DEPARTMENT OF COMPUTER APPLICATIONS

Department of Computer Applications

M.C.A Structure

(2025 Pattern)

JSPM's
RAJARSHI SHAHU COLLEGE OF ENGINEERING
TATHAWADE, PUNE-33
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

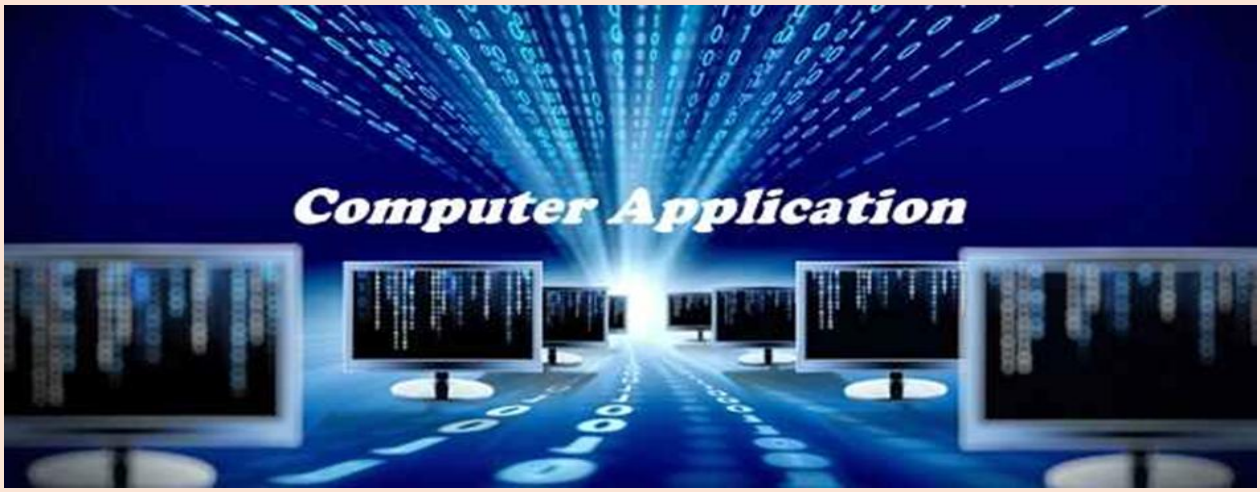
Department of Computer Applications

Vision

To progress as a center of brilliance in computing education producing globally proficient professionals contributing to the betterment of the society.

Mission of Department

1. To educate students in the basic standards of Software Engineering
2. To educate students to become successful professionals
3. To propel students for research and entrepreneurship



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Chairman BOS

Dr.Avinash Badadhe
Dean Academics

Dr.Santosh Bhosale
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Department of Computer Application

Program Outcomes (POs)

PO1: Computational Knowledge: Apply knowledge of computing fundamentals and domain knowledge.

PO2: Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.

PO3: Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.

PO4: Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions

PO5: Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.

PO6: Professional Ethics: Understand and commit to professional ethics and cyber regulations for professional computing practices.

PO7: Life-long Learning: Identify the need and have the ability, to engage in independent learning as a computing professional.

PO8: Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects.

PO9: Communication Efficacy: Communicate effectively with the computing community, and with society.

PO10: Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues

PO11: Individual and Team Work: Function effectively in diverse teams and in multidisciplinary environments.

PO12: Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity.

Department of Computer Applications

Program Specific Outcomes (PSOs)

Upon successful completion of PG MCA program, the students will attain following program specific outcomes.

PSO1: Professional Skills-

To provide an opportunity to work effectively with teams and group with better communication skills in written and oral form. Also, to develop an appreciation of ethics and social awareness needed and with this to develop master for successful career and leadership position.

PSO2: Problem-Solving Skills-

To prepare the students for technical and managerial skills necessary to design and implement computer applications to conduct open ended problem solving and applying critical thinking.

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PSO3: Professional Career and Entrepreneurship-

The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and zest for the higher studies and research and entrepreneurship.

Highlights of the Syllabus

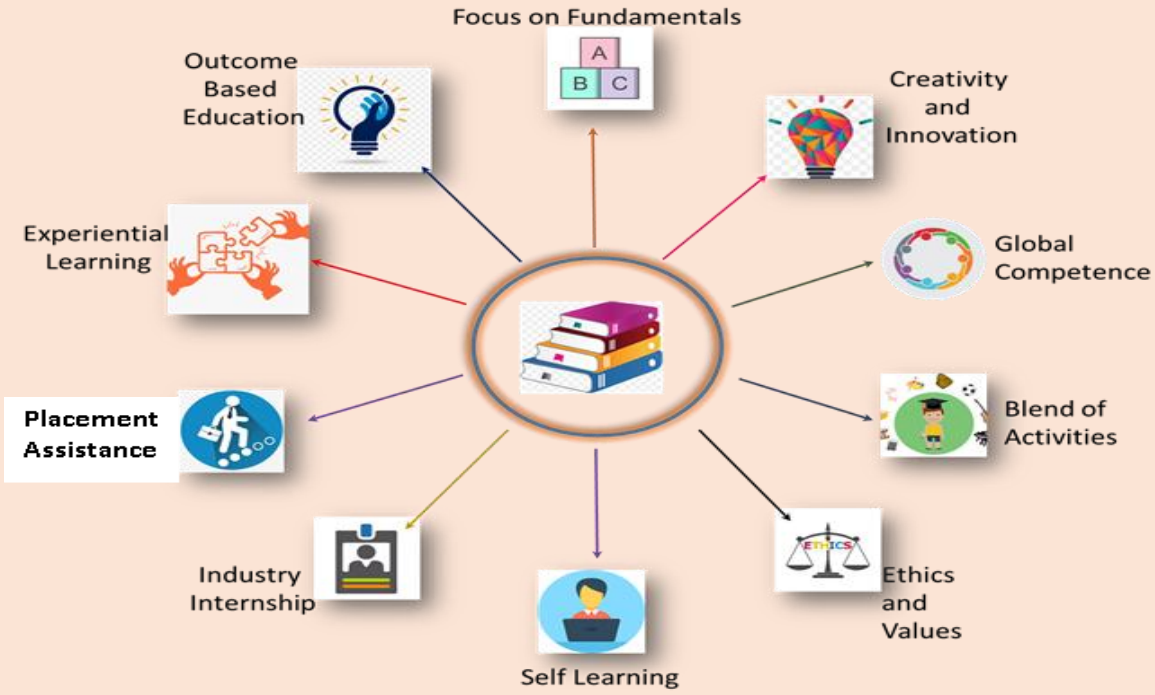
Curriculum of PG program for Computer Applications is designed in association with

Academic Experts

Industry/Corporate Experts

Distinguished Alumni

Features of **MCA** curriculum are designed in association with the **Industry.**



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Unique features of the curriculum

- The curriculum of MCA is designed in a way such that, students will get knowledge of most trending and "in use" industrial technologies and practices by the time they complete their post-graduation. Keeping this goal in mind updates the curriculum as and when required.
- MCA curriculum is designed to build a strong basic and clear all the fundamental concepts.
- Bridge course is introduced during the induction program for two weeks to learn basic concepts.
- Mini Projects- To understand the importance of working in teams and being part of collective success, we have incorporated Mini projects in each semester where student will work together and implement it.
- Human Values Course- RSCOE focus on the all-around development of our students. This includes refining their technical skills as well as their personal development. Human Values courses will teach them how to handle stressful situations, ethics of a professional and how to give back to the society. This will also motivate them to join the various CSR activities conducted by the company they join and help in achieving the different organizational goals of the company they join.
- Electives offered on emerging technologies. Students can opt any one as per his/her choice.
- Online Professional certification courses are enabled curriculum for all students.
- Language Proficiency courses - English, German and Japanese are introduced in curriculum. Student can opt any one of them.
- In order to make students ready for placement, gateway to industry course is given where basic aptitude and technical concepts are introduced.
- Professional communication skills course help students to develop over all personality and groom them.

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F. Y. M.C.A
Academic Year -2025-2026 (Semester –I)

Course Code	Course Type	Course	Teaching Scheme		Examination Scheme				Total Marks	Credits
			TH	Lab	ISE	MSE	ESE	Laboratory		
MCA1101T	SEC	Data Structure with C++	3	-	20	30	50	-	100	3
MCA1101L		Data Structure with C++ Lab	-	4	ICSE:60		40	100	100	2
MCA1102T	CC	Advance Database Management System	3	-	20	30	50	-	100	3
MCA1102L		Advance Database Management System Lab	-	4	ICSE:60		40	100	100	2
MCA1103T		Core Java	3	-	20	30	50	-	100	3
MCA1103L		Core Java Lab	-	4	ICSE:60		40	100	100	2
MCA1104T		Computer Networks	3	-	20	30	50	-	100	3
MCA1105T		Object Design & Agile Development	3	-	20	30	50	-	100	3
HSCA1204L HSCA1205L HSCA1206L	AEC	Language Proficiency-I (ENGLISH) , (GERMAN) (JAPANESE)	-	2	ICSE:30		20	50	50	1
MCA1106L	AEC	Online Professional Training Course	-	2	ICSE:30		20	50	50	1
		Bridge Course		Non-credit course						
		Total	**15**	**16**	**-**		**-**	**400**	**900**	**23**

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F. Y. M.C.A
Academic Year -2025-2026 (Semester –II)

Course Code	Course Type	Course	Teaching Scheme		Examination Scheme				Total Marks	Credits
			TH	Lab	ISE	MSE	ESE	Laboratory		
MCA1107T	SEC	Advance JAVA Programming	3	-	20	30	50	-	100	3
MCA1107L		Advance JAVA Programming Lab	-	4	ICSE:60		40	100	100	2
MCA1108T	CC	Python Programming	3	-	20	30	50	-	100	3
MCA1108L		Python Programming Lab	-	4	ICSE:60		40	100	100	2
MCA1109T		Web Design Technology	3	-	20	30	50	-	100	3
MCA1109L		Web Design Technology Lab	-	4	ICSE:60		40	100	100	2
MCA1110T		Optimization Technique	3	-	20	30	50	-	100	3
MCA1111T		Elective-I	3	-	20	30	50	-	100	3
HSCA1202L	MDC	Indian Knowledge System	-	4	ICSE:60		40	100	100	2
HSCA1207L	AEC	Professional communication Skills	-	2	ICSE:30		20	50	50	1
		Total	**15**	**18**			**470**	**450**	**950**	**24**

Professional Elective I		Professional Elective I	
Course Code	**Course Name**	**Cours**	**Course Name**
MCA1111AT	Internet Of Things	MCA1111ET	Block Chain Technology
MCA1111BT	Design and Analysis of Algorithm	MCA1111FT	Big Data Analytics
MCA1111CT	Cyber Security and Cyber Law	MCA1111GT	Entrepreneurship Development
MCA1111DT	Dev Ops		

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Academic Year -2025-2026 (Semester –III)

Course Code	Course Type	Course	Teaching Scheme		Examination Scheme				Total Marks	Credit
			TH	Lab	ISE	MSE	ESE	Laboratory		
MCA2101T	CC	Research Methodology	3	-	20	30	50	-	100	3
MCA2102T		Elective-II(Mini Project)	3	-	20	30	50	-	100	3
MCA2102L		Elective-II(Mini Project) Lab	-	4	ICSE:60		40	100	100	2
MCA2103T		Emerging Software Testing and Tools	3	3	20	30	50	-	100	3
MCA2103L		Emerging Software Testing and Tools Lab	-	2	ICSE:30		20	50	50	1
MCA2104T		Principles & practices of Management & Organization Behaviour	3	-	20	30	50	-	100	3
MCA2105T	SEC	Cloud Computing	3	-	20	30	50	-	100	3
MCA2106L	CC	Research Project	-	6	ICSE:120		80	200	200	6
HSCA2201T	HSSM	Universal Values & Ethics	2	-	ICSE:60		40	100	100	2
	Total		**17**	**15**				**450**	**950**	26

Professional Elective II		Professional Elective II	
Course Code	**Course Name**	**Course**	**Course Name**
MCA2102A	Advance Development Technology	MCA2102D	Framework – Springboot
MCA2102B	Mobile Application Development	MCA2102E	Framework – React JS
MCA2102C	Artificial Intelligence and Machine Learning	MCA2102F	Data Science

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Academic Year -2025-2026 (Semester –IV)

Course Code	Course	Teaching Scheme		Examination Scheme			Total Marks	Credit
		TH	Lab	ISE	MSE	ESE		
MCA2107	Self-Learning Course	-	-	ICSE:60		40	100	2
MCA2108	Industrial Internship	-	-	ICSE:200		200	400	12
Total		-	-				500	**14**

Abbreviations:

CC-Core Course SEC- Skill Enhancement course MDC- Multi Disciplinary Course

HSSM : Humanities Social Science and Management **AEC** : Ability Enhancement Course

L – Lecture, **T** – Tutorial, **P** – Practical, **Hr** – Hours, **C** – Credits, **TuT** – Tutorial, **ISE** – In Semester Evaluation, **MSE** – Mid Semester Evaluation, **ESE** – End Semester Evaluation

Notes:

For Theory courses: There shall be MSE, ISE and ESE. The ESE is a separate head of passing.
For Lab courses: There shall be continuous assessment (ISCE consists of ISE and MSE). The ESE is a separate head of passing.

	Total marks	Credits
Sem I	900	23
Sem II	950	24
Sem III	950	26
Sem IV	500	14
Total	**3250**	**86**

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F. Y. MCA

Academic Year – 2025-2026 Semester -I

[MCA1101T]: Data Structure with C++

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: C programming and Fundamental Data Structure

Course Objective:

1. To develop programming skill and to solve engineering related problems using Object Oriented Programming Concepts.
2. To acquire the knowledge fundamentals of various data structures and algorithms.
3. To understand and analyze various Searching and Sorting techniques to solve the problems.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Understand the foundational concepts of Object-Oriented Programming (OOP), such as classes, objects, inheritance, and polymorphism, and how they enhance code modularity and reusability.

CO2: Demonstrate the ability to create and manipulate objects in C++ by implementing constructors, destructors, and member functions effectively.

CO3: Implement operator overloading and inheritance hierarchies, including virtual functions, to achieve polymorphism and dynamic binding in C++ applications.

CO4: Understand and manage file I/O operations and exception handling mechanisms to write robust and error-handling C++ programs .

CO5: Implement linear and non-linear data structures, such as stacks, queues, linked lists, and binary search trees, using C++ to solve complex computational problems .

Course Contents

UNIT-I	Introduction to OOPs concept and programming in C++	08 Hours

Object and Classes, Features of Object Oriented Programming, Data abstraction and encapsulation, Inheritance, Polymorphism, Dynamic Binding, Resilience to change, Reusability of Code, Modularity of Code, Data Types in C++, Operator and Expression Decision making and Branching Statement strings representation, string manipulation. Modular programming: Classes, Object and Methods: Class Fundamentals, Declaring and Creating object, Accessing class, members and methods. Subclasses, scope of the function. Object initialization and Clean up: Constructor, parameterized Constructor, Constructor Overloading, Destructors order of construction and destruction, Static Member with constructors and destructors.

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UNIT-II	Polymorphism & Inheritance	08 Hours
Introduction, overloadable operators, unary operator overloading, operator keyword, binary operator overloading, concatenation of strings, comparison operator, assignment operator overloading, overloading of new and delete data conversion. Virtual Functions: Need for virtual functions, pointer to derived class objects, abstract classes, dynamic binding, virtual destructor, friend function Inheritance: Defining a subclass, forms of inheritance, inheritance and member accessibility, constructor and destructor in derived class, overloaded member functions, Multilevel inheritance, Multiple Inheritance, Hybrid Inheritance, Hierarchical inheritance.		
UNIT-III	**File I/O Streams and Exception handling**	**06 Hours**
Files: Stream Classes, Character Stream, Byte Stream, Using Stream I/O, Serialization Exception handling: Exception Handling Fundamentals, The try Block, the catch Exception HandlerThe try/throw/catch sequence, Uncaught Exception		
UNIT-IV	**Linear Data Structure**	**06 Hours**
Data Structure, Implementation of Data Structure, Fundamentals of Arrays and linked lists, Basics and implementation of Stacks, Queues.		
UNIT-V	**Non-Linear Data Structure**	**06 Hours**
Binary Tree, Binary Tree Representation, Binary Search Tree (BST), Creating a BST, Binary Search Tree Traversal, Preorder, post order, In-order Traversal, AVL tree, introduction to B+, B* tree, Graph, Adjacency Matrix Adjacency List.		
UNIT-VI	**Searching techniques**	**04 Hours**
Searching: Linear search and Binary search		

Text Books:

T1: Object-Oriented Programming with C++, E. Balaguruswamy Tata McGraw Hill 4th Edition 2002

T2: Data Structures Using C ++ by Malik D S

Reference Books:

R1. Mastering, C++, T. Rajkumar, K.R Venugopal, T Ravikumar Tata McGraw Hill 1stEdition 2012.

R2. C++ Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition 2003.

R3. C++ and Object-Oriented Programming Paradigm, Debasish Jana, PHI, 3rd Edition, 2005

R4. Data Structures Using C ++ by Malik D S

R5. Practical Approach to Data Structures by Hanumanthappa

R6. Data Structure Using C++ by Kasiviswanath N.

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Academic Year 2025-2026 Semester -I
[MCA1101L]: Data Structure with C++ Lab

Teaching Scheme:	Credit	Examination Scheme:	
PR: - 04 Hours/Week	PR: 02	I C S E	: 60 Marks
		End Sem. Exam	: 40 Marks
		Total	: 100 Marks

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Course Objective:

1. Introduce students to the principles of Object-Oriented Programming (OOP) using C++, emphasizing the design and implementation of modular, reusable code.
2. Familiarize students with file handling, I/O operations, and exception handling to develop robust and efficient programs.
3. Enable students to implement and manipulate fundamental data structures such as arrays, linked lists, stacks, queues, and trees using C++.
4. Develop the ability to implement and analyze searching and sorting algorithms, and apply them to large datasets in practical applications.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Demonstrate the ability to design and implement C++ programs using fundamental OOP concepts like classes, objects, constructors, and destructors

CO2: Implement operator overloading, inheritance hierarchies, and polymorphism to create efficient and flexible C++ programs.

