 30		End Term Examination: 70	
Theory	30	<input type="checkbox"/> Theory	70
1) Class Participation:	5	Written Examination	
2) Seminar/presentation/assignment/quiz/class test etc.:	10		
3) Mid-Term Exam:	15		

Part C-Learning Resources

Reference Books:

1. E. Balagurusamy, "Programming with Java :A Primer", McGraw Hill, 3rd edition.
2. Herbert Schildt, "Java:The Complete Reference", McGraw Hill, 7th edition.
3. Bruce Eckel, "Thinking in Java", Prentice Hall, 4th Edition.
4. Cay S. Horstmann, Gary Cornell, "Core Java Volume I—Fundamentals", Prentice Hall, 9th Edition.

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Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Data Base Management Systems
Course Code	M24-CAP-203
Course Type	CC-7
Level of the course (As per Annexure-I)	400-499
Pre-requisite for the course (if any)	-

Course Objectives

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS. This course ensures to develop a foundational understanding of MongoDB, covering its principles, architecture, and essential operations. You'll gain hands-on skills installing MongoDB, executing CRUD operations, and navigating its architecture

Course Learning Outcomes (CLO)

After completing this course, the learner will be able to:

CLO-1. Describe the fundamental elements of relational database management systems.

CLO-2 Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

CLO-3 Learn hands on skill training of MongoDB.

CLO-4 Execute CRUD Operations and navigating architecture, design schema in MongoDB.

Credits	Theory		Practical	Total
	4		0	4
Teaching Hours per week	4		0	4
Internal Assessment Marks	30		0	30
End Term Exam Marks	70		0	70
Max. Marks	100		0	100
Examination Time	3 hours			

Part B - Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Database System: Definition, Characteristics, Relational data models, Schemas, Instances, Three schema architecture and data independence. Data modeling : Entity, Entity type, Entity set, Attributes, Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak entity type, Naming convention for ER diagram, Design issues, Subclass, Super class, Inheritance, Specialization & Generalization.	15
II	Relational Algebra: Select, Project, Join, Division, Union, Intersection, Minus, Cartesian product. Relational Calculus: Tuple variable, Range relations, Expressions, Formulas, Existential & Universal Quantifiers & there transformation, Using the Universal Quantifier, Safe expression, Domain relational calculus.	15

Wish

Transaction Processing: Introduction, Single User, Multiuser, Read and Write Operation, Lost update problem, Temporary update, Incorrect summary problem, Transaction states, System log, Commit point of a transaction, Desirable properties, Serial, Non serial & Conflict Serializable schedule, Testing of Conflict Serializability of a schedule, View equivalence & View serializability.	15
IV Introduction to NoSQL. Classification, Features, Advantages, Disadvantages, Types of NoSQL, RDBMS vs NoSQL Database. Getting Started with MongoDB, 2dSphere Index, Aggregation, Authentication Mechanism in MongoDB, Backing Up and Restoring Data, Bulk Operations, Collections, Configuration, CRUD Operations, Mongo as Replica Set, Mongo as Shards, Pluggable Storage Engines, Querying for Data, Replication, Update Operators, Java Drivers, Python Drivers, Upserts and Inserts.	15
Total Contact Hours	60

Suggested Evaluation Methods

Internal Assessment: 30		End Term Examination: 70	
Theory	3	<input type="checkbox"/> Theory	70
	0		
• Class Participation:	5	Written Examination	
• Seminar/presentation/assignment/quiz/class test etc.:	1		
	0		
• Mid-Term Exam:	1		
	5		

Part C-Learning Resources

Reference Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems"; Pearson, 6th edition, 2010.
2. Silberschatz Abraham, "Database System Concept", Tata Mc Graw Hill, 7th edition, 2019.
3. C. J Date, "Introduction to Database Systems", Pearson Education, 8th edition, 2004.
4. Krishnan Ram and Gehrke, "Database Management System", , Tata Mc Graw Hill, 2003.
5. Byross Ivan, "Oracle 10 G The Database with HTML Database", BPB publication, 2006.
6. Marko Eleksendric et.al., "Mastering MongoDB 7.0", Fourth Edition, Packt Publishers, 2024

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Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Artificial Intelligence
Course Code	M24-CAP-203
Course Type	CC-7
Level of the course (As per Annexure-I)	400-499
Pre-requisite for the course (if any)	

Course Objectives

This course provides a develop software solutions demonstrating intelligent behaviour, handling uncertainty, constantly learning, and effectively using domain knowledge. To promote research in intelligent technology and concepts. To participate in life-long learning for effective professional growth and demonstrate leadership qualities to co-ordinate cooperative team in contributing for the betterment of the society.

