K.K. Wagh Institute of Engineering Education and Research, Nashik

Curriculum F.Y. MCA
w.e.f.: AY 2022-2023

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	In Sem	End Sem	CCE	TW/ TU	PR	Total	TH	TW /TU	PR	Total
MCA221001	DCC	Discrete Mathematics	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA221002	DCC	Data Structures and Algorithms	3	-	4	20	60	20	50	50	200	3	-	2	5
MCA221003	DCC	Data Communication and Network	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA221004	DCC	Web Technology	3	-	2	20	60	20	25	50	175	3	-	1	4
MCA221005	DCC	Software Engineering	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA221006	DCC	Python Programming	1	1	2	-	-	-	50*	-	50	1	1	1	3
MCA221007	LHSM	Business Communication	-	-	2	-	-	-	25	-	25	-	-	1	1
		Total	16	1	10	100	300	100	150	100	750	16	1	5	22

*50 Marks is divided as 25 marks for Term Work and 25 marks for Tutorial

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	In Sem	End Sem	CCE	TW/ TU	PR	Total	T H	TW / TU	PR	Total
MCA222001	DCC	Object Oriented Programming	4	-	4	20	60	20	50	50	200	4	-	2	6
MCA222002	DCC	Database Management System	3	-	4	20	60	20	50	50	200	3	-	2	5
MCA222003	DEC	Elective I A : Artificial Intelligence B: Information Retrieval C: Augmented Reality and Virtual Reality	3	-	2	20	60	20	25	-	125	3	-	1	4
MCA222004	DCC	Advanced Web Technology	3	-	2	20	60	20	25	-	125	3	-	1	4
MCA222005	DCC	UI/UX Design	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA222006	NC	Audit Course A : Entrepreneurship Management B: Foreign Language C: College to Corporate D: Environmental Studies	-	-	-	-	-	-	-	-	-	-	-	Grade	-
		Total	**16**	**-**	**12**	**100**	**300**	**100**	**150**	**100**	**750**	**16**	**-**	**6**	**22**

F. Y. M.C.A.
Pattern 2022   Semester: I
MCA221001: Discrete Mathematics

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week	03	InSem Exam: 20Marks Continuous Comprehensive Evaluation: 20Marks EndSem Exam: 60Marks

Prerequisite Courses, if any: Nil

Course Objectives:
1. To develop logical thinking and its application to computer science
2. To study use of set, relation and function models to solve practical problems
3. To learn fundamental counting principle , permutation and combinations
4. To introduce basic concepts of graphs and trees

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Understand discrete objects, relationship among them and Solve real world problems logically by using set and induction approaches.	02-Understand
CO2	Demonstrate an understanding of relations and functions	02-Understand
CO3	Apply counting principles to determine probabilities and logical reasoning to solve problems	03-Apply
CO4	Analyze problems in computer science using tree and graph	04-Analyze

COURSE CONTENTS

Unit I	Set Theory and Propositional Logic	(07hrs)	COs Mapped - CO1

Set Theory
Introduction: History of mathematics as related to discrete structure, motivations for discrete Structure, Sets: introduction, combination of sets, finite and infinite sets, uncountable infinite sets, Principle of inclusion/exclusion (addition principle)

Propositional Logic-Introduction, Propositional Equivalences, Application of Propositional Logic-Translating English Sentences, Proof by Mathematical Induction

Unit II	Relations and Function	(07hrs)	COs Mapped – CO2

Relations: Definitions, properties of binary relation, Applications of relation, Relation representation, equivalence relation, partial ordering relations, Hasse diagram, closure of relations, Warshalll's algorithm,
Functions: Subjective, Injective and Bijective functions, Inverse Functions and composition of functions, The Pigeonhole Principle

Unit III	Permutation and Combination	(07hrs)	COs Mapped – CO3

Permutations and Combinations: Rules of sum and products, counting principle, permutations, combinations, generations of permutations and combinations