CO3: Apply file I/O operations and exception handling techniques in practical applications to handle data streams and ensure program reliability

CO4: Understand and implement linear and non-linear data structures (e.g., stacks, queues, linked lists, binary trees) in C++ for solving computational problems

CO5: Develop and analyze search techniques (e.g., linear and binary search) and sorting algorithms in C++, demonstrating efficiency in handling data structures

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List of Laboratory Assignments/Experiments (to be covered)	
1	Fundamental Programming with Classes, Object and Methods using C++
2	Programming with Object initialization and Clean up
3	Implementation of virtual function, friend function
4	Demonstration of Inheritance concepts.
5	Use of input output streams using file handling.
6	Implementation of Data Structure using Arrays
7	Data Structure Implementation by linked lists
8	Basics and implementation of Stacks and Queues,
9	Implementation of advance data structure concept trees and graphs
10	Programming with Searching techniques

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F. Y. MCA

Academic Year – 2025-2026 Semester-I

[MCA1102T]: Advance Database Management System

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Creation of Database and functions of Database Management System.
2. Database models, SQL and database operations, this creates a strong foundation for application database design.
3. Making aware of current databases used in industry.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Develop conceptual schema of database using conceptual model. Implement logical scheme of database.

CO2. Create and manage database with all integrity constraints. Perform various DDL and DML operations.

CO3. Refine the scheme of database by applying normal forms.

CO4. Implement the transaction management protocols and crash recovery algorithms. Create views, procedures, functions and triggers on databases.

CO5. Implementation of crash recovery and backup by using various previliages

CO6. Create and manage NoSQL database, perform basic operations.

Course Contents

UNIT-I	Introduction to Database Management System	7 Hours

Database system applications, Database system vs file system, data abstraction, database users, Database system structure, Database design and ER diagram, ER design – Entities, attributes Entity sets, Relationship sets, additional features of ER model.

UNIT-II	Relational model	8 Hours

Integrity constraints, Database languages, DDL,DML,Basic form of SQL query, Querying relational data , logical database design, views, Destroying and creating tables/views, queries, sub queries, nested queries, null values, relational algebra- selection, projection, renaming, join examples.

UNIT-III	Normalization	8 Hours

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Comparison of File Organizations, types with examples, problems caused by redundancy, decomposition ,reasoning about FDS – FIRST, SECOND,THIRD Normal forms , BCNF Lossless decomposition.

UNIT-IV	Graph based database	6 Hours

Graph based database: What is graph based database, comparison of relational and graph based database.GraphDB vs. NOsql. Overview of open source graph database like Neo4g etc. APIs and graph query- programming languages. Databases on the Web and Semi Structured Data: Introduction, Structure of XML Data.

UNIT-V	Object Oriented Database	5 Hours

. Object oriented data base: Overview of Object–Oriented Concepts. Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Complex Objects; Database Schema.

UNIT-VI	Parallel Databases	4 Hours

Parallel databases: introduction, Parallel database architecture, speedup, scale-up I/O parallelism, Interquery and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation, Design of parallel systems, Implementation issues of Parallel query evaluation, Design of parallel systems, Comparison of Inter-query and Intra-query parallelism

Text Books:

T1. AviSilberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition
T2. Introduction to Database Systems, C,J Date, 8/e , Pearson, 2008.

Reference Books:

R1. Alexis Leon, Mathews Leon, (leon press), Database Management System.
R2. Database Management Systems, :Raghurama Krishnan and Johannes Geherke, TMH 3rd.
R3. Database System Concepts, Avi Silberschatz, Henry F. Korth, S. Sudarshan, 5/e.
R4. Database Management Systems, Elmsari Navathe, 5/e,Pearson,2005
R5. Database Management Systems, Majumdar, Bhattacharyya, TMH, 96
R6. Data base System Concepts, Peter ROB, Coronel , Cengage.

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F. Y. MCA

Academic Year – 2025-2026 Semester-I

[MCA1102L]: Advance Database Management System Lab

Teaching Scheme:	Credit	Examination Scheme:
PR: -04 Hours/Week	PR: 02	ICSE : 60 Marks End Sem. Exam : 40 Marks Total Marks : 100 Marks

Course Objective:

1. Creation of database .
2. To explore the relational database and implement CRUD Operation using SQL.
3. To gain a knowledge of No-SQL databases.
4. To enhance schema design skills .
5. To gain knowledge of object oriented database.

Course Outcome:

After successful completion of the course, students will able to:
CO1 Apply Demonstrate Basics of database concepts.
CO2 Apply Demonstrate CRUD Operation using SQL.
CO3 Apply Demonstrate database concepts using MYSQL .
CO4 Apply Demonstrate database concepts using Neo4j
CO5 Apply Demonstrate Object oriented database concepts.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1	Introduction to SQL – DDL, DML, DTL basic data types.
2	Create Database, select database, Drop database
3	Create Table, Drop table, Insert Query, Select Query
4	Operators, Expressions, where clause, AND & OR clauses.
5	Update Query/Delete Query, Like clause, Limit Clause

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6	Order By, Group By, With Clause, Having Clause, Distinct keyword
7	Constraints, Joins, Union Clause, NULL Clause, Alias Syntax
8	Alter Command, Truncate Table, Transactions Locks, Sub Queries, Auto increment, Priviliges
9	Functions : Date & Time, String, Functions, Aggregate Functions.
10	Synonym: Introduction , Create, Synonym as alias for table & view, drop
11	Sequence: Introduction , alter sequence, drop
12	View: Introduction, types, alter, drop.
13	Index: Introduction, types, alter, drop.
14	Queries, Sub Queries and nested queries. Basic operations on open source NoSQL database
15	Primary introduction to DBA- User create, alter user, Grant, Revoke
16	Introduction to graphs based query language using neo4j, implementation of graph queries.
17	MySQL database - creation and manipulation.
18	Creation of ER model.
19	Implement the database using MySQL and manipulate tables.
20	Converting the ER model to schema diagram.
21	Object oriented database and queries

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MCA

Academic Year – 2025-2026 Semester -I

[MCA1103T]: Core JAVA

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours / Week: 03	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total Marks : 100 Marks

Course Prerequisites: Object Oriented Programming

Course Objective:

1. To familiarize students with the concepts of OOPs.
2. To enable the students to understand the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes.
3. To enable the students to understand the core principles of the Java Language and use AWT and Swing tools to produce well designed, effective applications.
4. Students will be able to develop Multithreaded application using multithreading and collection framework.

Course Outcome:

After successful completion of the course, students will able to:

CO1: The concept of Object-Oriented Programming to map and solve simple real world problem
CO2: To design and develop robust, efficient Java applications using packages and interfaces
CO3: To design and develop robust, efficient and scalable Java applications using exception handling.
CO4: To develop Web application using Graphical User Interface AWT and Swing.
CO5: To design and develop robust multithreaded and scalable Java applications using multithreading.
CO6: To design and develop robust and efficient Java applications using collection Framework.

Course Contents

UNIT-I	Object oriented thinking and Java Basics	07 Hours

Need for oop paradigm, summary of oop concepts, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, using final with variables, garbage collection, overloading methods and constructors, nested and inner classes, exploring string class.

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UNIT-II	Inheritance, Packages& Interfaces	06 Hours
Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance and methods, polymorphism- method overriding, abstract classes, the Object class.		
Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages. Interfaces: differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.		
UNIT-III	**Exception handling**	**05 Hours**
Exception handling: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling,		
UNIT-IV	**Event Handling & Swing**	**07 Hours**
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model,handling mouse and keyboard events. Swing: Introduction, limitations of AWT, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables. Handling menus, graphics, layout manager – layout manager types – border, grid, flow, card .		
UNIT-V	**Multithreading**	**05 Hours**
Multithreading: Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter-thread communication, thread groups.		
UNIT-VI	**Java Collection Framework**	**8 Hours**
Collections Overview: The Collection Interfaces a. Collection Interface, List Interface, Set Interface, b. Sorted Set Interface c. The Collection Classes d. Array List Class, Linked List Class, Hash Set Class, Tree Set Class e. Accessing a Collection via an Iterator The Map Interfaces f. Map Interface, Sorted Map Interface g. The Map Classes h. Hash Map, Tree Map The Legacy Interfaces i. Enumeration Interface j. The Legacy Classes Vector, Stack Hash table		

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Text Books:

T1. Programming with Java, A Primer E. Balguruswami, McGraw-Hill, 4th Ed.

T2. Object oriented programming with java, Essentials and applications, McGraw Hill publications

Reference Books:

R1. Just Java by Peter Van der Liden

R2. OOP with Java An ultimate Tutorial by Jaffry A Borror,

R3. Java 6 Programming Black Book By Kogent Solution Inc, dreamTech Pub

R4. Core Java 2 Volume - I Cay S Horstmann, Fary Cornell, Sun Microsystems Press

R5. Core Java 2 Volume - II Cay S Horstmann, Fary Cornell, Sun Microsystems Press

R6. Rajkumar Buyya, S Thamarai Selvi, Xingchen Chu

R7. A programmer's Guide to java SCJP certification, Pearson, Khalid A. Mughal, Rolf W.A Rasmussen

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MCA

Academic Year – 2025-2026 Semester -I

[MCA1103L]: Core JAVA Lab

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours / Week: 04	TH: 02	ICSE : 60 Marks End Sem. Exam: 40 Marks Total : 100 Marks:

Course Objectives:
1.To implement foundation of Object Oriented Concepts
2. To implement Exception Handling Mechanism
3. To design and develop web application using Swing and AWT
4. To implement Collection Framework

Course Outcome:
CO1 : Demonstrate fundamental concepts of Java.
CO2: Design and implement classes and objects in Java, applying principles of inheritance, polymorphism, encapsulation, and abstraction.
CO3: Design and implement classes and object in java applying multithreading concept and collection Framework.
CO4: Develop web applications using Swing.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum to be covered)

1. Fundamental JAVA Programming assignments based on class,
2. Implementation of various Inheritance types.
3. Abstraction feature demonstration,
4. Achieving the functionality of Encapsulation.
5. Demonstrate the feature of Dynamic binding,
6. Polymorphism feature implementation,
7. Handling the feature of streams related to I/O systems,

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Academic Year 2025-2026 Semester-I

[MCA1104T]: Computer Networks

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total :100 Marks

Course Objective:

1. To get familiar with basics of networking concepts, functions of various layers in networking architecture.
2. To know the basics of transmission techniques and media used in networking environments.
3. To Understand the components used in networking and different protocols.
4. It explains about DNS and network management protocols.
5. To acquire the knowledge about network security.

Course Outcome:

On completion of the course, student will be able to–

CO1: Describe the basic knowledge of transmission media, modes, network topologies and working of various layers in ISO/OSI, TCP/IP reference model .

CO2: Compare different network architectures.

CO3: Implements concepts of IP addressing , sub-netting and routing mechanism.

CO4: Describe basics concepts DNS, DHCP and Transport layer protocols.

CO5: Compares various network security mechanism/ protocols..

Course Contents

UNIT-I	Introduction	7 Hours
Need of computer communication, Goals of communication system/Networking, Transmission Modes, Transmission Media: Guided: Twisted Pair, Coaxial and Fiber-Optic Cables, Unguided Media: Radio, VHF, Micro Waves and Satellite, Topologies: Star, Mesh, Bus etc., Multichannel Data Communication: Message, Circuits, Packets (Connection Oriented vs Connectionless Services) Components of LAN, WAN, MAN, Multiplexing: FDM, TDM, WDM, Protocol Layering: ISO/OSI Reference Model		
UNIT-II	**Common Network Architecture**	**5 Hours**
X.25 Networks, Ethernet (Standard and Fast): frame format and specifications, Wireless LAN's – 802.11x, 802.3 Bluetooth etc.		
UNIT-III	**IP Addressing and Routing**	**7 Hours**

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IPv4 addresses – Network and Host part, Network Masks, Network addresses and Broadcast addresses, Sub-net Masking, Super Net Masking, Numerical based on IP Address, Address Classes, IPv4 Structure, IP Routing concept, Routing Table, IPv6 Structure.		
UNIT-IV	**Transport Layer Services**	**5 Hours**
Transport Services, Elements of Transport Protocols, Connection Management, TCP and UDP Protocols		
UNIT-V	**Application Layer**	**7 Hours**
DNS and DNS Servers, Electronic Mail: Architecture and Services, Message Format, MIME, Message transfer, SMTP, Mail Gateways, FTP, WWW: Introduction, Static and Dynamic web pages, www pages and browsing, HTTP request and response, Basics of DHCP		
UNIT-VI	**Network Security**	**5 Hours**
Threat: Active and Passive Attacks, Cryptography: Symmetric and Asymmetric Key Cryptography, Digital Signature, Firewall		
Note: Demo of Microsoft Windows, Network Configurations, Install and Configure Network Cabling, Troubleshoot Networks, Cloud Concepts: Various Services of Cloud.		

References:

R1. Computer Networks by Andrew S. Tanenbaum 4ed
R2. Data Communication and Networking by Behroz A. Forouzan, TMH, 4 ed.
R3. Cryptography and Network Security by Atual Kahate, TMH 2 ed.
R4. Cryptography and Network Security by William Stalling
R5. Computer Networks and Internets with Internet Applications by Douglas E. Comer
R6. Data and Computer Communication by William Stallings 9 ed., Pearson Education, 2007
R7. Network Security by Ankit Fadi

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Academic Year – 2025-2026 Semester-I

[MCA1105T]: Object Design & Agile Development

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation :20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Software Engineering Fundamentals

Course Objective:

1. Analyze and evaluate system development life cycles and models.
2. Design and develop software requirements specifications and object-oriented models.
3. Explain and apply Agile principles, mindset, and methodologies.
4. Create and interpret behavioral models and architectural models.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Define and explain the system development life cycle and models.
CO2 : Design and implement object-oriented systems using UML.
CO3 : Apply agile principles to develop software solutions.
CO4 : Analyze and create behavioral and architectural models for software systems .
CO5 : Evaluate and select appropriate software development methodologies .
CO6: Develop effective software solutions through collaboration and communication.

Course Contents

UNIT-I	System Development Life Cycle and Models	4 Hours

System Development Life Cycle, Different approaches and models for System Development: Prototyping, Spiral (including WIN-WIN Spiral), RAD, Software requirement Specification (SRS), IEEE Format - Case study: SRS, Reverse Engineering, Maintenance.

UNIT-II	Object Oriented UML	5 Hours

Two views of software Developments: SSAD and OOAD, Rational Unified Process, Four Major phases:- Inception , Elaboration, Construction, Transition, Structural Modeling- Class Diagram, ObjectDiagram Case Study : Class Diagram and Object Diagram.

UNIT-III	Agile Principles and Mindset	6 Hours

Why use agile, Knowledge work projects are different, Defined versus Empirical Processes, The Agile Mindset, Personal, Team and Organizational Agility, The Agile Triangle, The Agile Manifesto, The FourValue, The Twelve Principles

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UNIT-IV	Agile Methodologies	5 Hours
Scrum, Extreme Programming (XP), Lean Product Development, Kanban, Crystal		
UNIT-V	**Object Oriented Behavioral Modeling I**	**8 Hours**
Behavioral Modeling- Use Cases and Use Case Diagrams, Interaction Diagrams: Sequence Diagrams Case Study: Use Case diagram, Sequence diagram		
UNIT-VI	**Object-Oriented Behavioral Modeling II & Architectural Modeling**	**8 Hours**
Behavioral Modeling- Interaction Diagrams cont: Collaboration Diagrams, Activity Diagrams, State chart Diagram. Architectural Modeling- Components & Component Diagrams, Deployment & Deployment Diagrams. Case Study: State chart diagram, Activity Diagram		

Text Books:

T1: Software Engineering by Pressman

T2: Applying UML And Pattern Craig Larman Pearson Education INC UML in Nutshell

Reference Books:

R1. Software Engineering by Pressman
R2. Applying UML And Pattern Craig Larman Pearson Education INC UML in Nutshell
R3. Principles of Object- Oriented Software Development - Anton Eliens , Addison Wesley
R4. Scrum Mastery: From Good to Great Servant-Leadership by Geoff Watts
R5. Agile Project Management for Dummies by Mark C. Layton

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Academic Year – 2025-2026 Semester-I

[HSCA1104L]: Language Proficiency-I (ENGLISH)

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 01	ICSE : 30 Marks ESE : 20 Marks Total : 50 Marks

Course Objective:

1. To enhance the systemic and specific knowledge and skills of the learners in the use of English language by improving their ability to listen, speak, read and write

Course Outcome:

After successful completion of the course, students will able to:

CO1: Students will be able to Acquire knowledge of basic and fundamental grammar in English including reading and listening comprehension, writing and speaking skills.

CO2: Construct different types of sentences using effective and new vocabulary to create good impression.

CO3: Students will be able to write clearly, precisely and competently in different scenarios.

CO4: Prepare the students to acquire structure and written expression required for their profession and enable them to acquire proper behavioral skills

CO5: Students will be able to present themselves well in front of large audience on a variety of situations related to group communication and presentation in a relevant scenario. Moreover, they will get the knack for structured conversation to make their point of views clear to the listeners.