Course Learning Outcomes (CLO)
After completing this course, the learner will be able to:

CLO-1. To learn about Heuristic Search Techniques.
CLO-2 To apply propotional and predicate logic.
CLO-3 To gain proficiency in Knowledge Ontologies.
CLO-4 To learn about neural network and neural computing.
CLO-5 To implement Fuzzy Logic and Fuzzy Arithmetic.

Credits	Theory		
	Theory	Practical	Total
Teaching Hours per week	4	0	4
Internal Assessment Marks	4	0	4
End Term Exam Marks	30	0	30
Max. Marks	70	0	70
Examination Time	100	0	100
	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Basics of AI: Definition of AI, History, Domains AI, AI problems & State space, Some examples problems representations like Travelling Salespersons, Syntax analysis Problem, Basic issues to solve AI problems, Underlying assumptions, AI techniques, Level of model, Criteria for success, Control strategies. Searching Techniques: DFS, BFS, Heuristic Search Techniques: Generate & Test: Hill Climbing (simple & steepest), Best first search/A*, Problem Reduction/AO*, Constraint satisfaction, Alpha-Beta pruning.	15
II	Reasoning in logic : Brief revision of propositional and predicate logic. Different characterizations of reasoning. Generalized modus ponens. Resolution. Forward and backward chaining. Knowledge Representation, Diversity of knowledge. Inheritance hierarchies. Semantic networks. Knowledgebase ontologies. Handling uncertainty, Diversity of uncertainty. Inconsistency. Dempster-Shafer theory.	15

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Nature and Goals of Neural Computing: Comparison with rule-based AI. 15

Overview of network

Architectures and learning paradigms. Binary Decision Neurons, The McCullough-Pitts model.

Single-layer perceptrons and their limitations. The Multilayer Perceptron, The sigmoid output

function. Hidden units and feature detectors. Training by error backpropagation.

The error surface and local minima. Generalisation, how to avoid overtraining.

IV Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. 15

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals; Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Total Contact Hours 60

Suggested Evaluation Methods

Internal Assessment: 30

End Term Examination: 70

Theory

3

Theory

70

0

•Class Participation:

5

Written Examination

•Seminar/presentation/assignment/quiz/class test etc.:

1

0

•Mid-Term Exam:

1

5

Part C-Learning Resources

Reference Books:

1. R. Beale, T. Jackson, "Neural Computing-an introduction", CRC Press, 1990.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice-Hall, 4th edition, 2020.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications" Prentice Hall, 1996.
4. M. Ganesh, "Introduction To Fuzzy Sets And Fuzzy Logic", PHI Learning, 2006.

Visla

PC-3 PRACTICAL-3 (Based on CC-5 & CC-6)

With effect from Session: 2024-25

Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Practical-3
Course Code	M24-CAP-205
Course Type	PC-3
Level of the course	400-499

Pre-requisite for the course (if any)

Course objectives
 This is a laboratory course and the objective of this course is to acquaint the students with the understanding and implementing of client-side web technologies. Also, the concepts of operating systems and shell programming will be implemented by the students.

Course Learning Outcomes (CLO)
 After completing this course, the learner will be able to:

CLO1: Solve practical problems related to theory courses undertaken in the CC-5 and CC-6 from application point of view.
 CLO 2: Know how to use the server-side web technologies.
 CLO 3: To implement various languages used for server side web development.
 CLO 4: To know about programming skills in Java.

Credits	Theory		Total
	Practical	Total	
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours	

Part B- Contents of the Course

Practicals	Contact Hours
Practical course will consist of two components Part-A and Part-B. The examiner will set 5 questions at the time of practical examination asking 2 questions from the Part-A and 3 questions from the Part-B by taking course learning outcomes (CLO) into consideration. The examinee will be required to solve one problem from the Part-A and to write and execute 2 questions from the Part-B.	120

2014

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Node JS:

- Express framework to create web applications: Configuring Routes, Working with Express.
- How to serve Static HTML pages to the browser, and serving other file formats and restricting certain files.
- Database Connectivity: MySQL Database, Creating Connection

Dot NET and C#:

- Polymorphism, Operator Overloading, Interfaces, Delegates and Events.
- Type conversion. C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.
- .Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic. Frameworks and Libraries:

PHP:

- Function, Call by value, Call by reference, Recursive function, Strings, Arrays, Index based and Associative array.
- Working with file and Directories, State management , Regular expression, Pattern matching.
- Abstract method and class Interface, Final Exception Handling Understanding Exception and error Try, catch, throw.