Unit IV	Graph Theory	(08hrs)	COs Mapped – CO4

Graphs : Basic terminology, Types of graph, Graph representation, Graph isomorphism, paths and Circuits, shortest path in weighted graphs, Hamiltonian and Eulerian paths and circuits, Graph coloring, Case Study-Web Graph

Unit V	Trees	(07hrs)	COs Mapped - CO4

Trees : Introduction**,** rooted trees, path length in rooted trees, prefix codes and optimal prefix codes, binary search trees, tree traversals, spanning trees, minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree

Text Books

1. N. Biggs, "Discrete Mathematics", 3rd Edition, Oxford University Press, ISBN 0 –19 850717 –8.

 2. C. L. Liu, "Elements of Discrete Mathematics", TMH, ISBN 10:0-07-066913-9

Reference Books

1   Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw-Hill, ISBN 978-0- 07-288008-3, 7th Edition.

2   Sriram P & Steven S, "Computational Discrete Mathematics", Cambridge University Press, ISBN 13: 978-0-521-73311-3

3   J. Tremblay, Manohar R., "Discrete Mathematical Structures with application to Computer Science", Tata McGraw-Hill, 2002 ISBN 0-07-463113-6

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	-	-	-	-	2	-	1	-	-
CO2	2	3	2	1	-	-	-	1	-	-	-	-
CO3	1	3	2	1	1	-	-	-	-	-	-	-
CO4	2	2	3	2	1	2	-	-	-	1	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Open Book Test – 1 on unit 3 and 4	**10**
2	Quiz – 1 on unit 5	**05**
3	Assignments -1 on unit 1,2,3 Assignments -2 on unit 4,5	**05**

F. Y. M.C.A.
Pattern 2022   Semester: I
MCA221002: Data Structures and Algorithms

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week Practical : 04 hrs/week	03 02	InSem Exam: 20Marks Continuous Comprehensive Evaluation:20Marks EndSem Exam: 60Marks Termwork: 50Marks Practical Exam: 50Marks

Prerequisite Courses, if any: Nil

Course Objectives:
1. To study the representation, structural constraints, implementation and applications of basic data structures
2. To develop the ability to analyze algorithms
3. To learn linear and nonlinear data structures and their applications
4. To understand searching and sorting techniques and their applications
5. To study applications of Data Structure in solving real life problems

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Demonstrate use of sequential data structures - array and linked list	3 - Apply
CO2	Implement stack and queue data structures for real application	3 - Apply
CO3	Use nonlinear data structure for solving problems of various domain	3 - Apply
CO4	Compare various searching and sorting techniques	4 - Evaluate
CO5	Analyze algorithms using time and space complexity	4 - Evaluate

COURSE CONTENTS

Unit I	Introduction to Data Structures and Algorithms	08hrs	COs Mapped - CO1, CO5

Algorithms: Introduction to Algorithms, Analysis of Algorithms, Space complexity, Time complexity, Asymptotic notation- Big-O, Theta and Omega, standard measures of efficiency.

Introduction to data structures, Abstract Data types (ADT), Linear data structures using sequential organization: Concept of sequential organization, Concept of Linear data structures, arrays as ADT, Multidimensional arrays, Storage representations (row major and column major). Application of array in sparse matrix representation, addition and transpose

Unit II	Linked Lists	05hrs	COs Mapped - CO1, CO5

Concept of linked organization, singly linked list, doubly linked list, circular linked list and operations on it. Application of linked list for Representation and manipulations of polynomials

Unit III	Stacks and Queues	06hrs	COs Mapped – CO2, CO5

Concept of stack and queues as ADT, Implementation of stacks using sequential and linked

organization, linear queue, circular queue using sequential and linked organization, Priority Queue, Deque, Application of stack for expression conversion, evaluation, recursion and backtracking Application of queue in job scheduling