Course Contents

UNIT-I	Sentence Structure	05 Hours
Orientation, Parts of speech- Introduction to Noun, Pronoun, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections, Use present, past, and future tenses (2-3) with appropriate time markers Recognize present perfect, past perfect and future perfect tenses and their progressive forms Use perfect tenses with increasing accuracy.		
UNIT-II	**Fundamentals of Communication (Vocabulary Building)**	**05 Hours**
Vocabulary-Synonyms, Antonyms, Root words, Origin Prepositions- A preposition shows where, when or how the action took place in a sentence. Importance of proper punctuations, Idioms and Phrasal Verbs.		
UNIT-III	**Nature and Style of Writing**	**02 Hours**
E-mail Writing and etiquettes, Reading Comprehension-Reading and comprehending passages and figuring out the answers of given questions.		
UNIT-IV	**Oral Communication**	**05 Hours**

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Orientation about grooming, Fluency, body language, Non-verbal communication, Expressions, Group Discussion, Debate, Extempore- Orientation and Mock GD, Debate, Extempore rounds.		
UNIT-V	**Presentation**	**03 Hours**
PPT presentation/ Poster making, group presentations to boost stage confidence and to inculcate team building skills, practice and implement communication skills practices to gain fluency while communicating.		
List of Laboratory Assignments/Experiments (to be covered)		
1	Implementation of English including reading and listening comprehension, writing and speaking skills.	
2	Defining different types of sentences using effective and new vocabulary to create good impression	
3	Writing clearly, precisely and competently in different scenarios	
4	Implementation of written expression required for their profession and enable them to acquire proper behavioral skills	
5	Self-Introduction, Group Discussion	

Text Books:

T1. English for Engineers. Dr.K.Anbazhagan, Dr.B.Cauveri&Dr.M.P.Devika, Cengage Publications. 2016.
T2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Units 1-5.Chennai: Orient, .Blackswan Ltd., 2009.
T3. Raman, Meenakshi and Sangeetha Sharama . Technical Communication-Principles and Practice. Oxford University Press. 2009.
T4. Day, R A. Scientific English: A Guide for Scientists and Other Professionals. 2nd ed. Hyderabad: Universities Press, 2000

Reference Books:

R1. K.R.Laxminarayanan, English for Technical Communication, Scitech, Sixth Edition, 2008
R2: William Sanborn Pfeiffer ,T.V.S. Padmaja ,Technical Communication: A Practical Approach, Pearson, Sixth Edition 2012
R3: A.K.Jain, Praveen Bhatia, A.M.Shaikh, Professional Communication Skills, S. Chand and Co: Fifth edition ,2009
R4: Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hills publishing Company 2006
R5: F.T.Wood,Remedial English Grammar, Macmillan, 2007
R6: Andrea Rutherford, PhD. Basic Communication Skills for Technology, Pearson Education Asia,2001
R7: Exercises in Spoken English, Parts 1 and II CIEFL, Hyderabad , Oxford University Press
R8: Sanjay Kumar, Pushplata, Communication Skills, Oxford University Press, First edition, 2012

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Academic Year – 2025-2026 Semester-I

[HSCA1205L]: Language Proficiency-I (German)

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 01	ICSE : 30 Marks ESE : 20 Marks Total : 50 Marks

Course Objective:

1. Introduction of Germany, Greetings, phrases, vocabulary,
2. Understanding of numbers till 100
3. Grammar- Introductory Sentence Formation, Articles, Pronouns, Tense, Prepositions, Question Formation

Course Outcome:

After successful completion of the course, students will able to:

CO1: Students would know the basic information of Germany
CO2: Students would be familiar with the pronunciation of German letters and greetings
CO3: Students would be able to count till 100
CO4: Students would be able to introduce themselves
CO5: Students would be able to form basic questions

Course Contents

UNIT-I	Start auf Deutsch: (Begin in German)	04 Hours

Deutschland, Deutschsehen und hören, ersteKontakte, Texte: Lied, Postkarte, Wortfelder: internationaleWörter, deutsche Namen

UNIT-II	Café	04 Hours

Gesprächeim Café, Texte: Getränkekarte, Telefonbuch, Rechnungen, Wortfelder:Gesprächeim Café, Zahlenbis 100, Strukturwörter

UNIT-III	Städte, Länder, Sprachen: (Cities, Countries, Languages)	02 Hours

Sehenswürdigkeiten in Europa, Sprachen in Europa, Nachbarsprachen,Texte:Landkarten, einStatistik, Wortfelder: Himmelsrichtungen, Sprachen

UNIT-IV	Menschen und Haüser: (People and Houses)	02 Hours

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Orientation about grooming, Fluency, body language, Non-verbal communication, Expressions, Group Discussion, Debate, Extempore- Orientation and Mock GD, Debate, Extempore rounds.	
List of Laboratory Assignments/Experiments (to be covered)	
1	Pronunciations of various words in German
2	Greetings in German
3	Counting up to 100 in German
4	Introducing himself/herself in German
5	Formation of question in German

Reference Books:

R1. Funk, Kuhn, & Demme. Studio d A1. Deutsch als Fremdsprache. 2011. Goyal Publishers & Distributors Pvt. Ltd. Delhi, India

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Academic Year – 2025-2026 Semester-I

[HSCA1206L]: Language Proficiency-I (Japanese)

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 01	ICSE : 30 Marks ESE : 20 Marks Total : 50 Marks

Course Objective:

1. To meet the needs of ever-growing industry with respect to language support,
2. To get introduced to Japanese society and culture through language

Course Outcome:

After successful completion of the course, students will able to:

CO1: One will have ability of basic communication

Course Contents

UNIT-I	Introduction to Japanese Language	04 Hours
Hiragana basic Script, colors, Days of the week		
UNIT-II	**Hiragana**	**04 Hours**
Modified Kana, double consonant, Letters combined with ya, yu, yo Long vowels, Greetings and expression		
UNIT-III	**Self-Introduction, Introducing other person**	**04 Hours**
Numbers, Months, Dates, Telephone numbers, Stating one's age.		

List of Laboratory Assignments/Experiments (to be covered)

1	Pronunciations of various words in Japanese
2	Greetings in Japanese
3	Counting up to 100 in Japanese
4	Introducing himself/herself in Japanese
5	Formation of question in Japanese

Reference Books:

R1. Basic Connections: Making Your Japanese Flow by Kakuko Shoji
R2: Genki I: An Integrated Course in Elementary Japanese I - Workbook (English and Japanese Edition) Eri Banno

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Academic Year – 2025-2026 Semester-I

[MCA1106L]: Online Professional Training Courses

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 01	ICSE : 30 Marks ESE : 20 Marks Total : 50 Marks

Course Objective:

1. Certification of Students for knowledge and employability skills development.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Have a knowledge of different certification platforms/resources

CO2: Getting the Certification from the professional organization such as MOOC/ NPTEL/SWAYAM/ Coursera, Udemy, Spoken Tutorials

CO3: Enhance the Employability.

Course Contents

MOOC:

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions. The MOOC contains the organization like NPTEL/SWAYAM, Spoken Tutorials, Coursera, Udemy etc. These organizations contain many online courses.

NPTEL/SWAYAM:

It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Scalable Data Science, Deep Learning, Cloud computing, Introduction to internet of things, Software Testing, Big Data Computing and So on,

Spoken Tutorials: It also contains the courses like courses from different areas Such as Engineering, Management etc. Under Computer engineering it contains courses like PHP, gateway, R, CAD etc and soon.

Coursera: It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Java, C++, IOt,

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Linux, Block chain, Big Data etc.

Udemy: It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Java, C++, IOt, Linux, Block chain, Big Data etc

Lab Contents

Guidelines for Assessment

Students are expected to choose one subject for certification. Self-learning Courses to be done as per the own choice from the different reputed organizations such as MOOC/ NPTEL/SWAYAM/Cousera/Udemy/Spoken Tutorials etc.

References:

R1. https://www.udemy.com
R2. https://www.coursera.org
R3. https://swayam.gov.in
R4. https://spoken-tutorial.org/accounts/login/

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Academic Year – 2025-2026 Semester -II

[MCA1107T]: Advance JAVA

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation:20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Core JAVA

Course Objective:

1. Students will be able to develop server-side applications with database handling using servlets, JSP, JDBC.
2. Students will be able to develop server-side applications using MVC.

Course Outcome:

After successful completion of the course, students will able to:

C01: To develop Client Server networking based application
CO2: To develop Web application for solving real life problem using Servlet
CO3: To develop Web application for solving real life problem using JSP,
CO4: To develop Web application for solving real life problem using JDBC
CO5: To develop application using Java Beans.
CO6: To develop robust web applications using Spring MVC.

Course Contents

UNIT-I	Networking with Java	06 Hours

Networking basics - Sockets, port- Proxy servers, java.net – networking classes and interfaces Implementing TCP/IP based Server and Client Datagrams – Datagram packet, Datagram server and client URL connections Multithreaded Chat Server Multithreaded socket Programming.

UNIT-II	Servlet	06 Hours

J2EE: Enterprise Architectura Styles, Containers and Technologies, Introduction of Servlet, Servlet Architecture, Servlet Life Cycle, Servlet packages: javax.servlet & javax.servlet.http, Setting up the environment, Handling Form Data**:** Retrieving form data with request.getParameter(),GET vs POST methods. Session Management: Cookies, HTTP Session Tracking, Servlet Chaining, Request Dispatching and Redirection: RequestDispatcher (forward() and include()), sendRedirect(),JDBC and Servlets **:**Database connectivity using JDBC,CRUD operations from Servlets

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UNIT-III	JSP	06 Hours
Introduction of JSP, JSP Architecture, JSP life cycle, JSP Syntax, JSP Scripting elements, JSP Directives: @Page, @Include,@Taglib, JSP ActionTags: jsp:include,jsp:useBean jsp:setProperty, jsp:getProperty, jsp:forward JSP Implicite object: request ,response, out, session ,application, config, page,Exception, pageContext, Working with variable scope, JSP: methods in form processing, Working with JSP &JDBC		
UNIT-IV	**JDBC**	**07 Hours**
JDBC : Introduction to JDBC, JDBC Drivers, Packages related to JDBC, JDBC Data Sources, Retrieving Meta Information from database and Result set, Distributed Transactions and Row Set objects, Accessing a Database through Servlets and JDBC.		
UNIT-V	**JAVA Beans**	**07 Hours**
Java Beans: The software component assembly model- The java beans development kit- developing beans –using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.		
UNIT-VI	**MVC Architecture**	**06 Hours**
What is MVC Architecture in Java. Advantages of MVC Architecture. Implementation of MVC using Java. MVC Architecture Layer. Example on MVC Archirecture..		

Text Books:

T1. Java Complete Reference PatricNaughton, Herbert Schildt, TMH,7th Ed.
T2. Java unleashed,; Micheal Morrison

Reference Books:

R1. Beginning Java Networking Chad Darby, John Griffin & others

R2. Complete Reference- J2EE Jim Keogh, TMH.

R3. Inside Servlets Dustine R. Callway, Pearson pub.

R4. Developing Java Servlets James Goodwill, Techmedia Pub.

R5. Professional JSP Wrox press

R6. Complete reference JSP, TMH.

R7. Java Server Programming Vol-I Wrox press.

R8. JDBC, Servlet and JSP, Black Book, Santosh Kumar K. Dremtech publication

R9. Spring and Hibernate, Santosh Kumar K. Mc.Graw Hill Education
R10. Spring Persistence with Hibernate, Ahmad Seddighi

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Academic Year – 2025-2026 Semester -II
[MCA1107L]: Advance JAVA Lab

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 04	PR: 2	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Prerequisites : Subject Name/Topic Name

Course Objective:

To design Client server application
1) To explore use of Java Servlets
2) To design and develop web application using JSP
3) To design a web application using JDBC and MVC

Course Outcome:

After successful completion of the course, students will able to:

CO1: Design Client Server Chat Application
CO2: Develop dynamic web applications using Java Servlets.
CO3: Develop dynamic web applications using Java Server Pages.
CO4: Establish database connectivity using JDBC, execute SQL queries, handle result sets, and manage database transactions from Java applications.
CO5: Develop application using Java Beans.
CO6: Use spring MVC framework to build web application

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

1. Creation of servlet through the servlet programming concept
2. Develop JSP pages with programming.
3. Develop server side applications with database
4. Implementation of beans will be known.
5. Application of Frameworks will be made easy in web application development.

Mini Project using JDBC, Servlet MVC

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Academic Year – 2025-2026 Semester - II

[MCA1108T]: Python Programming

Teaching Scheme:	Credit	Examination Scheme:
TH: - Hours/Week : 03	TH: 3	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites : Subject Name/Topic Name

Course Objective:

1. To learn and apply basic constructs of python such as data, operations, conditions, loops, data types.
2. To understand advance concepts of python and apply it for solving the complex problems.
3. To understand the development of real-world applications using OOP concepts in python.
4. To understand and implement the exception handling mechanism effectively.
5. To understand basic database concepts in python

Course Outcome:

After successful completion of the course, students will able to:

CO1: Learn and demonstrate the basic constructs of python such as data, operations, conditions, loops, data types.

CO2 Understand and implement the advance concepts of python and apply it for solving the complex problems

CO3: Develop Python programs that incorporate OOPS concept, regular expressions and exception handling mechanism for complex problem-solving and performance enhancement.

CO4: Develop programs that involve file handling, user-defined functions, and modular programming using Python packages.

CO5: Implement database operations and perform data analysis using Python's PostgreSQL integration.

Course Contents

UNIT-I	Introduction to Python	5 - Hours

What is Python and history of Python? Unique features of Python, Python-2 and Python-3 differences, First Python Program, Python Identifiers, Keywords and Indentation, Expressions and Statements, Operators and Operands in Python.(Arithmetic, relational and logical operators).Comments and document interlude in Python, Command line arguments, Getting User Input, Python Data Types, What are variables? Python Core objects and Functions, Number and Math's.

Conditional and Looping Construct-: if - else statement and nested if – else while, for, use of range function in for, Nested loops, break, continue, pass statement, Use of compound expression in conditional constructs

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UNIT-II	List, Tuples, Dictionaries and Sets	6 Hours

List & Tuples in Python
Lists- Lists in Python, List functions and Methods, List Comprehensions and Lambda Expressions
Tuples- immutable concept, Ordered Sets with tuples, tuple functions.
Python Dictionaries and Sets
Python Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Dictionary functions & Methods
Sets: Python Sets Examples, Sets operation(Membership, union, intersection, difference, and symmetric difference, set method

UNIT-III	Input & Output in Python And Functions	7 Hours

Input and Output in Python: Reading and writing text files, writing Text Files, Appending to Files and Challenge, Writing Binary Files Manually

Functions: Python user defined functions, Python packages functions, Defining and calling Function, The anonymous Functions, Python Modules & Packages, Packages Importing * From a Package, Intra-package References, Packages in Multiple Directories, random, time and time module, dir() function, Built-In Function, invoking built in functions, python string and string built in functions.

UNIT-IV	Python Object Oriented Concepts	7 Hours

Python Object Oriented: Overview of OOPs, Creating Classes and Objects, Class and Instance Variables, Accessing attributes, Built-In Class Attributes, Python Scopes and Namespaces, Destroying Objects, inheritance and its types.

UNIT-V	Python Regular Expressions and Exceptions Handling	7 Hours

Python Regular Expressions: What are regular expressions? The match Function, search Function, Matching vs. searching, Search and Replace, Extended Regular Expressions, Wildcard.
Exceptions Handling: What is Exception? Syntax Errors, Handling an exception, Raising Exceptions, try….except…else, try-finally clause, Argument of an Exception, Python Standard Exceptions, User-Defined Exceptions.

UNIT-VI	Database in Python and Data Analysis	6 Hours

PostgreSQL: Python PostgreSQL Database Access, Install the PostgreSQL and other Packages, Create Database Connection, CREATE, INSERT, READ, UPDATE and DELETE Operation, DML and DDL Operation with Databases, Performing Transactions
Numpy: Introduction to numpy, Creating arrays, Using arrays and Scalars, Indexing Arrays, Array Transposition.
Pandas: What is pandas? Where it is used? Series in pandas

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Text Books:

T1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

Reference Books:

R1. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058

R2. AurelienGeron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299.

R3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

R4. Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

R5. Learning Python By Mark Lutz,O'Reilly Publication

R6. Programming with python, A users Book, Michael Dawson, Cengage Learning

R7. Python Essential Reference, David Beazley, Third Edition

Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

R5. Learning Python By Mark Lutz,O'Reilly Publication

R6. Programming with python, A users Book, Michael Dawson, Cengage Learning

R7. Python Essential Reference, David Beazley, Third Edition

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F. Y. - MCA
Academic Year – 2025-2026 SemesterII
[MCA1108L]: Python programming Lab

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours / Week : 04	PR: 2	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. To implement fundamental programming and OOPs concepts using Python
2. To enable students to implement real-world solutions using Python's control flow mechanisms (loops, if-else, nested loops) and error handling.
3. To teach students to handle files and perform input/output operations, and interact with databases using Python
4. To develop the ability to design Python programs using object-oriented principles and regular expressions to handle advanced programming tasks

Course Outcome:

After successful completion of the course, students will able to:

CO1: Demonstrate Basics of Python and OOPs concepts.
CO2: Implement Python data structures in practical scenarios to manipulate and process data efficiently.
CO3: Develop Python programs that incorporate functions, modules, and packages to create reusable and maintainable code.
CO4: Understand and apply Python's object-oriented programming (OOP) concepts to create and manipulate classes and objects in lab exercises.
CO5: Implement database operations such as CRUD using Python to connect and interact with a PostgreSQL database.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratoryassignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1. Programs on Built-In Function, invoking built in functions, Math Functions

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2. Programs on Creating, initializing and accessing the elements of strings and string operators.
3. Demonstration of List, tuples, dictionary and sets using built in methods.
4. Programs on file operations such as reading and writing to text and binary files.
5. Program demonstration on python functions, modules, packages
6. Programs on object oriented concepts using real time examples.
7. Email, mobile, name and different validations programs using regular expression.
8. Programs on exception handling concepts in python
9. CRUD operations using PostgreSQL database.
10. Demonstration on various data analysis libraries.
11. Mini Project using Python and PostgreSQL database

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Academic Year – 2025-2026 **Semester- II**

[MCA1109T]: WEB TECHNOLOGY

Teaching Scheme:	**Credit**	**Examination Scheme:**
TH:-03 Hours/Week	**TH:03**	**InSem.Evaluation : 20Marks** **Mid Sem. Exam : 30 Marks** **End Sem. Exam : 50 Marks** **Total : 100 Marks**

Course Objective:

1. To impart the design, development and implementation of Dynamic Web Pages.
2. To develop programs for Web using Scripting Languages.
3. To Design and implement dynamic websites with good sense of designing and latest technical aspects.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Student will able to design various term related web designing technology like HTML.
CO2: Students will be able to apply Cascading Style Sheets on the HTML elements of web pages.
CO3: Students will be able to Implement interactive and validate web page(s) using JavaScript.
CO4: Students will be able to implement the event handling, web pages traversing using jQuery
CO5: Design MVC based application with use of Angular JS concepts like, model, controller, Directives etc.
CO6: Build Dynamic web site using server-side PHP Programming and Database connectivity.

Course Contents

UNIT-I	**HTML 5**	**5 Hours**

Introduction to HTML5, What Is HTML5? Features of HTML5, Introduction to Web 2.0 and Web 3.0, What Is The W3C?, What Is The WHATWG?, Getting Started With HTML5, Structure of a Web Page HTML5 DOCTYPE, Page Encoding, New And Updated Elements, New Attributes Deprecated Elements And Attributes, Audio and Video, The State of Web Audio And Video Based On Plug-in, Attributes And Methods, Understanding Audio/Video Events, HTML5 Canvas, Overview Of Graphics In The Browser, Canvas Vs. SVG, Using A Canvas, Forms, Working With Paths, Drawing Straight Lines, Drawing Circles Or Arcs, Drawing Text, Drawing Images, Understanding Transforms, Translation, Rotation, Scaling.