Ruby:

- Creating Objects, Member Functions, Variables, Constants and Literals, Operators
- Conditional Control, Loop Control, Methods, Blocks
- Modules and Mixins, Strings, Arrays, Hashes, Ranges, Iterators
- File I/O, Exceptions, DBI, Web Applications.

Java:

- Packages and Exceptions: Java API packages, Creating and using packages, static import, Exceptions handling, Types of Exceptions, multiple catch statements, 'throw' and 'throws', using 'finally' statement, Creating your own exception.
- Applet Programming: How Applets differs from Java Application, Applet Life Cycle, APPLET Tag, Running an Applet, Passing Parameters to Applet.
- Event Handling: Mechanism, The Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and inner classes.
- GUI Programming: Working with Frame Window, Graphics and Text, AWT Controls and classes. Layout Managers, working with Menus.

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(Lab hours include instructions for writing programs and demonstration by a teacher and for running the programs on computer by students.)

- 1) Create and handle a custom event using the EventEmitter class
- 2) Using Express framework, Serve Static HTML and Restrict Access to Certain Files.
- 3) Connect to a MySQL database and fetch data in Node JS proram.
- 4) Web Server Handling Requests and Working with Files and Buffers in Node JS.
- 5) Write a program in C# for Multiple Inheritance using interface.
- 6) The Car and Motorcycle classes inherit from the base Vehicle class, which defines a StartEngine() method. The StartEngine() method is overridden in the Car and Motorcycle classes to provide specific behavior for each type of vehicle. Use Polymorphism, when the StartEngine() method is called on both Car and Motorcycle objects stored in the Vehicle array.
- 7) Create a simple Windows Form and handling events. On clicking the "Click Me!", button will display a message box saying "Hello from Windows Forms!". Use file I/O and console I/O operation with error handling to implement the working of form.
- 8) Write a Program to Demonstrate Assemblies and Attributes.
- 9) Write a program to handle simple basic terminology in PHP. i)Variable ii)constant iii)data type iv) operator v) function vi) Expression handling vii) keywords viii)Iterations.
- 10) Write a program in PHP to handle call by value and call by reference.
- 11) Write a program to handle regular expression and pattern matching.
- 12) Write a program to handle all the features of OOPs.
- 13) Create a Ruby program to manage student grades. The program should allow you to add, remove, and update student grades. It should also calculate the average grade and display the highest and lowest grades.
- 14) Develop a Ruby program to simulate a shopping cart. Users should be able to add items to the cart, remove items, and view the total cost. Include features like discounts and taxes.
- 15) Create a Ruby program to manage a library's book inventory. The program should allow you to add, remove, and search for books. It should also track which books are checked out and by whom..
- 16) Develop a Ruby program for a number guessing game. The program should randomly select a number between 1 and 100, and the user should try to guess the number. Provide hints if the guess is too high or too low.
- 17) Create a Java program to manage an employee payroll system with features for adding employees, calculating salaries based on hours worked or monthly salary, and generating pay slips using classes, inheritance, and polymorphism.
- 18) Define a Java class representing a Student with private instance variables and public getter and setter methods.
- 19) Develop a Java program to implement inheritance by creating a base class Animal and derived classes like Dog and Cat.
- 20) Write a Java program to demonstrate method overriding by implementing a base class Shape and derived classes like Circle and Rectangle.