Unit IV	Trees and Graphs	06hrs	COs Mapped – CO3, CO5

Introduction, concepts and basic terminologies. Sequential & Linked representation of trees and graphs. Algorithm for tree and graph traversals, Applications of trees and graphs

Unit V	Searching and Sorting	05hrs	COs Mapped – CO4, CO5

Sequential, binary and Fibonacci search. General concepts: sort order, sort stability, efficiency and passes, Internal and external sorting, Bubble sort, Quick sort ,Merge sort, Heap sort

Text Books
1. Horowitz E., Sahani S., "Fundamentals of Data structures in C"
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
Reference Books
1. A. Aho, J. Hopcroft, J. Ulman, "Data Structures and Algorithms"‖, Pearson Education, 1998, ISBN-0-201-43578-0
2. G A V Pai, "Data Structures and Algorithms"‖, McGraw-Hill Companies, ISBN -9780070667266

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	2	1	-	-	-	-	1	-	-	-
CO2	3	1	2	1	-	-	-	-	1	-	-	-
CO3	3	1	2	1	-	-	-	-	1	-	-	1
CO4	3	2	2	2	-	-	1	-	1	-	-	1
CO5	3	2	1	2	-	-	1	-	-	-	-	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Open Book Test – 1 on unit 3 and 4	10
2	Quiz - 1 on unit 5	5
3	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	5

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write a program to represent sparse matrix using array and perform simple and fast transpose	**CO1**
2	Write a menu driven program to perform following operations on singly linked list: Create, Insert, Delete, reverse, search, count and Display	**CO1**
3	Write a menu driven program which will maintain a list of car models, their price, name of the manufacture, engine capacity etc. as a doubly linked list. The menu should make provisions for inserting information pertaining to new car models, delete obsolete models, update data such as price besides answering queries such as listing all car models within a price range specified by the client and listing all details given a car model	**CO1**
4	Write a program to implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix – Postfix)	**CO2**
5	Write a program to implement circular queue using arrays	**CO2**
6	Write a program to create binary tree. Find height of the tree and print leaf nodes. Find mirror image, print original and mirror image using level-wise printing	**CO3**
7	Write a program that reads a list of names and telephone numbers from user and insert into a BST tree. Once the tree has been built, present the user with a menu that allows him to search the list for a specified name, insert new name, delete an existing name or print the entire phone list.	**CO3**
8	Write a program to create graph, use the map of any city as the graph. Represent graph using adjacency list/adjacency matrix and perform Depth First Search and Breadth First Search.	**CO3**
9	Write a program to represent a graph of any city using adjacency matrix /adjacency list. Nodes should represent the various areas in the city and links should represent the distance between them. Find the shortest path of your college from your home using Dijkstra's algorithm	**CO3**
10	Write a program to create student database. Database contains different fields of student like Roll No, Name and percentage. Search a particular student according to roll number using binary search.	**CO4**
11	Write a program to arrange list of students to find out first ten toppers from a class using Bubble sort. (refer the student database given in assignment 10)	**CO4**
12	Write a program to implement Merge sort / Quick sort method	**CO4**

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-

Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

F. Y. M.C.A.			
Pattern 2022 Semester: I			
MCA221003: Data Communication and Network			
Teaching Scheme:		**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week		**03**	**InSem Exam: 20Marks** **Continuous Comprehensive** **Evaluation: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Nil

Course Objectives:
1. To understand the fundamental concepts of networking standards, protocols and technologies
2. To learn different techniques for framing, error control, flow control and routing
3. To learn different layer protocols in the protocol stacks

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Illustrate fundamental concepts of Computer Networks, architectures, protocols and technologies	1-Knowledge
CO2	Summarize the working and functions of data link layer	2-Understand
CO3	Compare the working of different routing protocols and mechanisms	3-Apply
CO4	Solve client-server applications using sockets	3-Apply
CO5	Describe role of application layer with its protocols	3-Apply