UNIT-II	**CSS3**	**7 Hours**

Introducing CSS3, What is CSS3? , The History of CSS, Selectors and Pseudo Classes, Attribute Selectors, The Target Pseudo-Class, UI Element States Pseudo-Classes, Fonts and Text Effects,

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on the Web, Font Services, The @font-face Rule, Colors, Gradients, Background Images, and Masks, Color, The Opacity Property, Backgrounds, Transitions, Transforms and Animations, Transitions and Transforms, Embedding Media, Video Formats, Styling Video.		
UNIT-III	**JavaScript**	**7 Hours**
Introduction to JavaScript, Types of Scripts with suitable example, Control and looping structure, Various Operators in JavaScript with Example, Array its Types, Event Handling with Example, Math, Date and String objects with Example, DOM Objects, Form Validation, Dynamic effect using JavaScript.		
UNIT-IV	**jQuery**	**7 Hours**
Intro to jQuery , Need of jQuery , Advantages of jQuery , JQuery versions , Features , Retrieving Page Content , Using selectors , Using filters , Child, visibility, and content filters in jquery , Manipulating Page Content , Creating, getting, and setting content , Manipulating attributes , Inserting content , Wrapping, replacing, and removing content, Methods in jQuery 4.5 Events in JQuery, Animation in JQuery , Plugins in JQuery .		
UNIT-V	**Introduction to AngularJS**	**7 Hours**
Angular JS introduction, Architecture & Features, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. MVC architecture (Model, Controller). Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives. Scope: $scope, understanding the scope, $rootScope.Filters: Adding filters to directives, Currency filter, Array filter, Custom filters.		
UNIT-VI	**PHP**	**5Hours**
Installing and Configuring PHP, Introduction , PHP and the Web Server Architecture, PHP Capabilities , PHP and HTTP Environment Variables, PHP Language Core , Variables , Constants , Data Types , Operators , Working with Arrays, Decision Making , Flow Control and Loops, Error Handling and Reporting Considerations, Creating a Dynamic HTML Form with PHP, Database Connectivity with MySql , Connection with MySql Database , Performing basic database operations(DML) Insert, Delete, Update, Select), Using GET, POST, SESSION, and COOKIE Variables		
Text Books: **T1.** Complete Reference wrox publication **T2.** HTML**,** DHTML CSS AND XML by PBP Publication		

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Reference Books:

R1: 101 UX Principles A definitive Design Guide-Packt Publishing Ltd,Will Grant
R2: Smashing UX Design-Jesmond Allen and James chudley
R3. JavaScript Bible, Wiley Pub.
R4. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub
R5. Programming the World Wide Web by Robert W. Sebesta
R6. Professional Ajax, 2nd Edition Wrox Press
R7. AngularJS - Brad Green, ShyamSeshadriLearning Python By Mark Lutz,O'Reilly
R8. AngularJS Web Application Development Cookbook-Packt Publishing Ltd, Matt Frisbie
R9. JavaScript: The Complete Reference by Thomas Powell, Fritz Schneider
R10.HTML & CSS: The Complete Reference, Fifth Edition by Powell Thomas
R11.JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)
R12.jQuery Reference Guide by Chaffer Jonathan
R13.Complete Ref. PHP 6. Introducing HTML5 - Bruce Lawson, Remy Sharp
R14.HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed
R15.JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)
R16.Learning jQuery - Jonathan Chaffer, Karl Swedberg
R17.HTML5 & CSS3 , Castro Elizabeth 7th Edition
R18. Head First PHP & MySQL – by Lynn Beighley & Michael Morrison
R19. The Joy of PHP Programming: A Beginner's Guide – by Alan orbes

Weblinks:

1. http://www.w3schools.com
2. https://www.tutorialspoint.com

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Academic Year 2025-2026 **Semester- II**

[MCA1109L]: WEB TECHNOLOGY Lab

Teaching Scheme: **LAB:- Hours/Week 04**	**Credit** **LAB:02**	**Examination Scheme:** **ICSE : 60Marks** **End Sem. Exam : 40 Marks** **Total : 100 Marks**

Course Objective:

1. To impart the design, development and implementation of Dynamic Web Pages.
2. To develop programs for Web using Scripting Languages.
3. To Design and implement dynamic websites with good sense of designing and latest technical aspects.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Student will able to design various term related web designing technology like HTML.
CO2: Students will be able to apply Cascading Style Sheets on the HTML elements of web pages.
CO3: Students will be able to Implement interactive and validate web page(s) using JavaScript.
CO4: Students will be able to implement the event handling, web pages traversing using jQuery
CO5: Design MVC based application with use of Angular JS concepts like, model, controller, Directives etc.
CO6: Build Dynamic web site using server-side PHP Programming and Database connectivity.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include-timely completion, performance, innovation, efficient codes, punctuality and neatness.

A. List Of Experiments:

1. Designing web pages using various HTML tags.
2. Implementation of CSS on HTML
3. Implementation of interactive web pages with various validations using JavaScript
4. Implementation of various events handling of web pages using jQuery
5. Designing of application based on MVC architecture using Angular JS
6. Implementation of Dynamic web pages using PHP and Database connectivity

B. Mini Project

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Academic Year – 2025-2026 Semester-II

[MCA1110T]: Optimization Techniques

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Formulate and solve linear programming problems using various methods
2. Apply optimization techniques to special cases in linear programming
3. Analyze and solve sequential models and replacement theory problems.
4. Understand and apply network analysis techniques to project management.
5. Develop inventory models and apply queuing theory to manage inventory and waiting lines.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Define and interpret various operations research models and techniques
CO2. Apply optimization techniques to real-world problems
CO3. Analyze and solve complex problems using linear programming, network analysis, and inventory management.
CO4. Design and develop innovative solutions to operations research problems
CO5. Evaluate and interpret results of operations research models and solutions.
CO6. Communicate complex operations research concepts and solutions effectively

Course Contents

UNIT-I	Linear Programming	09 Hours
1.1 Linear Programming model – simplex method 1.2 Two PhaseSimplex Method and problems 1.3 Dual Simplex Method and problems 1.4 Big –M method and problems.		
UNIT-II	**Special Cases in LP**	**07Hours**
2.1 Transportation Problem 2.1 Optimization Technique for TP (MODI Method) 2.3 Assignment Problem and its solutions by Hungarian Method		
UNIT-III	**Sequential Model and Replacement Theory**	**07 Hours**

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3.1 Introduction and general notations 3.2 Algorithm for solving Sequence Problem 3.3 Processing n jobs through 1 machine and 2 machines 3.4 Replacement of items that deteriorates with time 3.5 when money value is consider & Problems 3.6 Individuals and Group Replacement		
UNIT-IV	**Network Analysis including PERT and CPM-I**	**7 Hours**
4.1Basic differences between PERT and CPM. 4.2 Arrow Networks, time estimates, Earliest expected time Latest – allowable occurrences time Forward Pass Computation Backward Pass Computation 4.3 Representation in Tabular Form 4.4 Critical Path 4.5 Probability of meeting scheduled date of completion, 4.6 Calculation on CPM network.		
UNIT-V	**Network Analysis including PERT and CPM - II**	**5 Hours**
5.1 Critical Path 5.2 Crashing the network 5.3 Resource leveling and recourse loading		
UNIT-VI	**Inventory Theory and Queuing Theory**	**3 Hours**
6.1 Inventory Model Building 6.2 Single item deterministic Model 6.3 Inventory Control Models without strategies 6.4 Inventory Control Models with shortages 6.5 Introduction and classification of queues		

Text Books:

T1: J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd

T2: R. Panneer selvam, Operations Research, 2nd Edition, PHI Learning Private Ltd New Delhi

Reference Books:

R1. Taha, Hamdy A. Operations Research: An Introduction. Pearson Education India, 1982.

R2. Kedarnath Ramnath and Co, Operations Research-S.D. Sharma Vohra, N. D. QuantitativeTechniques in Management, Tata McGraw-Hill Education, 2006.

R3. Hillier, Frederick S. Introduction to operations research. Tata McGraw-Hill Education, 2012.

R4. Kanti Swarup, Gupta P.K., Man Mohan, Operations Research, 12th Edition; Sultan Chand & Sons,New Delhi.

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Academic Year 2025-2026 **Semester II**

[MCA1111AT]: Internet of Things

Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: - 03/Week	**TH: 03**	**In Sem. Evaluation : 20 Marks** **Mid Sem. Exam : 30 Marks** **End Sem. Exam : 50 Marks** **Total : 100 Marks**

Course Objectives: This course will enable students to

1. . Gain vision and Introduction to IoT
2. Acquire knowledge about IoT Architecture and Design Principles
3. Describe IoT standards and Business Processes
4. Gain knowledge of Networking & IoT communication Technologies
5. Insight about security & Privacy issues of IoT
6. Gain knowledge about IoT Applications in Industrial & Real world.

Course Outcome: After successful completion of the course, students will able to:

CO1. Acquire objective of IoT
CO2. Determine the IoT Architecture and Design Principles
CO3. Understand how to analyze and organize the data.
CO4. Describes about Networking and IoT Communication Technologies
CO5. Understand about security & Privacy issues of IoT
CO6. Compare IOT Applications in Industrial & Real world.

Course Contents

UNIT-I	**Introduction to IoT**	**6 Hours**
Introduction to IoT - Definition and evolution of IoT, IoT application domains, IoT Fundamentals: Sensors, Actuators, and Smart Networks		
UNIT-II	**IoT Architecture and Design Principles**	**6 Hours**
Layers of IoT architecture: Perception, Network, Edge, and application layers, Design principles and considerations for IoT systems. IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT		
UNIT-III	**Data Analytics**	**6 Hours**
Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT, Data Analytics Challenges, Data Acquiring, Organizing in IoT, Big Data Analytics , Data Visualization		

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UNIT-IV	Networking and IoT Communication Technologies	6 Hours
Classification of IoT protocols, Network Layer Routing Protocols for IoT, Network Layer Encapsulation Protocols for IoT, Session Layer Protocols for IoT, IoT Management Protocol, Role of networking in IoT scalability and efficiency, Challenges in IoT networking		
UNIT-V	**Security & Privacy Issues in IoT**	**6 Hours**
Security in IoT- IoT security challenges: Authentication, confidentiality, and integrity, Security protocols for IoT devices, **Privacy Issues in IoT** - Privacy risks in IoT ecosystems, Data protection and anonymization techniques, Legal and ethical considerations of IoT data collection.		
UNIT-VI	**Challenges in IoT and Case Studies**	**6 Hours**
Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation		

Text Books :

T1. DaCosta, Francis. Rethinking the Internet of Things: a scalable approach to connecting everything. Apress, 2013
T2. Schwartz, Marco. Internet of Things with the ArduinoYún. Packt Publishing Ltd, 2014

Reference Books:

R1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
R2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759
R3. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle,"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
R4. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1stEdition, VPT, 2014.
R5. Hakima Chachi "Internet of Things (Connecting Objects)" Wiley – 2010.

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Academic Year – 2025-2026 Semester-II

[MCA1111BT]: Design and Analysis of Algorithm

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To analyze performance of algorithms, Big O Notations, Sorting
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To solve problems using algorithm design methods such as the greedy method
4. To solve problems using algorithm design methods such as the divide and conquer, dynamic programming
5. To solve problems using algorithm design methods such as the Backtracking
6. To introduce the problem solving using branch and bound, various problems in P and NP classes

Course Outcome:

After successful completion of the course, students will able to:

CO1: Analyze a problem and identify the computing requirements appropriate for its solution, and to understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.

CO2:Ability to design, implement, and evaluate an algorithm to meet desired needs

CO3 : Apply dynamic programming, backtracking, branch and bound strategy for problem solving

CO4 : Ability to distinguish between polynomial and non-polynomial problem solving

Course Contents

UNIT-I	Introduction	7 Hours
Algorithm, analysis, Time complexity and space complexity, O-notation, Omega notation and Theta notation, Heaps and Heap sort, Sets and disjoint set, Union and find algorithms, Sorting in linear time, Tower of Hannoi		
UNIT-II	**Divide And Conquer**	**5 Hours**
Divide and Conquer, General Strategy, Exponentiation. Binary Search, Quick Sort Merge Sort		
UNIT-III	**Greedy Method**	**6 Hours**
General Strategy, Knapsack problem, Job sequencing with Deadlines, Optimal merge patterns, Minimal Spanning Trees, Dijkstra's algorithm.		
UNIT-IV	**Dynamic Programming**	**6 Hours**

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General Strategy, Multistage graphs, OBST, 0/1 Knapsack, Traveling Salesperson Problem, Flow Shop Scheduling		
UNIT-V	**Backtracking**	**6 Hours**
Backtracking: General Strategy, N- Queen's problem, Graph Coloring, Hamiltonian Cycles, 0/1 Knapsack		
UNIT-VI	**Branch and Bound, NP-HARD AND NP-COMPLETE PROBLEMS**	**6 Hours**
General Strategy, 0/1 Knapsack, Traveling Salesperson Problem, Basic concepts, of NP-Hard And NP-Complete Problems (Only concepts should be covered)		

Text Books :

T1. Design and Analysis of Algorithms,S.Sridhar First Ed., ISBN: 9780198093695, Oxford University Press

T2. Design And Analysis Of Algorithms, Anany Levitin, 3Rd Ed, Pearson,

Reference Books:

R1. Bressard, "Fundamental of Algorithm." PHI

R2. Horowitz/Sahani, "Fundamentals of computer Algorithms", Galgotia

R3. Magnifying Data Structures, Arpita Gopal : PHI Publications

R4. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm" PHI

R5. A. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Addison Wesley

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Academic Year – 2025-2026 Semester-II

[MCA1111CT]: Cyber Security and Cyber Law

Teaching Scheme:	Credit	ExaminationScheme:
TH:-03Hours/Week	TH:03	InSem.Evaluation : 20 Marks MidSem.Exam : 30Marks End Sem.Exam : 50Marks Total : 100 Marks

Course Objective:

Students should be able to understand

1. The difference between threat, risk, attack and vulnerability
2. How threats materialize into attacks.
3. Where to find information about threats, vulnerabilities and attacks.
4. Typical threats, attacks and exploits and the motivations behind them.
5. Cyber Laws and Risks management

Course Outcome:

On completion of the course, student will be able to–

CO1: Understand concepts of Cyber-attacks, security issues and policies

CO2:Understand and identify cyber vulnerabilities and safeguards.

CO3: Identify and learn websecurity and services.

CO4: Cyberlaws and international and national security policies and investigations.

CO5:Concepts of network security and cryptography

CO6:Managingsecurityrisksandplanningincidents

Course Contents

UNIT-I	Introduction to Cyber Security	4 Hours

Overview of Cyber Security, CIA (Confidentiality, Integrity, Availability), Threats and Attacks: Attackergoals,capabilities,andmotivations•Malware,•Socialengineering,Risk,threats,vulnerabilities,and attack vectors

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UNIT-II	Network Security and Cryptography	7 Hours

• Network specific threats and attack types, Access Control and Intrusion Detection, Server Managementand Firewalls, Security for VPN and Next Generation Technologies, Use of cryptography for data and network security •Architectures for secure networks Security for wireless, cellular networks, Introduction to Cryptography: Encryption & Decryption, Digital Signatures, Applications of Cryptography, Tools and techniques of Cryptography : Chinese Remainder Theorem and it simplication in Cryptography, DiffieHellman key exchange algorithm, RSA algorithm, Elgamal Arithmetic, Elliptic Curve Cryptography, Message Digest and Cryptographic Hash Functions, MD5 and SHA-1.

UNIT-III	Securing Web Application, Services and Servers	7 Hours

Introduction:why web application security,importance,challenges,Web security VS network security.Webapplication vulnarabilities, BrokenAccess Control, Broken Authentication and Session Management Buffer Overflows ,Cross Site Scripting Flaws, Denial of Service, SQL Injection Flaws, Insecure Storage,Unvalidated Input, Defensive Measures, Improper Error Handling, Insecure Configuration Management Webapplication security guidelines, improvement and testing. Identity Managementand WebServices, AuthorizationPatterns, Security Considerations, Challenges.

UNIT-IV	Digital Forensics	7 Hours

Network Forensics: Introduction, Network basics for digital investigators: History, Technical overview, Network Technologies, Connecting networks using Internet Protocols. Mobile device Forensic and Email Forensics: Mobile Device Forensics, Types of evidence on mobile device, Handling mobile device as a sources of evidence, Forensic prevention of mobile devices, Forensic examination & analysis of mobile devices, Forensic acquisition & examination of SIM cards (Architecture, Data Storage, Files, Mobile Operating System) mobile devices, Mobile forensics and its challenges Email Forensics: Email header Analysis, Function & Forensics, Chat and Social Networking Evidence. Web forensics and Anti forensics.

UNIT-V	IT Security Management	5 Hours

IT Security Management:Organizational Context and Security Policy, Security Risk Assessment, Security Controls or Safeguards ,IT Security Plan, Implementation of Controls, Monitoring Risks, Physical and Infrastructure Security, Human Resources Security, Legal and Ethical Aspects: Cybercrime and Computer Crime, Intellectual Property , Privacy , Ethical Issues.

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UNIT-VI	**Cyber space and the Law**	6 Hours

Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy . Laws and Ethics in Information Security, Codes of Ethics, Protecting programs and data Cybercrime and Information security, The legal perspectives-Indian perspective, Global perspective.

TextBooks:

T1. Computer Security: Principles and Practices, Pearson 6Ed,ISBN 978-0-13-335469-0,William Stalling

T2. Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiely IndiaPvt.Ltd,ISBN-978-81-265-2179-1, Nina Godbole, Sunit Belapure

T3. Cryptographyand Network Security,Behrouz AForouzan

ReferenceBooks:

R1.Security in Computing,Charles P.Pfleeger Shari Lawrence PfleegerJonathanMargulies,5th Edition, Pearson Education,2015.

R2.CyberSpace and Cyber Security, George K. Kostopoulous, CRC Press, 2013

R3.CyberSecurity:Analytics,TechnologyandAutomationedited,Martt Lehto,Pekka Neittaanmäki, Springer International PublishingSwitzerland 2015

R4.ComputerForensics and Investigations, Nelson Phillips and Enfinger Steuart,Cengage Learning,New Delhi,2009.

R5.CyberSecurity:APractitioner'sGuide(AmazonAsia-PacificHoldingsPrivateLimited,2017

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Academic Year- 2025-2026 **Semester- II**

[MCA1111DT]: DevOps

Teaching Scheme:	**Credit**	**Examination Scheme:**
TH: -Hours/Week : 03	**TH: 03**	**In Sem. Evaluation : 20 Marks**
		Mid Sem. Exam : 30 Marks
		End Sem. Exam : 50 Marks
		Total : 100 Marks

Course Objective:

Students should be able to understand

1. Understand the principles of continuous development and deployment.
2. DevOps productivity by automating infrastructure and workflows and continuously measuring applications performance.
3. Understand and use AWS Services.
4. Concepts of version control and using Git
5. Understand and use the container Technology
6. Using DevOps tools like Git, Jenkins, Ansible, Docker

Course Outcome:

On completion of the course, student will be able to–

CO1: CO2: Explain the principles of continuous development and deployment of software.