Suggested Evaluation Methods

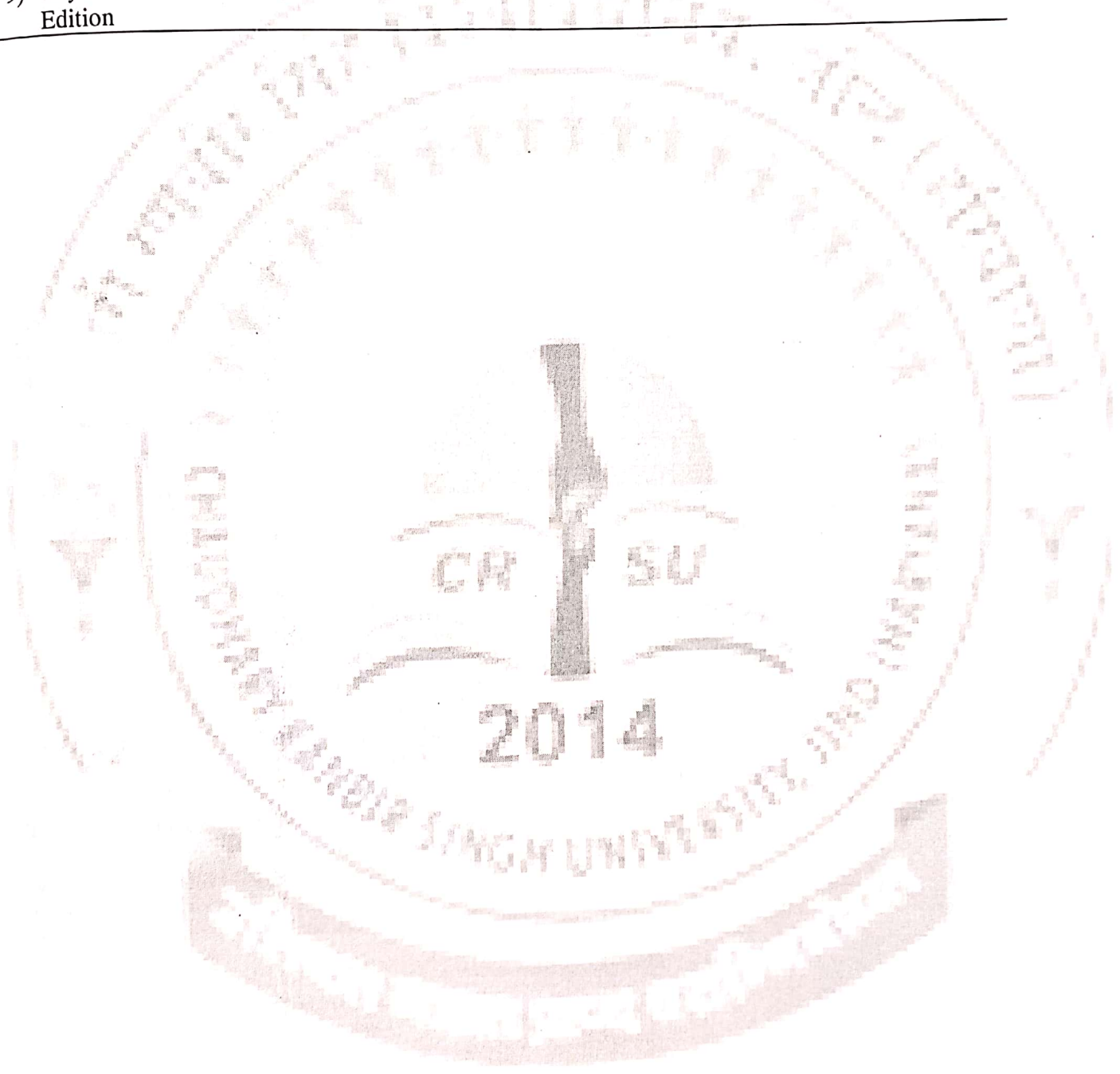
Internal Assessment: 30		End Term Examination: 70	
Practicum	3	<input type="checkbox"/> Practicum	70
•Class Participation:	0	Lab record, Viva-Voce, write-up and execution of the programs	
•Seminar/Demonstration/Viva-voce/Lab records etc.:	5		
•Mid-Term Examination:	1		
	0		
	1		
	5		

Part C-Learning Resources

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Recommended Books/e-resources/LMS:

- 1) Mario Casciaro (2020). *Node.JS Design Patterns*. Packt Publishers.
- 2) David Harron (2020). *Node.JS Web Development*. Packt Publishers.
- 3) Vikram Vaswani (2017). *PHP – A Beginner's Guide*. McGraw Hill Education (Indian Edition)
- 4) Mark J. Price (2023). *C# 12 and .NET 8*. Packt Publishers.
- 5) Noel Rappin, Dave Thomas (2024). *Programming Ruby 3.3*. Pragmatic Bookshelf.
- 6) E. Balagurusamy, "*Programming with Java :A Primer*", McGraw Hill, 3rd edition.
- 7) Herbert Schildt, "*Java:The Complete Reference*", McGraw Hill, 7th edition.
- 8) Bruce Eckel, "*Thinking in Java*", Prentice Hall, 4th Edition.
- 9) Cay S. Horstmann, Gary Cornell, "*Core Java Volume I—Fundamentals*", Prentice Hall, 9th Edition



Visal

Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Practical-4
Course Code	M24-CAP-206
Course Type	PC-4
Level of the course	400-499
Pre-requisite for the course (if any)	

Course objectives This is a laboratory course and the objective of this course is to acquaint the students with the understanding and implementation of various data structures. Also, the students will implement the concepts of programming with Artificial Intelligence and Data Base Management System.

Course Learning Outcomes (CLO) After completing this course, the learner will be able to:

CLO 1: Solve practical problems related to theory courses undertaken in the CC-3 and CC-4 from an application point of view.

CLO 2: Know how to use and implement the various techniques of Artificial Intelligence.

CLO 3: Know how to create and manipulate Relational Database.

CLO 4: Know how to work with MongoDB.

Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours	

Part B- Contents of the Course

Practicals	Contact Hours
Practical course will consist of two components Part-A and Part-B. The examiner will set 5 questions at the time of practical examination asking 2 questions from the Part-A and 3 questions from the Part-B by taking course learning outcomes (CLO) into consideration. The examinee will be required to solve one problem from the Part-A and to write and execute 2 questions from the Part-B.	120
Part-A	60

Task 1: Heuristic Search Techniques

- To implement various Heuristic Search Techniques.

Task 2: Neural Networks

- To know about creation and functioning of Neural Networks.

Task 3: Fuzzy Logic

- To know about applications of Fuzzy Logic and Fuzzy Arithmetic

Task 4: Relational Data Base Management System

- Create and Manipulate Relational Data Base Management System.
- To understand transaction processing in concurrent environment.

Task 5: MongoDB

- To know about creation of Database in MongoDB
- To know handling of NoSQL queries.

Wish

(Lab hours include instructions for writing programs and demonstration by a teacher and for running the programs on computer by students.)

- 1) Write a program implement graph in python using adjacency matrix & Adjacency list
- 2) Write a program to implement BFS(breadth first search) for graphs in python.
- 3) Write a program to implement DFS(depth first search) for graphs in python.
- 4) Write a program to find solution for TSP(Travelling Salesmen problem).
- 5) Write a program to implement A* algorithm.
- 6) Write a program to implement AO* algorithm.
- 7) Write a program to implement Hill Climbing algorithm.
- 8) Write a program to implement Eight Puzzle Problem
- 9) Write a program to implementation for propositional logic using python.
- 10) Create a simple neural network using python
- 11) Create a knowledge base that include facts and rule using logical reasoning to answer question about knowledge base world.
- 12) Write a program to implement operation on Fuzzy set.
- 13) Write a program to code the Defuzzification, fuzzy output to obtain a crisp result using centroid method.
- 14) Write a Rule based fuzzy logic program to determine fan speed based on temperature.
- 15) Write a program to find out intersection on fuzzy set using python.
- 16) Write a program to find out unions on fuzzy set using python.
- 17) Create a PL/SQL program to manage a student database. The program should include functionalities for adding new students, updating student information, and deleting records. Also, implement procedures to calculate and display student grades and generate reports based on different parameters (e.g., courses, academic year).
- 18) Write a PL/SQL program to manage a library's book inventory. The program should include procedures for adding new books, updating book details, and removing books from the inventory. Also, implement a feature to keep track of borrowed books and their due dates.
- 19) Develop a PL/SQL program to manage employee information. The program should allow adding, updating, and deleting employee records. Implement features to calculate employee salaries, bonuses, and to retrieve specific employee details based on various criteria (e.g., department, job title).
- 20) Develop a PL/SQL program to generate sales reports for a retail store. The program should include functionalities for adding and updating sales data. Implement procedures to generate daily, weekly, and monthly sales reports, and to analyze sales trends.
- 21) Develop a MongoDB schema to store and manage product information for an e-commerce platform. Implement functionalities to add new products, update product details, remove products, and perform search operations based on product attributes like category, price range, and brand.
- 22) Develop a MongoDB schema to manage customer feedback for a retail business. Implement functionalities to add new feedback, update existing feedback, delete feedback, and retrieve feedback based on various parameters like product ID, customer ID, and rating.
- 23) Design a MongoDB schema to manage events for an event planning company. Implement functionalities to create new events, update event details, delete events, and search for events based on date, location, and type. Track attendees and their registration details.
- 24) Design a MongoDB schema to manage real estate listings for a property management company. Implement functionalities to add new property listings, update listing details, remove listings, and search for properties based on location, price, and property type. Track inquiries and interactions with potential buyers or renters.