CO2: Describe DevOps & DevSecOps methodologies and their key concepts

CO3: Set up complete private infrastructure using version control systems and CI/CD tools

CO4: Use container Technology in Software development

CO5: Implement Containerization using Kubernetes, Configuration management with Ansible

CO6: Using DevOps tools like Jenkins, Git, Maven etc. in various aspects of DevOps delivery model DevOps using Cloud and Using AWS Services □

Course Contents

UNIT-I	**Introduction to DevOps**	**04 Hours**
What is DevOps?, Why is DevOps is Needed?, How is DevOps ? Why is DevOps used?, DevOps Lifecycle, Principles, Roles, Responsibilities, and Skills of a DevOps Engineer, DevOps and Software Development Life Cycle: Waterfall Model,Agile Model		
UNIT-II	**DevOps Architecture**	**05 Hours**

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DevOps Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes.

UNIT-III	Continuous Integration, Delivery and Deployment	05 Hours

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices . Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

UNIT-IV	Container Technology	08 Hours

Container Technology - Introduction to Containers? Benefits of Contain Containers Work?, Virtual Machines vs Containers, brief intro to Container Terminology, Overview of Container Architecture, Installing Container engine tool, Creating Containerized Services, Provisioning Containerized Services, Manipulating Container Images Creating Custom Container Images - Designing Custom Container Images, Building Custom Container Images with Dockerfile.

UNIT-V	Containerization and Configuration Management	07 Hours

Configuration management with Ansible - Introduction to Ansible, Ansible Installation, Configure Ansible roles, write, Playbooks, working with playbooks, manage ansible variables, Executing Adhoc command, Ansible Variables. Containerization using Kubernetes- Introduction to Kubernetes engine, Kubernetes Cluster Architecture, understanding YAML, creating a services in Kubernetes.

UNIT-VI	DevOps Tools	07 Hours

Introduction to Jenkins with Architecture, Jenkins Management, Introduction to Maven, Introduction to Git: What is Git, Why Git, GIT, Workflow. DevOps on Cloud: Why Cloud, Introduction to Cloud Computing, Why DevOps on Cloud, Introduction to AWS, Various AWS services, DevOps using AWS.

Text Books :

T1. The DevOPS Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations by Gene Kim , John Willis , Patrick Debois , Jez Humb,O'Reilly publications

T2. What is Devops? Infrastructure as code By in Mike Loukides ,O'Reilly publications.

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T3. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, by Jez Humble and David Farley

T4. Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and Microservices by Dave Harrison, Knox Lively

Reference:

R1: DevOps For Dummies 2ndIBMLimitedEdition by Sanjeev Sharma and Bernie Coyne

R2: DevOps_Revealed_by_International_DevOps_Certification_Academy.

R3: Effective DevOps by Jennifer Davis & Katherine Daniels.

R4: The DevOps Handbook_ How to Create World Class Agility, Reliability, and Security in Technology Organizations.

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Academic Year –2025-2026 Semester-II

[MCA1111ET]: Block Chain Technology

Teaching Scheme: TH: -Hours/Week : 03	Credit TH:03	Examination Scheme: In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To provide conceptual understanding of block chain technology
2. To acquire skills to develop block chain based solutions
3. To familiarize potential applications for Bit coin-like crypto currencies
4. To develop & integrate ideas from various domains and implement the technology in different perspectives
5. The course will enable an individual to learn, how these systems work and how to develop secure software that interacts with the Bit coin network and other crypto currencies

Course Outcome:

After successful completion of the course, students will able to:

CO1. Understand the types, benefits and limitation of block chain
CO2. Explore the block chain decentralization and cryptography concepts
CO3. Apply the tools for understanding the background of crypto currencies
CO4. Build and deploy block chain application for on premise and cloud based architecture
CO5. Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain
CO6. Understanding of latest advances and its applications in Block Chain Technology

Course Contents

UNIT-I	Block Chain Fundamentals	06 Hours
Block chain 101: Distributed systems, History of block chain, Introduction to block chain, Types of block chain, CAP theorem and block chain, Benefits and limitations of block chain.		
UNIT-II	**Decentralization and Cryptography Fundamentals**	**05 Hours**
Decentralization and Cryptography: Decentralization using block chain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys.		
UNIT-III	**Bit Coin**	**05 Hours**
Bit coin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bit coin. Bitcoin block chain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin		

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scripting language and their uses with examples.

UNIT-IV	Bitcoin and Block chain	07 Hours

Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) -basic introduction, Hashcash PoW, Bitcoin PoW.

UNIT-V	Ethereum	06 Hours

Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts. Ethereum and Smart Contracts- The Turing Completeness of Smart Contract Languages and verification challenges- comparing Bitcoin scripting vs. Ethereum Smart Contracts

UNIT-VI	Block Chain-Recent Trend	07 Hours

Block chain Implementation Challenges- Zero Knowledge proofs and protocols in Block chain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves – Zcash - attacks on Block chains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms

Text Books :

T1. Mastering Blockchain by Imran Bashir Packt Publishing Ltd. ISBN 978-1- 78883-04-4

T2. Melanie Swan, "Block Chain: Blueprint for a New Economy", O"Reilly, first edition – 2015.

T3. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.

T4. Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing, first edition – 2012

Reference Books:

R1: Ritesh Modi, "Solidity Programming Essentials: A Beginner"s Guide to Build Smart Contractsfor Ethereum and Block Chain", Packt Publishing

R2: Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology Decentralization andSmart Contracts Explained", Packt Publishing

R3: Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

R4: Bitcoin and Cryptocurrency Technologies, Author- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University, 2016

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Academic Year 2025-2026 Semester- II

[MCA1111FT]: Big Data Analytics

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Optimize business decisions and create competitive advantage with big data analytic.
2. The several key big data technologies used for storage, analysis and manipulation of data.
3. The key concepts of Hadoop framework and map reduce.
4. The concepts of PIG and HIVE for application development.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Understand the basic concepts of Big Data and Technology used in the same

CO2. Understand the Hadoop technology and its implementation and Hadoop file distribution System

CO3. Understand the Basic aspects of the Map reduce Functions

CO4. Understand the Basic aspects of the Pig and Hive technology used for the operations on HDFS

Course Contents

UNIT-I	INTRODUCTION TO BIG DATA	6 Hours

Introduction to Big data: Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, Traditional Business Intelligence (BI) versus Big Data. Big data analytics: Classification of Analytics, Importance and challenges facing big data, Terminologies Used in Big Data Environments, The Big Data Technology Landscape.

UNIT-II	INTRODUCTION TO HADOOP	6 Hours

Introducing Hadoop, RDBMS versus Hadoop, Distributed Computing Challenges, History and overview of Hadoop, Use Case of Hadoop, Hadoop Distributors, Processing Data with Hadoop, Interacting with Hadoop Ecosystem.

UNIT-III	THE HADOOP DISTRIBUTEDFILESYSTEM	6 Hours

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Hadoop Distributed File System (HDFS): The Design of HDFS, HDFS Concepts, Basic Filesystem Operations, HadoopFilesystems.

UNIT-IV	HADOOP File SYSTEM	6 Hours

The Java Interface- Reading Data from a Hadoop URL, Reading Data Using the File system API, Writing Data. Data Flow- Anatomy of a File Read, Anatomy of a File Write, Limitations.

UNIT-V	UNDERSTANDING MAP REDUCE FUNDAMENTALS	6 Hours

Map Reduce Framework: Exploring the features of Map Reduce, Working of MapReduce, Exploring Map and Reduce Functions, Techniques to optimize MapReduce jobs, Uses of MapReduce .Controlling MapReduce Execution with Input Format, Reading Data with Custom Record Reader, -Reader, Writer, Combiner, Partitioners, MapReduce Phases, Developing simple MapReduce Application.

UNIT-VI	INTRODUCTION TO PIG AND HIVE	6 Hours

Introducing Pig: Pig architecture, Benefits, Installing Pig, Properties of Pig, Running Pig, Getting started with Pig Latin, working with operators in Pig, Working with functions in Pig. Introducing Hive: Getting started with Hive, Hive Services, Data types in Hive, Built-in functions in Hive, Hive DDL.

Text Books:

T1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley Publications, 2nd Edition, 2014, DT Editorial Services, Big Data, Dream Tech Press, 2nd Edition, 2015.
T2. Tom White, Hadoop: The Definitive Guide, O „Reilly, 3rd Edition, 2012.
T3. Black Book Big Data, Dream tech publications, 1st Edition, 2017.

Reference Books:

R1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today „s Business, Wiley CIO Series, 1st Edition, 2013.
R2. Rajiv Sabherwal, Irma Becerra- Fernandez, "Business Intelligence Practice, Technologies and Management", John Wiley, 1st Edition, 2011.
R3. ArvindSathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", IBM Corporation, 1st Edition, 2012.

Web References:

1. https://www.sas.com/en_us/insights/analytics/big,data,analytics.html
2. https://www.searchbusinessanalytics.techtarget.com/definition/big,data,analytics
3. https://www.webopedia.com

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Academic Year– 2025-2026 Semester-II

[MCA1101GT]: Entrepreneurship Development

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To develop and strengthen entrepreneurial quality in students. and motivation
2. To develop and strengthen motivation quality in students
3. To impart basic entrepreneurial skills
4. To impart understandings to run a business efficiently and effectively.

Course Outcome:

CO1. After successful completion of the course, students will able to:

CO2. Students will gain the Knowledge of Entrepreneurship and will get the competence

CO3. Students will gain skills needed to run a business.

CO4. Students will gain knowledge needed to run a business

Course Contents

UNIT-I	Entrepreneurial Competence	06Hours

Entrepreneurship concept, Entrepreneurship as a Career, Entrepreneurial Personality, Characteristics of Successful, Entrepreneur, Knowledge and Skills of Entrepreneur

UNIT-II	Entrepreneurial Environment	07 Hours

Business Environment, Role of Family and Society, Entrepreneurship Development Programmes, Government Policies for Small Scale Enterprises, Small Enterprises in International Business

UNIT-III	Business Plan Preparation	06 Hours

Sources of Product for Business, Pre-feasibility Studies, Criteria for Selection Process, Ownership Structure, Capital, Budgeting Project Profile Preparation, Matching Entrepreneur with the Project, Feasibility Report Preparation and Evaluative Criteria

UNIT-IV	Launching of Small Business	07 Hours

Financial Planning, Human Resource mobilization, Production and Operation Management, Marketing and Channel Selection

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UNIT-V	Management of Small Business	05 Hours
Growth strategies in small business, Product Launching, Incubation, IT startups Monitoring and Evaluation of Business, Industrial Sickness, Effective Management of small Business		
UNIT-VI	**Rules and Legislation**	**05 Hours**
Applicability of Legislation, Industries Development (Regulations) Act, 1951, Factories Act, 1948., The Industrial Employment (Standing Orders) Act		

Text Books:

R1. Arya Kumar. Entrepreneurship. Pearson. 2012

R2. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

Reference Books:

R1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis,

R2. Biztrantra ,2nd Edition ,2005

R3. Prasanna Chandra, Projects Planning, Analysis, Selection, Implementation and Reviews,

R4. Tata McGraw-Hill, 1996.

R5. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai -1997.

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Academic Year – 2025-2026 Semester-II

[HSCA1202L]: Indian Knowledge System

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 02	ICSE : 60 Marks ESE : 40 Marks Total : 100 Marks

Prerequisite: Historical background of India

Course Objective:

1. Understand the foundational concepts and key tenets of Indian knowledge systems.
2. Understand various philosophicaland spiritual traditions within the Indian context.
3. Examine the historical evolution of Indian literature, art, and science

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the foundational concepts of Indian Knowledge Systems (IKS), including the significance and structure of the Vedas, Purusharthas, and classifications like Shruti and Smriti.

CO2: Interpret key philosophical ideas from major Upanishads and analyze their relevance to contemporary knowledge and ethical reflection.

CO3: Classify the Astika and Nastika schools of Indian philosophy and evaluate their contributions to the foundation of Indian education and moral reasoning.

CO4: Analyze ancient Indian approaches to leadership, governance, and management principles through texts like the Arthashastra and Mahabharata.

CO5: Evaluate Indian perspectives on health, wellness, and psychology, including the role of Yoga and the mind-body consciousness model.

CO6: Identify and describe ancient Indian contributions to science, engineering, and technology, including innovations in mathematics, metallurgy, architecture, and irrigation.

UNIT-I	Introduction to Indian Knowledge Systems and Vedic Corpus	05 Hours

Overview of Indian Knowledge system with Ancient Indian Knowledge in Action. Purpose of IKS, Vedic Period : Vedas & their Significance, Purpose of Vedas, Types of Vedas, Mantras, Brahmans, Aranyankas, Shruti and Smritis, Four Purusharthas In Vedas

UNIT-II	Glimpses of Upanishads	07 Hours

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Upnishads- Isha, Kena, Katha, Prashan, Mundaka, Mandukya, Tattiriya, Aitareya, Chhandogya, Brihadaranyaka		
UNIT-III	**Wisdom through Smrutis and Foundation of Indian Education**	**08 Hours**
Classification of Indian philosophy with Unique features - Astika Schools : Nyaya, Vaisheshika, Sankhya, Yoga, Mimamsa, Vedanta Nastika Schools: Buddhism, Jainism, Cārvāka		
UNIT-IV	**From Arthashastra to Mahabharata: Indigenous Principles of Governance and Leadership**	**05 Hours**
Ancient Indian Mathematics and its contribution to the world. Introduction to mathematics (number Glimpses of Kautilyas Arthashastra (Mind map on Statecraft, leadership and ethics, and Governance. for better management), Management Principles from Mahabharata.		
UNIT-V	**Health wellness and Psychology**	**03 Hours**
Introduction wellness through Indian medical system, Glimpses of Yoga Shastra, Mind body consciousness complex .Ancient Indian approach to psychology, Contributions of Yoga to the world		
UNIT-VI	**Foundational concepts for Science, Engineering and Technology through IKS**	**02 Hours**
Ancient Indian Mathematics and its contribution to the world. Metallurgy (Iron and steeling India and alloys). The great Indian Architecture and Irrigation systems.		
Guidelines for Assessment		
Assessment is a continuous assessment based on submission of the assignments, timely completion, attendance and understanding		
List of Assignments		
1	Participation in class discussions and activities	
2	Unit wise quizzes to assess understanding of concepts	
3	Group Presentations for exploring a specific aspect of Indian knowledge systems	

Text Books:

1. An Introduction to Indian Knowledge Systems: Concepts and Applications, B Mahadevan, V R Bhat, and Nagendra Pavana R N; 2022 (Prentice Hall of India).
2. Indian Knowledge Systems: Vol I and II, Kapil Kapoor and A K Singh; 2005 (D.K. Print World Ltd).

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Academic Year – 2025-2026 Semester-II

[HSCA1207L]: Professional Communication Skills

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	PR: 01	ICSE : 30 Marks ESE : 20 Marks Total : 50 Marks

Course Objective:

1. Understand the role of communication in personal & professional success.
2. Develop awareness of appropriate communication strategies.
3. To enhance the verbal communication of students.
4. To focus on Formal and Informal Conversation, etiquettes. .
5. Ethically use, document and integrate sources.
6. Practice critical thinking to develop innovative and well-founded perspectives related to the Student's emphases.
7. Use technology to communicate effectively in various settings and contexts.
8. Demonstrate appropriate and professional ethical behavior.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Understand and apply effective communication methods and Listening skills.
CO2: Display competence in oral, written, and visual communication.
CO3: Respond to industry professionals and recruiters and effectively answer interview questions, and clearly understand what to do before, during and after an interview.
CO4: Demonstrate positive group communication exchanges.
CO5: Display competence in written communication and use current technology related to the communication field
CO6: Respond effectively to cultural communication differences and communicate ethically

Course Contents

UNIT-I	Communication Skills	04 Hours

Communication: Meaning, Nature, Importance and Purpose of Communication, Types of Communication, Process of Communication, Communication Network in an Organization, Strategy for Effective Communication, Verbal and Non-Verbal Communication, Barriers to Communication, Essentials of Good Communication, Communication Techniques.

Listening: The Process of Listening, Barriers to Listening, Types of Listening, Purpose of Listening, Listening to Conversation (Formal and Informal) , Active Listening- an Effective Listening Skill , Benefits of Effective Listening , Barriers to Listening , Listening to Announcements- (railway/ bus stations/ airport /sports announcement/ commentaries etc.), Academic Listening (Listening to Lectures) , Listening to Talks and Presentations , Note Taking Tips. Various Class activities should be conducted

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for more practical exposure.

UNIT-II	Body Language	4 Hours

Body Language : 1.Communicating with Your Body-Interpret a New Language, The Power of Para verbal Communication, Bodies Speak Louder than Words 2.How to Read Body Language- Head Movement, Translate Gestures into Words, Open vs. Closed Body Language, Watch Eye Movement 3.Body Language Assumptions-Common Postures, Personal Space Invasion, Reactive Movements, Fidgeting and Boredom 4.Male vs. Female Variations- Facial Expressions by Gender, Personal Space Differences, Common Female Body Language, Common Male Body Language 5.Nonverbal Signals-Gestures and Hand Signals, Sending Signals to Others, It's ,Not What You Say, It's How You Stand, What is Your Posture Communicating? 6. Facial Expressions- Emotions Displayed, Micro-Expressions, Facial Action Coding System (FACS), Universal Facial Expressions 7. Body Language in the Workplace-Communicate with Power, Cultural Differences, Building Rapport and Trust, Using Mirroring 8.Are They Lying? - Hand Movements, Forced Smiles, Eye Movement, Changes in Posture 9. Using Body Language- Becoming Aware of Your Signals, Communicating with Confidence, Posturing Explained, Practicing in the Mirror 10.Match Your Words with Your Body- Involuntary Movements, Say What You Mean, Staying Consistent, Actions Will Trump Words

UNIT-III	Interview and Presentation skills	04 Hours

Interview Skills: Preparing for the Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process, How you should prepare for a job interview, find out about companies, overcome nerves, decide which clothes to wear, vocabulary about your hard and soft skills, and answering questions using the STAR technique, Job Interview Techniques-Manners and etiquettes to be maintained during an interview

Answering Interview Questions: Sample Questions Commonly asked During Interview, Avoiding mistakes during the interview, tips to help you answer questions effectively and confidently, understanding the importance of non-verbal communication during interviews, and the importance of intonation.

Responding to Challenging Interview: Questions Answering those challenging interview questions, being able to stand out during interviews, providing diplomatic answers to questions you would prefer had not been asked and giving yourself time to come up with an answer, and stressing key words in your replies, Critical Success Factors for Interview, Negotiating Salary & Compensation.

Closing the Job Interview Effectively: Post Interview and Online Interviews Considering the questions that you, the interviewee should ask, or not ask, deciding what you should do, or not do at the end of the interview, and after the interview, and discovering how online interviews are similar and different to face to face interviews, Post-Interview & Follow-up.

Mock Interviews should be conducted.

Presentation Skills: Preparing a PowerPoint Presentation, Greeting and introducing, Presenting a Paper, Group Discussions. Preparing for and Facing a Job Interview

UNIT-IV	Group Discussion Preparation	4 Hours

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GD Introduction: What is a Group Discussion?, Who holds a Group Discussion?, How is a GD Conducted? Why is a "GD" conducted?, Why GD is important?,GD: Approach(Carefully craft the opening gambit, Use Key Word Approach, Apply Shock Strategy GD: Do's and Don'ts, GD: Communications, Types of GD topics: Techniques, GD: Ettiquette, GD: Content Discuss Solved Case Studies and Conduct GD in Class on different topics, Experience sharing by Industry people &Alumni

UNIT-V	Written communication	04 Hours

Elements of Effective Writing (What is Writing?), Main Forms of Written Communication, Letter Writing(formal and informal) , Applying for a job (Preparing Cover letters , Preparing a CV/Resume and Effective Profiling), Summarizing(Précis Writing , Note-making, Preparing Agenda and Minutes for Meetings), Writing Notices and Memos , Drafting an E-mail, Press Release , Correspondence with Govt./Authorities, Office Orders, Enquiries and Replies)

UNIT-VI	Grooming for Career Building	04 Hours

Telephone Skills : Basics of Telephone communication • How to handle calls- telephone manners • Leaving a message • Greeting and Leave Taking over phone(etiquette).
Time & Stress Management: Identifying Time Wasters • Time Management Tips • Identifying Factors Responsible for Stress • Stress Management Tips • Test Preparation Tips.
Soft Skills for Leadership and Team Management: Qualities of a Good Leader • Leadership Styles • Decision Making • Intrapersonal skills • Interpersonal skills • Problem solving • Critical thinking • Negotiation skills.

List of Laboratory Assignments/Experiments (to be covered)

1	Understanding and implementation of effective communication and Listening skills
2	Implementation in oral, written, and visual communication
3	Implementation of Interview skills
4	Group communication exchanges
5	Written communication and use current technology related to the communication field
6	Implementation effectively to cultural communication differences and communicate ethically

Reference Books:

R1: Communicating at work: Strategies for success in business and the professions: Adler, Elmhorst, & Lucas (2013). NE: McGraw Hill.
R2: The Definitive Book of Body Language Allan Pease
R3: The Art of Public Speaking by Dale Carnegie
R4: On Writing Well: The Classic Guide to Writing Nonfiction by William Zinsser
R5: Five Stars: The Communication Secrets to Get from Good to Great (Hardcover) by Carmine Gallo

Weblinks:

W1: www.google.com
W2: www.citehr.com

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Academic Year – 2025-2026 Semester-III

[MCA2101T]: Research Methodology

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH : 03	In Sem Evaulation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Introduction to philosophy of research.
2. Understand process to formulate research questions / idea
3. Understand process of planning of research time, resource
4. Understand different statistical analysis methods
5. Develop thesis and report writing.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Knowledge on various kinds of research questions and research designs

CO2: Formulate research problems (task) and develop a sufficiently coherent research design

CO3: Assess the appropriateness of different kinds of research designs

CO4: Knowledge on qualitative, quantitative and mixed methods of research, as well as relevant ethical and philosophical considerations

CO5: Develop independent thinking for critically analyzing research reports

Course Contents

UNIT-I	Research Foundation	6Hours
What is Research, Objectives of Research, Types of Research, Scientific Research, Research and Theory, Conceptual and theoretical Models, Importance of research Methodology in scientific research		
UNIT-II	**Review of Literature**	**6 Hours**

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Need for Reviewing Literature, What to Review and for what purpose, Literature Search Procedure, Sources of Literature, Planning of Review work, Note Taking, Library and documentation.

UNIT-III	Planning of Research	6 Hours

The planning process, Selection of a Problem for Research, Formulation of the Selected , Problems, Hypothesis formation, Measurement, Research Design/Plan

UNIT-IV	Processing of Data and Statistical Analysis of Data	6 Hours

Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Neural Network based optimization, Optimization of fuzzy systems, Error Analysis,Results and their discussions

UNIT-V	Data Processing and Statistical Analysis tools	6 Hours

Introduction to Statistical Software, MINITAB, Weka

UNIT-VI	Report and Thesis writing	6 Hours

Types of Reports, Planning of Report Writing, Research Report Format, Principles of Writing, Data and Data Analysis Reporting in a Thesis, Use of Endnote, Bibliography, API , appendix, table, Observations arrangement, Preparation of type script and lay-out of thesis, Use of LATEX Indexing ofJournals, Impact factor and social Media for Researchers.

References:

R1. Research Methodology: Methods and Techniques by C. R. Kothari, New Age
R2. Statistical Methods for Research Workers by Fisher R. A., Cosmo Publications, New Delhi ISBN:81- 307-0128-6
R3. Design and Analysis of Experiments by Montogomery D.C. (2001), John Wiley, ISBN: 0471260088
R4. MINITAB online manual
R5. Methodology of Research in Social Sciences by O. R. Krishnaswamy and M. Rangnatham Himalaya publication House, 2005, ISBN: 8184880936
R6. Weka online manual

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Academic Year – 2025-2026 Semester-III

[MCA2102AT]: Advanced Development Technology

Teaching Scheme:	Credit	Examination Scheme:
TH: - Hours/Week : 03	TH: 3	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Explain how C# fits into the .NET platform and analyse the basic structure of a C# and ASP Application.
2. Describe the object oriented aspects of C#.
3. Develop applications using ASP .Net using C#.
4. Design and develop Web based applications on .NET
5. Describe the foundations of CLR execution.
6. Describe the developing the MVC Applications and Ajax controls on web form.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Gain a comprehensive understanding of the philosophy and architecture of C-Sharp Programming

CO2: Learn how to implement object oriented concepts using c# and implementation of delegate and Exception handling.

CO3: Attain a detailed knowledge of the building blocks of web applications using web forms, Including Programs that interact With databases.

CO4: Develop Rich Internet Web applications by using C#, ASP.NET, ADO.NET

CO5: Determine to Deploy web application using ADO.NET and learning to use of web services

CO6: Express proficiency in handling of Ajax on web forms and creating MVC applications used for Web Development

Course Contents

UNIT-I	Introduction .NET Framework 4.0	6 Hours

Benefits of .NET Framework, Architecture of .NET Framework 4.0, Components of .NET Framework 4.0: CLR, CTS, Metadata and Assemblies, .NET Framework Class Library,. ASP .Net Architecture, Processing of an application in .Net, Namespace Fundamentals, Maintaining State Information **Introducing C#:** overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array List, Enumerations, boxing and unboxing.

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UNIT-II	Object Oriented aspect of C#	7 Hours
OOPs concepts, The System namespace, Access Modifiers, Static Classes and Static Class Members. Static Property, Polymorphism/Overloading, Runtime Polymorphism/Overriding. Abstraction: Abstract classes, Abstract methods. Interfaces: Syntax of Interfaces, Implementation of Interfaces and Inheritance. Delegates:Creating and using. Multicasting with Delegates, Exception Handling: The try/catch/finally statement, Checked and Unchecked Statements. Chained exceptions, using exceptions.		
UNIT-III	**Creating a User Interface (Controls and Master age)**	**7 Hours**
Using Controls-: Validation Controls, Navigation between Pages, Master Pages & Themes, Simple MasterPage Nested Master Page Configuring Master Page Creating Themes, Applying Themes, Applying Style sheet. **Data Binding -:** Bind data to UI, Transform and filter Data.		
UNIT-IV	**Storing and Retrieving Data with ADO.NET, Catching and Correcting Errors**	**6 Hours**
Accessing Data with ADO.NET, Using Data Sets on Web Forms, Processing Transactions, CRUD operations using SQL-Server. **Using Exception Handling-:** Using Error Pages, Logging Exceptions		
UNIT-V	**Web Services, Testing Web Applications & Building and Deploying Web Applications**	**6 Hours**
Web Services -: Creating Web Services, Discovering Web Services, Instantiating and Invoking Web Services, **Testing Web Applications -:** Creating Tests, Running Tests, Debugging, **Building and Deploying -:** Building a Web Application, Deploying a Web Application authenticating and Authorizing Users using windows and forms		
UNIT-VI	**Use of Ajax and Introduction to MVC**	**6 Hours**
Ajax -: Introduction to Ajax Controls, Using various Ajax controls on web forms. **Introduction to MVC -:** MVC Architecture, MVC- Model, Views, Controllers, Creating Simple MVC Application		

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Text Books:

T1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata Mc Graw Hill, 2012.

Reference Books:

R1. J.NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc.,Wiely- Dream Tech Press, 2010.
R2. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 3 edition 201
R3. Microsoft ASP.NET 4.0 Step by Step - George Shepherd, Microsoft Press
R4. Mastering ASP.Net - BPB Publication
R5. ASP.net – The Complete Reference- Tata McGraw Hill
R6. ASP.NET Programming –

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Academic Year – 2025-2026 Semester-III

[MCA2102AL]: Advanced Development Technology Lab

Teaching Scheme:	Credit	Examination Scheme:
PR: - Hours/Week : 04	PR: 2	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. Explain how C# fits into the .NET platform and analyse the basic structure of a C# and ASP Application.
2. Describe the object oriented aspects of C#.
3. Develop applications using ASP .Net using C#.
4. Design and develop Web based applications on .NET
5. Describe the foundations of CLR execution.
6. Describe the developing the MVC Applications and Ajax controls on web form.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Gain a comprehensive understanding of the philosophy and architecture of C-Sharp Programming
CO2: Learn how to implement object oriented concepts using c# and implementation of delegate and Exception handling.
CO3: Attain a detailed knowledge of the building blocks of web applications using web forms, Including Programs that interact With databases.
CO4: Develop Rich Internet Web applications by using C#, ASP.NET, ADO.NET
CO5: Determine to Deploy web application using ADO.NET and learning to use of web services
CO6: Express proficiency in handling of Ajax on web forms and creating MVC applications used for Web Development

A) List of Laboratory Assignments/Experiments (minimum -- to be covered)

1. Simple programs using branching and looping, arrays, strings and methods, structures, classes, objects, inheritance, polymorphism and interfaces
2. Programs to implement operator overloading, delegates, events, errors and exceptions
3. Perform string manipulation with the string builder and string classes
4. Program to implement windows forms

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5. Simple application using web controls a) Finding factorial Value b) Currency Conversion c) Quadratic Equation d) Temperature Conversion e) Login control
6.Calendar control a) Display messages b) Display vacation c) Selected day using style d) 7. Difference between two calendar dates
8. Tree view control a) Tree view control and data list b) operations
9. Program to implement connectivity with database
10. Binding to databases using controls
11. Program to implement multiple forms, standard modules, and menus
12. Program to implement file manipulation
13. Working with XML, using Crystal Reports in web forms
MINI Project
Develop a website using ASP .Net with C# concepts learnt in the theory and exercises listed in part A with a good look and feel effects. You can use ASP .Net and .Net framework 4.0 and database. **Note: -** 1. A team of two students must develop the web-based project. However, during the examination, Each student must demonstrate the project individually. 2. The team must submit a brief project report (20-25 pages) that must include the following: **a.** Introduction **e**. Screen Shots **b.** System Requirement Specification **f.** Conclusion & Future Enhancement **c.** System Design **g.** Bibliography **d.** Implementation The Demonstration, Viva and Report Evaluation will be done for 50 Marks.
Instructions: 1. Mini project student group size is limited to two students only. Project report duly signed by the Guide and HOD need to be submitted during examination

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Academic Year – 2025-2026 Semester – III

[MCA2102B-T]: Mobile Application Development Lab

Teaching Scheme:	Credit	Examination Scheme:
TH:-03Hours/Week	TH:03	InSem. Evaluation : 20 Marks Mid Sem. Exam : 30Marks End Sem. Exam : 50Marks Total : 100 Marks

Course Objective:

1. To provide conceptual understanding of Mobile applications development
2. To acquire skills to develop Mobile applications.
3. To Designing and develop mobile applications using a chosen application development framework.
4. To evaluate alternative mobile frameworks, and contrast different programming platforms.

Course Outcome:

After successful completion of the course, students will able to:
CO1. Demonstrate their understanding of the fundamentals of Android operating systems
CO2. Demonstrate their skills of using Android software development tools
CO3. Understand database activities like retrieval and Sharing.
CO4. Discover the need for working with SQLite and its operations.
CO5. Illustrate the Peer to peer to communication using instant messaging and GTalk services.
CO6. Illustrate the android wifi features and Accessing Android Hardware.

Course Contents

UNIT-I	Android application development undamentals	5 Hours

Overview of Android, Features of android, Architecture of Android, Libraries, Software development kit, Introducing views, List of views and view groups, Introducing layouts, Creating new views, Creating and using Menus

UNIT-II	Starting with Application Coding	6 Hours

Introducing Intents, Introducing Adapters, Using Internet Resources, Selecting Location Provider, finding your location, creating map-based activities.

UNIT-III	Data Storage, retrieval and Sharing	7 Hours

File system in android, Internal storage and external storage, Saving and loading files, File Management tools

UNIT-IV	Introduction to SQLite	7 Hours

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Creating SQLite database, Editing Tasks with SQLite, Cursors and content values, Working with Android database		
UNIT-V	**Peer to peer to communication**	**7 Hours**
Accessing Telephony Hardware, Introducing Android Instant Messaging, GTalk Service : Using, binding & Making connection, Managing chat Sessions, Sending and receiving Data messages, Introducing SMS Using, sending & receiving SMS Messages		
UNIT-VI	**Accessing Android Hardware**	**5 Hours**
Audio, Video and Using the camera, Introducing Sensor Manager, Android Telephony, Using Bluetooth , Manage network and Wi-Fi connections		

Text Books :

T1. Professional Android™ Application Development Wrox Publications, Reto Meier
T2. Hello Android, Introducing Google"s Mobile Development Platform, Ed Burnette,Pragmatic Programmers,ISBN: 978-1-93435-617-3
T3. Sams teach yourself Android application development, Lauren Dercy and Shande Conder, Sams publishing

Reference Books:

R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

Web Links:
https://developer.android.com
http://www.tutorialspoint.com/android/

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Academic Year – 2025-2026 Semester – III

[MCA2102B-L]: Mobile Application Development Lab

Teaching Scheme:	Credit	Examination Scheme:
LAB:-04Hours/Week	LAB:02	ICSE : 60 Marks End Sem. Exam : 40Marks Total : 100 Marks

Course Objective:

1. To provide conceptual understanding of Mobile applications development
2. To acquire skills to develop Mobile applications.
3. To Designing and develop mobile applications using a chosen application development framework.
4. To evaluate alternative mobile frameworks, and contrast different programming platforms.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Demonstrate their understanding of the fundamentals of Android operating systems
CO2. Demonstrate their skills of using Android software development tools
CO3. Understand database activities like retrieval and Sharing.
CO4. Discover the need for working with SQLite and its operations.
CO5. Illustrate the Peer to peer to communication using instant messaging and GTalk services.
CO6. Illustrate the android wifi features and Accessing Android Hardware.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Students need to develop Mini Project on the basis of various concepts learned in the subject.

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Academic Year – 2025-2026 Semester – III

[MCA2102C-T]: Artificial Intelligence & Machine Learning

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To Learn and understand the concepts of artificial intelligence and Machine Learning
2. Introduce and define the meaning of Intelligence and explore various paradigms for Search and knowledge encoding in computer systems .
3. To appreciate supervised & unsupervised learning and their applications.
4. To appreciate the concepts of Generative AI.

Course Outcome:

On completion of the course, student will be able to

CO1: Understanding objective of Machine Learning .

CO2: Understanding basic Concept of Regression & Classification.

CO3: Describes about Frequent Pattern Mining

CO4: Demonstrate fundamental understanding of Artificial Intelligence (AI) and its foundations.CO5: Understanding the Concepts of Search Space Methods and Search Techniques.

CO6: Acquire Concept of Generative AI.

Course Contents

UNIT-I	Introduction : Machine Learning(ML)	6 Hours
Machine Learning Process- Preliminaries for Machine, Learning algorithms -Turning data into Probabilities and Statistics for Machine Learning- Probability theory Probability Distributions, Decision Theory.		
UNIT-II	**Regression & Classification**	**10 Hours**
Regression-Concept of Supervised and Unsupervised Machine Learning , Regression- Linear Regression, Multiple Linear Regression , Polynomial Regression. **Classification**- Introduction to classification , Evaluation of Classifiers , Linear Model- Logistic Regression , Support Vector Machine, Non-Linear Model- K-Nearest Neighbor (KNN)		
UNIT-III	**Frequent Pattern Mining**	**6 Hours**

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Frequent Pattern Mining – Basic Problem Definition, Mining Association Rules , Apriori Algorithm , FIM Algo (Frequent Item set Mining Algorithm), Frequent Pattern Growth Algorithm, ECLAT Algorithm,

UNIT-IV	Introduction to AI Fundamentals	6 Hours

Defining Artificial Intelligence, History of AI, AI task domains, Defining AI techniques, Turing Test, Intelligent Agents: Agents and Environments, Nature of Environments, Rationality, Performance Measures, Structure of Agents, Problem-Solving Agents.

UNIT-V	State space search and Heuristic Search Techniques	8 Hours

Defining problems as state space search, Problem Characteristics, Production Systems and characteristics, Breadth First Search , Depth First Search, Heuristic Search, Best First Search, A* Algorithm , Hill Climbing Algorithm.

UNIT-VI	Generative AI	6 Hours

Concept of Generative AI, Historical Context, Applications and Use Cases for Generative AI, Core Technologies, Machine Learning Models , Generative Algorithms, AI Text Generation Tools, Generative Audio & Video, Ethical Challenges.

References:

R1.Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, 3rd Edition, McGraw Hill

R2. Artificial Intelligence-A modern Approach, Stuart Russell and Peter Norvig, 3rd Edition,Pearson Education

R3. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.

R4. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Third Edition, 2014

R5. Rogers, Simon, and Mark Girolami. **A first course in machine learning**. CRC Press, 2015..