Suggested Evaluation Methods

Internal Assessment: 30

End Term Examination: 70

Practicum	3	<input type="checkbox"/> Practicum	70
0			
• Class Participation:	5	Lab record, Viva-Voce, write-up and execution of the programs	
• Seminar/Demonstration/Viva-voce/Lab records etc.:	1		
	0		
• Mid-Term Examination:	1		
	5		

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. R. Beale, T. Jackson, "Neural Computing-an introduction", CRC Press, 1990.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice-Hall, 4th edition, 2020.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications" Prentice Hall, 1996.
4. M. Ganesh, "Introduction To Fuzzy Sets And Fuzzy Logic", PHI Learning, 2006.
5. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson, 6th edition, 2010.
6. Silberschatz Abraham, "Database System Concept", Tata Mc Graw Hill, 7th edition, 2019.
7. C. J Date, "Introduction to Database Systems", Pearson Education, 8th edition, 2004.
8. Krishnan Ram and Gehrke, "Database Management System", , Tata Mc Graw Hill, 2003.
9. Byross Ivan, "Oracle 10 G The Database with HTML Database", BPB publication,2006.
10. Marko Eleksendric et.al., "Mastering MongoDB 7.0", Fourth Edition, Packt Publishers, 2024



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Part A - Introduction

Name of the Programme	MCA
Semester	2 nd
Name of the Course	Constitutional, Human and Moral Values, and IPR
Course Code	M24-CHM-201
Course Type	CHM
Level of the course (As per Annexure-I)	400-499
Pre-requisite for the course (if any)	-

Course Objectives

To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

To know about publication ethics and Intellectual Property Rights.

Course Learning Outcomes (CLO)
After completing this course, the learner will be able to:

CLO-1. To become a good human being with highest moral values.
CLO-2 To understand how to generate and maintain harmony in family, society and at workplace.
CLO-3 To get the knowledge of Research Ethics and Scientific Misconduct.
CLO-4 To implement publication ethics and know about various guidelines.

Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations, Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	15

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order, Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Definitiveness of (Ethical) Human Conduct, Competence in Professional Ethics, Strategies for Transition towards Value-based Life and Profession 15

III Introduction to philosophy: definition, nature and scope, concept, branches. 15
 Ethics: definition, moral philosophy, nature of moral judgments and reactions.
 Ethics with respect to science and research, Intellectual honest and research integrity, Scientific misconducts: falsification, fabrication, and plagiarism.
 Redundant publications: duplicate and overlapping publications, salami slicing
 Selective reporting and misrepresentation of data

IV Publication ethics: definition, introduction and importance. 15
 Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
 Conflicts of interest
 Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, Violation of publication ethics, authorship and contributorship
 Identification of publication misconduct, complaints and appeals, Predatory publishers and journals

Total Contact Hours 60

Suggested Evaluation Methods

Internal Assessment: 30

End Term Examination: 70

Theory

3

Theory

70

0

● Class Participation:

5

Written Examination

● Seminar/presentation/assignment/quiz/class test etc.:

1

0

● Mid-Term Exam:

1

5

Part C-Learning Resources

Reference Books:

- 1) Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- 2) Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- 3) Muralidhar K et. al., *Ethics in Science Education, Research and Governance*, Indian National Science Academy, 2019
- 4) Huma Praveen and Nayeem Showkat, *Research Ethics*, e-PG Pathshala, 2017
- 5) MacIntyre, Alasdair, *A Short History of Ethics*, London, 1967
- 6) P. Chaddah, *Ethics in Competitive Research : Do not get scooped; do not get plagiarized*, ISBN: 978-9387480865 (Self Published)

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