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Academic Year – 2025-2026 Semester – III

[MCA2102C-L]: Artificial Intelligence & Machine Learning Lab

Teaching Scheme:	Credit	Examination Scheme:
LAB: -04 Hours/Week	LAB: 02	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. To implement Array Indexing, Sorting and searching using NumPy
2. To implement data cleaning and analyzing using Pandas.
3. To gain knowledge of plotting and histogram using Matplotlib
4. To enhance problem solving skills using Heuristic Search Techniques
5. To implement various supervised and unsupervised Learning algorithms

Course Outcome:

On completion of the course, student will be able to–

CO1: Demonstrate basics of Python Libraries concepts

CO2: Demonstrate array indexing , array sorting , data cleaning, data analyzing operations and plotting operation using Python libraries.

CO3: Implement various supervised and unsupervised Learning algorithms using Python.

CO4: Implement various Heuristic Search algorithm.

CO5: Implement Generative Algorithms.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marksbased on parameters with appropriate weightage. Suggested parameters for overall assessment as wellas each Laboratory assignment assessment include- timely completion, performance, innovation,efficient codes, punctuality and neatness.

A. **List of Laboratory Assignments/Experiments (minimum -- to becovered)**

1. Write a NumPy to create above Series and then double the value in series and store inanother series named Series2
2. Write a NumPy program to reverse an array (first element becomes last).
3. Number of students in class 11 and 12 in three streams('Science', 'Commerce' and 'Humanities') are stored in two series objects c11 and c12. Write NumPy code to find totalnumber of students in class 11 and 12 , stream wise.

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4. Write a NumPy program to sort an along the first, last axis of an array.
5. Write a NumPy program to create a new shape to an array without changing its data.
6. Write a NumPy program to count the number of "P" in a given array, element-wise.
7. Write a Pandas program to change the order of index of a given series.
8.Write a Pandas program to calculate the number of characters in each word in a givenseries.
9.Write a Pandas program to select the rows where number of attempts in the examinationis less than 2 and score greater than 15.
10.Write a Pandas program to insert a given column at a specific column index in aDataFrame.
11.Write a Pandas program to count the missing values in a given DataFrame.
12. Predict Salary using Simple Linear Regression .
13. Predict Profit using Multiple Linear Regression.
14.Predict Salary using Polynomial Regression .
15.Predict Purchasing capability with % Accuracy of a person using Logistic Regression.
16.Predict Purchasing capability with % Accuracy of a using K-Nearest Neighbors (K-NN)Model.
17.Write a program to implement Best First Search traversal.
18.Write a program to implement using A* algorithm.
19.Use Heuristic Search Techniques to Implement Hill-Climbing Algorithms.
B.Develop a Mini project using concepts learnt in the theory and exercises listed in part A

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Academic Year – 2025-2026 Semester-III

[MCA2102D-T] : Framework - Spring Boot

Teaching Scheme:	Credit	Examination Scheme:
TH: - Hours/Week : 03	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1.To enable the students to understand the core principles of Spring Framework and use of dependency Injection.
2. Students will be able to develop Rest Api using testing tool Postman.
3. Students will be able to develop building web applications using Spring MVC and H2 Databases.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Apply the spring core concept to map and solve simple real world problem.
CO2. To develop web application using various dependencies .
CO3. To develop Rest api using testing tool springboot Developer tool **.**
CO4. To develop CURD application using JPA.
CO5. To develop CURD application using JDBC Template **.**
CO6. To develop robust web applications using Spring MVC with H2 database.

Course Contents

UNIT-I	Introduction to Spring Boot	7 Hours

Introduction to Spring and Springboot , Features and advantages of Spring Boot, Setting up the development environment, Developing simple application using Spring Initializer, Spring Boot Project Structure : Understanding the directory layout, Application entry point (@SpringBootApplication), Springboot AutoConfiguration.

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UNIT-II	Spring Boot Starter Projects	6 Hours
Core Spring Boot Concepts:@SpringBootApplication annotation Auto-configuration and component scanning, Application entry point (main method), Running a Spring Boot app from the IDE and command line. **Dependency Management**: Understanding pom.xml, Adding/removing dependencies via Spring Initializr or manually, Starter dependencies (e.g., spring-boot-starter-web, spring-boot-starter-data-jpa) SpringbootAnnotation, Overview of different Spring BootStarter Projects, Spring Boot Actuator& Spring Boot Developer Tool. **Spring Boot Web Basics**: Creating a simple REST controller with @RestController, Mapping endpoints with RequestMapping, @GetMapping, @PostMapping, etc.		
UNIT-III	**REST API**	**7 Hours**
Introduction to Spring Boot and REST API Concepts: Overview of RESTful APIs and HTTP methods (GET, POST, PUT, DELETE),Introduction to Spring Boot and its advantages in building REST APIs ,Setting up the Spring Boot application with Spring Initializr, Understanding the Spring Boot Project structure **Building Your First REST API**: Creating a simple REST controller with @RestController and @RequestMapping, Handling HTTP methods: @GetMapping, @PostMapping, @PutMapping, @DeleteMapping,Working with request parameters (@RequestParam, @PathVariable, @RequestBody) Postman usage to call and test REST API		
UNIT-IV	**JPA Concept**	**6 Hours**
Introduction to JPA and Spring Data JPA, **Setting Up the Project and Database**:Setting up Spring Boot project using Spring Initializr with Spring Data JPA dependency, Configuring a relational database (H2, MySQ, etc.),Configuring JPA properties like dialect, H2 console, etc.,Introduction to @Entity, @Table, and @Id annotations**.** **Spring Data JPA Repositories:** Introduction to JpaRepository and CrudRepository, Understanding repository methods (save(), findById(), findAll(), delete()),Creating custom repository methods by defining queries with method names, Example: findByName, findByAgeGreaterThan, Using @Query annotation for custom JPQL (Java Persistence Query Language) queries, Querying with JPQL and Native SQL, Transactions in JPA.		
UNIT-V	**Spring JdbcTemplate**	**6 Hours**
Introduction to JDBC Template, Benefits of using JDBC Template over raw JDBC, Simplifying database interactions with Spring JDBC Template, Key concepts: DataSource, JdbcTemplate, RowMapper, NamedParameter JdbcTemplate, CRUD Operations with JDBC Template, Executing SQL Queries with Named Parameters		
UNIT-VI	**Springboot with H2 database**	**6 Hours**
Introduction to H2 Database and Spring Boot: What is H2 Database?, Overview of H2 database (in-memory and embedded database), Benefits and use cases of H2 in Spring Boot applications , Configuring H2 Database in Spring Boot, Performing CRUD Operations with H2 Database.		

Text Books:

T1. Spring Boot in Action – Craig Wells
T2. Spring Microservices in Action – John Carmell

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Reference Books:

R1. Learning Spring Boot 2.0 – Stephani Maldini **R2.** Spring 5 Recipes: A Problem – Solution Approach

R3. Reactive Spring - JoshLong

R4. Spring Security in Action – Laurentiu Spilca

R5. Expert Spring MVC and Web Flow – Seth Ladd

WebLinks-

1) http://www.springboottutorial.com/spring-boot-auto-configuration
2) http://www.springboottutorial.com/spring-boot-vs-spring-mvc-vs-spring
3) http://www.springboottutorial.com/spring-boot-starter-projects
4) http://www.javatpoint.com/spring-vs-spring-boot-vs-spring-mvc

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Academic Year 2025-2026 Semester-III
[MCA2102D-L] : Framework - Spring Boot Lab

Teaching Scheme:	Credit	Examination Scheme:
		ICSE : 60 Marks
PR: -Hours/Week : 04	LAB: 02	End Sem.Exam: : 40 Marks
		Total : 100 Marks

Course Objective:

1. Describe the application development and configuration using spring Boot Framework and spring.
2. Learn the use of starter web and starter JPA for database access using spring and Postman usage to call and test REST API services
3. Learn JPA to handles most of the complexity of JDBC-based database access and object-relational mappings
4. Learn how Spring Integration enables lightweight messaging within Spring-based applications and supports integration with external systems.
5. To Learn Web MVC Framework for building web applications using Spring MVC and H2 Databases.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Learn to develop the spring Boot application and its configuration.
CO2. To Learn use of starter web and starter JPA for database access using spring.
CO3. Indicate the use Postman usage to call and test REST API services for database access.
CO4. Express proficiency in handling the most of the complexity of JDBC-based database access and object-relational mappings Using JPA Repository
CO5. Create a Spring-based applications using JDBC template .
CO6. Develop the web applications using Spring MVC and H2 Databases.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as wellas each Laboratory assignment assessment include- timely completion, performance, innovation, Efficient codes, punctuality and neatness. Evaluation of mini project based on presentation and work done.

A. List of Laboratory Assignments/Experiments (minimum -- to be covered)

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1.Creating a simple Spring Boot web applications
2.Managing Spring Boot beans, properties, and application configuration
3.Creating and consuming REST services
4.Demonstrate the Postman usage to call and test REST API services
5.Implementation of JDBC-based database access and object-relational mappings Using JPARepository
6.Creating Spring Boot web applications using spring web MVC
7.Perform the crud operations with spring MVC forms and spring boot H2 databases.
B. Mini Project using Spring Boot, Web MVC and H2 Databases

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Academic Year – 2025-2026 Semesters-III

[MCA2102E-T]: Framework REACT JS

Teaching Scheme:	Credit	Examination Scheme:
TH:-03 Hours/Week	TH:03	InSem.Evaluation: 20 Marks Mid Sem. Exam :30 Marks End Sem. Exam :50 Marks Total : 100 Marks

Course Objective:

1. Use a JavaScript package manager (either npm or Yarn)
2. The objective of this course is to help you learn the practical aspects of ReactJS and its ecosystem.
3. ReactJS will enable developers to develop large web applications which can change data, without reloading the page.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Students will learn about MVC architecture, what is React and difference between single and multiple page applications? You will also learn how to install React, make use of NPM packages and ES6 concepts.

CO2. Students will learn React core concepts like Components, State and Props. You will also learn how to build the application layout using forms and style sheets.

CO3. Students will learn to build an application using different route techniques and consume remote data by integrating API in React applications.

CO4. Students will learn how to integrate Redux with React. Also, you will understand the other key terminologies associated with Redux to build a web application.

CO5. Students you will learn how to write and handle the Asynchronous actions using Redux

CO6. Students will learn how to implement Class component- Stateful features within Functional components using React Hooks.

Course Contents

UNIT-I	Introduction to Web Development and React	5 Hours

ReactJS – Introduction, Need of ReactJS, Applications, ReactJS – Installation, ReactJS - Creating a React Application, ReactJS – Features, ReactJS - Advantages & Disadvantages, Architecture, Different Client-side Technologies,JavaScript, DOM.

UNIT-II	Components and Styling the Application Layout	6 Hours

React Elements, Render Function, Components, Class Component, Component Constructor, Functional Components, Multiple Components, Props, Props with Class

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based Component, Props with Function based Component, States, Component Lifecycle, React Events, React Page, Layout, React Forms, Different Form Concepts, Styling in React, Inline Styling		
UNIT-III	**Component-based Architecture**	**7 Hours**
Understanding the concept of components, Props and state management in React, Functional components vs. class components, Creating reusable components, Component lifecycle methods		
UNIT-IV	**Handling Navigation with Routes**	**7 Hours**
Routing, react-router, Features of react-router, Configuration of routing using react-router, Navigation using Links, 404 page (Not found Page), URL Parameters, Nested Routes, Implementing styles using NavLink, Application Programming Interface, Build a REST API using json-server, API consumption in React application using Fetch method, ReactJS - JSX		
UNIT-V	**React State Management using Redux**	**7 Hours**
ReactJS - State Management, Actions, reducers, and the store, Need of Redux, What is Redux?, Redux Architecture, Redux Action, Redux Reducers, Redux Store, Principles of Redux, Pros of Redux, Connecting React components to Redux, NPM Packages required..		
UNIT-VI	**React Hooks**	**5 Hours**
Understanding React hooks in depth, useState, useEffect, useContext, and more, Custom hooks and their usage, Best practices for using hooks, Applying learned concepts to real-world projects, Building a multi-page web application using React.		

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Academic Year – 2025-2026 Semesters-III

[MCA2102E-L]: Framework REACT JS Lab

Teaching Scheme:	Credit	Examination Scheme:
LAB :-04 Hours/Week	PR:02	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. Use a JavaScript package manager (either npm or Yarn)
2. The objective of this course is to help you learn the practical aspects of ReactJS and its ecosystem.
3. ReactJS will enable developers to develop large web applications which can change data, without reloading the page.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Students will learn about MVC architecture, what is React and difference between single and multiple page applications? You will also learn how to install React, make use of NPM packages and ES6 concepts.
CO2. Students will learn React core concepts like Components, State and Props. You will also learn how to build the application layout using forms and style sheets.
CO3. Students will learn to build an application using different route techniques and consume remote data by integrating API in React applications.
CO4. Students will learn how to integrate Redux with React. Also, you will understand the other key terminologies associated with Redux to build a web application.
CO5. Students you will learn how to write and handle the Asynchronous actions using Redux
CO6. Students will learn how to implement Class component- Stateful features within Functional components using React Hooks.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include-timely completion, performance, innovation, efficient codes, punctuality and neatness.

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A. List of Laboratory Assignments/ Experiments(minimum—to be covered)
1. Designing web pages using various DOM elements.
2. Implementation of Components and Styling the Application Layout
3. Implementation of Handling Navigation with Routes.
4. Implementation of various React State Management using Redux.
5. Implementation of Asynchronous Programming with Saga Middleware.
6. Implementation of React Hooks.
B. **Mini Project** Develop a Mini project using concepts learnt in the theory and exercises listed in part A

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Academic Year – 2025-2026 Semesters-III

[MCA2102F-T]: Data Science

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. An understanding of the data operations
2. An overview of simple statistical models and the basics of Machine Learning Techniques of Regression.
3. An understanding good practices of Data Science.
4. Skills in the use of tools such as python, IDE.
5. Understanding of the basics of the Supervised Learning.

Course Outcome:

On completion of the course, student will be able to–
CO1: Describe what Data Science is and the skill sets needed to be a data scientist
CO2: Explain the significance of exploratory data analysis (EDA) in data science.
CO3: Ability to learn the supervised learning, SVM.
CO4: Apply basic machine learning algorithms (Linear Regression)
CO5: Explore the Networks, Page Rank.
CO6: Apply Data Cleaning , Preparation and Visualization Techniques.

Course Contents

UNIT-I	Introduction	6 Hours

Introduction, Toolboxes: Python, fundamental libraries for data Scientists. Integrated development environment (IDE). Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and plotting.

UNIT-II	Descriptive Statistics & Data Preparation	7 Hours

Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score. Statistical Inference frequency approach, variability of estimates, hypothesis testing using confidence intervals, using p-values

UNIT-III	Supervised Learning	7 Hours

Supervised Learning: First step, Learning curves, Training-validation and test. Learning models generalities, Support Vector Machines, Random Forest. Examples

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UNIT-IV	Regression Analysis	6 Hours
Regression analysis, Regression: Linear Regression Simple linear regression, Multiple & Polynomial regression, Sparse model. Unsupervised Learning, Clustering, Similarity and Distances, Quality Measures of Clustering, Case Study.		
UNIT-V	**Network Analysis**	**6 Hours**
Network Analysis, Graphs, Social Networks, Centrality, Drawing centrality of Graphs, Page Rank, Ego-Networks, community Detection		
UNIT-VI	**DATA CLEANING, PREPARATION AND VISUALIZATION**	**6 Hours**
Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers-String, Manipulation: Vectorized String Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.		

Text Books:

R1. Introduction to Data Science a Python approach to concepts, Techniques and Applications, Igual, L. Seghi', S. Springer, ISBN:978-3-319-50016-4

R2. Data Analysis with Python A Modern Approach, David Taieb, Packt Publishing, ISBN-9781789950069

R3. Python Data Analysis, Second Ed., Armando Fandango, Packt Publishing, ISBN: 9781787127487

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Academic Year 2025-2026 Semesters-III
[MCA2102F-L]: Data Science Lab

Teaching Scheme:	Credit	Examination Scheme:
LAB: - 04 Hours/Week	PR: 03	ICSE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. An understanding of the data operations
2. An overview of simple statistical models and the basics of Machine Learning Techniques of Regression.
3. An understanding good practices of Data Science.
4. Skills in the use of tools such as python, IDE.
5. Understanding of the basics of the Supervised Learning.

Course Outcome:

On completion of the course, student will be able to–
CO1: Describe what Data Science is and the skill sets needed to be a data scientist
CO2: Explain the significance of exploratory data analysis (EDA) in data science.
CO3: Ability to learn the supervised learning, SVM.
CO4: Apply basic machine learning algorithms (Linear Regression)
CO5: Explore the Networks, Page Rank.
CO6: Apply Data Cleaning , Preparation and Visualization Techniques.

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marksbased on parameters with appropriate weightage. Suggested parameters for overall assessment as wellas each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1.Create Pandas Series and DataFrame from various inputs.

2. Import any CSV file to Pandas DataFrame and perform the following:
(a) Visualize the first and last 10 records
(b) Get the shape, index and column details
(c) Select/Delete the records(rows)/columns based on conditions.
(d) Perform ranking and sorting operations.

3.Write a Pandas program to change the order of index of a given series.

4.Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.

5.Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.

6.Computation on NumPy arrays using Universal Functions and Mathematical methods.

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7.Import a CSV file and perform various Statistical and Comparison operations on rows/columns
8.Load an image file and do crop and flip operation using NumPy Indexing.
9.Create Pandas Series and DataFrame from various inputs.
10. Import any CSV file to Pandas DataFrame and perform the following: (a) Handle missing data by detecting and dropping/ filling missing values. (b) Transform data using apply() and map() method. (c) Detect and filter outliers. (d) Perform Vectorized String operations on Pandas Series. (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.
11.Write a Pandas program to count the missing values in a given DataFrame.
12.Predict Salary using Simple Linear Regression .
13.Predict Profit using Multiple Linear Regression.
14.Predict Salary using Polynomial Regression .
15.Predict Purchasing capability with % Accuracy of a person using Logistic Regression.
16.Predict Purchasing capability with % Accuracy of a using K-Nearest Neighbors (K-NN) Model.
17.Write a program to implement Best First Search traversal.
18.Write a program to implement using A* algorithm.
19.Use Heuristic Search Techniques to Implement Hill-Climbing Algorithms.
B. **Mini Project** Develop a Mini project using concepts learnt in the theory and exercises listed in part A

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Academic Year- 2025-2026 Semester- III
[MCA2103T]: Emerging Software Testing and Tools

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 marks

Course Objective:

Students should be able to understand

1. To learn the overview of software testing concepts and its techniques.
2. To expose to various testing tools.
3. To understand and manage the effective testing process.

Course Outcome:

On completion of the course, student will be able to–

CO1: Design, implement and evaluate effective and efficient test cases to meet desired needs.

CO2: Choose appropriate testing techniques and tools for real time testing applications.

CO3: Write stubs and drivers code during unit, integration and system testing phase.

CO4: Design Test cases to test object-oriented application, web based systems and to test mobile apps.

CO5: Develop Test Plan document and produce Test Summary Reports in synchronization with the software development activities.

CO6: Apply Software Testing process models and to improve the quality of the software from maintenance point of view

Course Contents

UNIT-I	Introduction to Software Testing	05 Hours

Basics of Software Testing –Evolution - Myths and Facts-Goals -Definitions-Model for Software Testing-Software Testing as a Process- Software Testing Terminology and Methodology- Software Testing Life Cycle(STLC)- types of testing- testing in the development life-cycle

UNIT-II	Dynamic - Static and regression Testing	10 Hours

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Black-Box Testing Techniques - Requirement based testing - Boundary Value Analysis (BVA) - Equivalence Class Testing - State Table-Based Testing - Cause-Effect Graphing Based Testing - Decision Table-Based Testing - Error Guessing. White-Box Testing Techniques: Need - Logic Coverage Criteria - Basis Path. Testing - Graph Matrices - Loop Testing - Data Flow Testing - Mutation Testing.		
Testing principles-Verification and Validation – Test case design strategies. Inspections- Structured Walkthroughs- Technical Reviews- Validation Activities – Progressive vs. Regressive Testing - Regression Testing Produces Quality Software - Regression Testability - When is Regression Testing Done?- Types- Regression Testing Techniques.		
UNIT-III	**Levels of Testing**	**06 Hours**
Need for Levels of Testing - unit testing – Test Harness - Integration testing - system testing – Types of system test: Functional, performance, stress and configuration testing - Regression testing - Acceptance testing		
UNIT-IV	**Testing for SpecializedEnvironment**	**06 Hours**
Object oriented testing - Testing Web based System – Challenges in testing for Web based software –Mobile app testing –Testing Mobile Apps – Mobile test Automation and tools – Mobile Test and Launch strategies		
UNIT-V	**Managing the TestingProcess**	**05 Hours**
Test Organization-Structure of Testing Group-Test Planning- Detailed Test Design and Test Specifications-Definition of Software Metrics-Classification -Entities to be Measured-Size Metrics-Testing Metrics for Monitoring and Controlling the Testing Process-Estimating Testing Efforts-Cyclomatic Complexity Measures for Testing-Function Point Metrics for Testing-Test Point Analysis (TPA)		
UNIT-VI	**Quality Management**	**04 Hours**
Software Quality- Quality Costs- Benefits of Investment on Quality-Quality Control and Quality Assurance-Quality Management and Project Management-Quality Factors-Methods of Quality Management-SQA Models-Testing Process Maturity Models- Need for Test Process Maturity-Measurement and Improvement of Test Process- Test Process Maturity Models.		

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Text Books :

T1. Software Engineering – A practitioner's approach by Roger S. Pressman, 5th Edition, McGraw Hill

Reference:

R1. Naresh Chauhan, Software Testing Principles and Practices, 2013, 6th impression, Oxford University Press.

R2. Srinvasan Desikan, Software Testing principles and practices, 2012, 4th Edition, Pearson Publication R3. Ilene Burnstein, Practical Software Testing, 2013, 12th Edition, Springer Verlag International Edition, Springer, India.

R4. Software Engineering: A Precise Approach by Pankaj Jalote.

R5. Foundations of Software Testing by Aditya P. Mathur – Pearson Education custom edition 2000

R6. Testing Object Oriented Systems: models, patterns and tools, Robert V Binder, Addison Wesley, 1996

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Academic Year- 2025-2026 Semester- III
[MCA2103L]: Emerging Software Testing and Tools Lab

Teaching SchemeLAB :	Credit	Examination Scheme:
02 Hours / Week	PR: 01	ICSE : 30 Marks End Sem. Exam: 20 Marks Total : 50 Marks

Course Objective:

Students should be able to understand

1. To learn the overview of software testing concepts and its techniques.
2. To expose to various testing tools.
3. To understand and manage the effective testing process.

Course Outcome:

On completion of the course, student will be able to–

CO1: Design, implement and evaluate effective and efficient test cases to meet desired needs.

CO2: Choose appropriate testing techniques and tools for real time testing applications.

CO3: Write stubs and drivers code during unit, integration and system testing phase.

CO4: Design Test cases to test object-oriented application, web based systems and to test mobile apps.

CO5: Develop Test Plan document and produce Test Summary Reports in synchronization with thesoftware development activities.

CO6: Apply Software Testing process models and to improve the quality of the software from maintenancepoint of view

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marksbased on parameters with appropriate weightage. Suggested parameters for overall assessment as wellas each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1.Introduction to Selenium, Installation and Setup

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2.Selenium WebDriver Commands • Browser Commands • Navigation Commands • Web Element Commands • Find Element and Find Elements Command • Check Box & Radio Button Operations • Drop Down& Multiple Select Operations • Handle DynamicWeb Tables in Selenium Web driver Radio Button Operations • Drop Down& Multiple Select Operations • Handle DynamicWeb Tables in Selenium Web driver
3.Navigate back/forwards, get, refresh • I_ loading a page in current window / Newwindow • Move back and forward • Refresh Page
4.Interrogation: i. get window title ii. Current url iii. Page source
5.Locating web elements by Id, ClassName, LinkText, PartialLinkText, Name, TagName,CssSelector ,XPath
6.Inspecting elements in web browsers
7.Element interrogation
8.Manipulation: Click, submit, shift-click, special actions, type text, clear text, list boxselection and manipulation commands
9.Synchronization: Page load time out, implicit wait, explicit wait, Expected Conditionsclass
10.Window handling: size, position, handles, switch to
11.Screenshot/capture
12.Browser profile: set preferred language, changing user agent, enable extension
13.Cookies: reading, creating and deleting
14.Data Driven Testing; Use pre-stored data as input and expected output (possible dataSource file Excel)
15.Page Object Model: test scenario like shopping cart from login

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Academic Year – 2025-2026 Semester-III

[MCA2104T]: Principles and Practices of Management and Organizational Behavior

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To improve students understanding of Management & human behavior in organization and the ability to lead people to achieve more effectively toward increased organizational performance.
2. Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories.
3. Understand group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations.
4. Understand the organizational system, including organizational structures, culture, human resources, and change.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Describe various aspects of management.
CO2: Analyze the interactions between multiple aspects of management.
CO3: Understand individual behavior in organizations, including diversity, attitudes.
CO4: Justify the role of leadership qualities.
CO5: Ability to create group and team as per organization perspective.
CO6: Ability to handle stress and conflict situation in an organization.

Course Contents

UNIT-I	Management & Development of Management Thought	04 Hours

Meaning and Definition, The need, scope and process of Management, Managerial levels/Hierarchy, Managerial functions : Planning , Organizing , Staffing , Directing, Controlling, Types of managers & its Skill : Functional, Specialize, Generalize, Social responsibility of management, Evolution of Management: Introduction to Scientific Management by Taylor, Administrative Management by Fayol, Contribution of Peter Drucker.

UNIT-II	Decision Making	04 Hours

Introduction, Decision making environment- Decision making under certainty, under uncertainty, under risk, Types of Decision , decision making processes & Tools, Individual Vs Group decision making, Information Technology & Decision Making, Herbert Simon's Model & Principle of Rationality

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UNIT-III	Organization, Organizational Behavior & Organizational Culture	04 Hours
Definition and Need for Organization, Introduction to OB, Organizing Process, Organizational structure (Functional organization, Product Organization, Territorial Organization), Types of Corporate Culture.		
UNIT-IV	**Motivation and Leadership**	**08 Hours**
Concept of Motivation, Benefits to organization and Manager, Maslow's need Hierarchy theory, Definition, Nature, Qualities of Leader, Leader V/s Manager, Leadership Theories (Great Man Theory, Trait Theory, Behavioral Theories), Leadership Styles(Autocratic, Participative, Laissez faire or subordinate-centered ,Bureaucratic leadership, Transformational leadership, Transactional leadership)		
UNIT-V	**Group and Group Dynamics, Team Building**	**08 Hours**
Concept of Group, Effect & Characteristics of group, Types of groups, The Five-Stage Model of Group Development, Group Properties (Roles, Norms, Status, Size, and Cohesiveness), Concept of Team, Nature, Benefits from team, Types of Teams, Creating Effective Teams, Turning Individuals into Team Player, Concept of Team, Nature, Benefits from team, Types of Teams, Creating Effective Teams, Turning Individuals into Team Player.		
UNIT-VI	**Stress Management and Conflict Management**	**08 Hours**
Work stress: Meaning of stress, Sources of Stress, Types of stress, Stress Management strategies, Concept of Conflict, Functional versus Dysfunctional Conflict, Five stage Conflict Process, Types of Conflict (Task Conflict, Relationship Conflict, Process Conflict, Personality Conflict, Intergroup Conflict), Managing Conflict (Styles for Handling Dysfunctional Conflict, Third-PartyInterventions).		

Reference Books:

R1. Principles and Practices of Management- Shejwalkar
R2. Essential of management- 7th edition Koontz H &Weitrich H TMH
R3. Management Today Principles And Practices - Burton & Thakur
R4. Mgmt. Principles and Functions - Ivancevich & Gibson, Donnelly
R5. Organizational behavior Keith Davis
R6. Organizational behavior Fred Luthans TMH 10th edition
R7. Organizational behavior Dr. Ashwatthapa THI 7th edition
R8. Organizational Behaviour - Fred Luthans
R9. Organizational Behaviour - Stephen Robbins
R10. Organizational Behaviour - K. Aswathappa (8th revised edition)

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Academic Year – 2025-2026 Semester -III

[MCA2105T]: Cloud Computing

Teaching Scheme:	Credit	Examination Scheme:
TH : - 03Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Introduce the fundamental aspects of cloud computing
2. To understand the concept of Virtualization and design of cloud Services
3. Understanding the various cloud implementations and migrationtechniques
4. To understand the different aspects of Cloud Security
5. Demonstrate different features of cloud platforms used in Industry
6. Understand the different Application of Cloud Computing

Course Outcome:

After successful completion of the course, students will able to:

CO1. Elaborating the basic concepts of cloud computing and defining the basic terms
CO2. Identify the components of cloud computing for service perspective
CO3. Ability to understand various service delivery models of a cloud computingarchitecture.
CO4. In depth learning of security challenges and preventive measures in cloud computing
CO5. Explore the different cloud service Platforms.
CO6. Uses of cloud computing services in different fields

Course Contents

UNIT-I	Cloud Computing Fundamentals	06 Hours

Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Open Challenges-Cloud Interoperability and Standards-Scalability and Fault Tolerance.

UNIT-II	Cloud Virtualization	07 Hours

Introduction, Characteristics of Virtualized Environments, Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Para virtualization, VMware: Full Virtualization, Microsoft Hyper-V.

UNIT-III	Cloud Computing Architecture	06 Hours

Introduction, Cloud Reference Model-Architecture-Infrastructure / Hardware as a Service-Platformas a Service, Four Cloud Deployment Models- Public Clouds- Private Clouds- Hybrid Clouds, Community Clouds.

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jobs through 1 machine and 2 machines 3.4 Replacement of items that deteriorates with time 3.5 when money value is consider & Problems 3.6 Individuals and Group Replacement		
UNIT-IV	**Security in theCloud**	**05 Hours**
Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Monitoring, Data Security, Application Security, Identity Management and Access Control, Autonomic Security.		
UNIT-V	**Cloud Platforms inIndustry**	**07 Hours**
Amazon web services: Compute services, Storage services, Communication services, Google App Engine: Architecture and core concepts, Application life cycle, Creating Account on Google App Engine, configuring Google App Engine Services. Microsoft Azure: Azure core concepts, SQL Azure, Creating Account on Microsoft Azure and introduction to configuring MicrosoftAzure Services.		
UNIT-VI	**Cloud Applications**	**05 Hours**
Scientific Applications- Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRMand ERP, Social Networking, Media Applications		

Text Books :

T1. Dr. Kumar Saurabh, Cloud Computing Insight into New Era Infrastructure,Wiley India. Gautam Shroff,(2011)Enterprise Cloud Computing, Cambridge University Press

T2. Roger Jennings, Cloud Computing, Wiley India

Reference Books:

R1: Dr. Kumar Saurabh, Cloud Computing Insight into New Era Infrastructure, Wiley India. Gautam Shroff,(2011)Enterprise Cloud Computing, Cambridge University Press

R2: Roger Jennings, Cloud Computing, , Wiley India

R3: Rosenberg and Matheos, The Cloud at your service, Manning Publications

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Academic Year – 2025-2026 Semester – III

[MCA2106L]: Research Project Lab

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week: 06	PR: 06	ICSE : 120 Marks ESE : 60 Marks Total : 200 Marks

Course Contents

Students are encouraged to explore diverse areas such as software engineering, data science, cybersecurity, and artificial intelligence, fostering expertise that aligns with industry demands. Engaging in research not only enhances academic understanding but also cultivates practical skills in problem-solving, critical analysis, and project management. Students are encouraged to publish their research work in reputed journals/conferences

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Academic Year – 2025-2026 Semester – III

[HSCA2201T]: Universal Values & Ethics

Teaching Scheme:	Credit	Examination Scheme:
PR: -Hours/Week : 02	TH: 01	ICSE : 60 Marks ESE : 40 Marks Total : 100 Marks

Course Objective:

1. To help students to distinguish between values and skills and understand the need, basic guidelines, content and process of value education.
2. To help students to initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession.
3. To help students to understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly

Course Outcome:

After successful completion of the course, students will able to:

CO1: Relate foundational concepts of value education , self-exploration, happiness, prosperity, and the basic human aspirations.

CO2: Develop an understanding of human beings as an co-existence of self and body,

CO3: Evaluate the values in human relationships and their impact on societal harmony and nature

Course Contents

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UNIT-I	Introduction to value education	06 Hours
Understanding value education, self-exploration as the process for value education, happiness and prosperity, right understanding, relationship and physical facility, happiness and prosperity–current scenario, method to fulfill the basic human aspiration**.**		
UNIT-II	**Harmony in human being**	**06 Hours**
Understanding human being as a coexistence of the self and body, understanding the needs of self and body,the body as an instrument of the self, understanding activities of self, understanding harmony in the self, understanding the harmony in self with body, programs to fulfill the self-regulation and health.		
UNIT-III	**Harmony in family and society**	**06 Hours**
Harmony in family-a basic unit of human interaction, Human—human relationship, values inrelationships, understanding harmony in the society and vision for universal human order.		
UNIT-IV	**Harmony in nature and existence**	**06 Hours**
Understanding the harmony in nature, understanding the four orders of nature, realizing existence as co-existence at all levels and holistic perception of harmony in existence.		
UNIT-V	**Implications of the holistic understanding of harmony**	**06 Hours**
Natural acceptance of human values, definitiveness of ethical human conduct, basis for universal human order, competence in professional ethics, holistic technologies, production systems and management models: Typical case studies.		
Guidelines for Assessment		
In semester evaluation shall be based on continuous assessment based on timely submission of assignments		

Text Books:

T1. Human values and Professional Ethics by R R Gaur, R Sangal,G P Bagaria, ExcelBooks, New Delhi, 2010

T2.JeevanVidya: E k Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.

ReferenceBooks:

R1.Manav Vyavhar Darshan, ANagaraj, Jeevan Vidya Prakashan, Amarkantak,2001

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Academic Year – 2024-2025 Semester - IV

[MCA2107L]: Self Learning Course

Teaching Scheme: PR: -Hours/Week : 02	Credit PR: 02	Examination Scheme: ICSE : 60 Marks ESE : 40 Marks

Course Objective:

1. Certification of Students for knowledge and employability skills development.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Have a knowledge of different certification platforms/resources.

CO2. Getting the Certification from the professional organization such as MOOC.

CO3. NPTEL/SWAYAM/ Coursera, Udemy, Spoken Tutorials.

CO4. Enhance the Employability.

Course Contents

MOOC:

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions. The MOOC contains the organization like NPTEL/SWAYAM, Spoken Tutorials, Coursera, Udemy etc. These organizations contain many online course.

NPTEL/SWAYAM: It contains courses from different areas Such as Engineering, Management, Entrepreneurship etc. and soon. Under Computer engineering it contains courses like Scalable Data Science, Deep Learning, Cloud computing, Introduction to internet of things, Software Testing, Big Data Computing and So on.

Spoken Tutorials: It also contains the courses like courses from different areas Such as Engineering, Management etc. Under Computer engineering it contains courses like PHP, Python, R, CAD etc. and soon.

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Dean Academics

Dr. Santosh Bhosle
Director

Coursera: It contains courses from different areas Such as Engineering, Management, Entrepreneurship etc and soon. Under Computer engineering it contains courses like Java, C++, IOT, Linux, Block chain, Big Data etc. **Udemy:** It contains courses from different areas Such as Engineering, Management, Entrepreneurship etc. and soon. Under Computer engineering it contains courses like Java, C++, IOT, Linux, Block chain, Big Data etc.
Lab Contents
Guidelines for Instructor's Manual
Students are expected to choose one subject for certification. Self-learning Courses to be done as per the own choice from the different reputed organizations such as MOOC/ NPTEL/SWAYAM/Cousera/Udemy/Spoken Tutorials etc.
Guidelines for Assessment
Certificate to be submitted to the concern faculty.
References: **R1.** https://www.udemy.com **R2.** https://www.coursera.org **R3.** https://swayam.gov.in **R4.** https://spoken-tutorial.org/accounts/login/

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S. Y. - MCA

Academic Year – 2024-2025 Semester – IV

[MCA2108]: Industrial Internship

Teaching Scheme:	Credit PR: 12	Examination Scheme: ICSE : 200 Marks ESE : 200 Marks Total : 400 Marks

Course Objective:

1. Finding areas of interest in current IT domain.
2. Increasing awareness in technological development in chosen field.
3. Exploring the application areas
4. Showcase of Presentation skills

Course Outcome:

After successful completion of the course, students will able to:

CO1. Domain knowledge of the topic selected

CO2. Get an idea about documentation through SRS

CO3. Will get knowledge about system design and implementation

CO4. Will get the presentation knowledge

Course Contents

Students are expected to complete the project work on the area/ module assigned in the internship program at industry.

Project Evaluation

1. A students must develop the project in industry. However, during the examination, Each student must demonstrate the project individually
2. The student must submit a hard bound project report that must include the following : Introduction, System Requirement Specification, System Design, Implementation, Screen Shots, Conclusion & Future Enhancement, Bibliography
3. The Demonstration, Viva and Report Evaluation will be done for specified marks.

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