COURSE CONTENTS

Unit I	**Introduction**	**07hrs**	**COs Mapped - CO1**

Definition, Types of Networks: LAN, MAN and WAN, Wireless networks, Networks Software, Protocol, Design issues. Network Models: The OSI Reference Model, TCP/IP Model, Network Topologies, Types of Transmission Medium. Network Architectures: Client-Server, Peer To Peer, Hybrid. Network Devices: Bridge, Switch, Router, Gateway, Access Point. Line Coding Schemes: Manchester and Differential Manchester Encodings, Frequency Hopping (FHSS) and Direct Sequence Spread Spectrum (DSSS).

Unit II	**Data Link Layer**	**08hrs**	**COs Mapped - CO2**

Design Issues: Services to Network Layer, Framing. ARQ strategies: Error Detection and correction, Parity Bits, Hamming Codes (11/12-bits) and CRC. Flow Control Protocols: Unrestricted Simplex, Stop and Wait, Sliding Window Protocol. WAN Connectivity: PPP and HDLC.
MAC Sub layer: Multiple Access Protocols: Pure and Slotted ALOHA, CSMA, WDMA, CSMA/CD, CSMA/CA, Binary Exponential Back-off algorithm

Unit III	**Network Layer**	**07hrs**	**COs Mapped – CO3**

Functions of Network layer, Switching Techniques, IP Protocol: Classes of IP (Network addressing), IPv4 , IPv6, Network Address Translation, Sub-netting , CIDR. Network layer Protocols: ARP, RARP,

ICMP, IGMP. Network Routing and Algorithms: Static Routing, Dynamic Routing, Distance Vector Routing, Link State Routing, Path Vector. Routing Protocols: RIP, OSPF, BGP, MPLS. Routing in MANET: AODV, DSR, Mobile IP.

Unit IV	Transport Layer	07hrs	COs Mapped – CO4

Process to Process Delivery, Services, Socket Programming. Elements of Transport Layer Protocols: Addressing, Connection establishment, Connection release, Flow control and buffering, Multiplexing, Congestion Control. Transport Layer Protocols: TCP and UDP, SCTP, RTP, Congestion control and Quality of Service (QoS), Differentiated services, TCP and UDP for Wireless networks.

Unit V	Application Layer	07hrs	COs Mapped – CO5

Introduction: Client Server Paradigm: Communication using TCP and UDP, Peer to Peer Paradigm, Application Layer Protocols: DNS, FTP, TFTP, Web and HTTP, Web Caching, Email: SMTP, MIME, POP3, Webmail, DHCP, Network Management: SNMP.

Text Books

1. Fourauzan B. ,"Data Communications and Networking", 5th Edition, Tata McGraw-Hill, Publications, ISBN:0–07 – 058408 – 7
2. Andrew S. Tanenbaum, Computer Networks, 5th Edition, Pearson India, 2012.

Reference Books

1.Kurose, Ross, "Computer Networking a Top Down Approach Featuring the Internet", Pearson, ISBN-10: 0132856204

2. L. Peterson and B. Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan-Kaufmann, 2012

3. Douglas E. Comer & M.S Narayanan, "Computer Network & Internet", Pearson Education

4. William Stallings, "Cryptography and Network Security: Principles and Practice", 4th Edition

5. Pachghare V. K., "Cryptography and Information Security", 3rd Edition, PHI

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	1	2	2	1	-	-	-	-	1	1
CO2	1	1	1	1	1	-	1	-	-	1	-	-
CO3	2	1	2	1	2	-	-	-	-	-	-	1
CO4	1	2	1	2	2	-	-	-	1	-	1	1
CO5	1	2	-	-	1	1	2	1	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Class Test – 1 on unit 3	10
2	Group Presentation -1 on any suitable topic of the course	05
3	Assignment – 1 on unit 1,2,3 Assignment – 2 on unit 4,5	05

F. Y. M.C.A.
Pattern 2022 Semester: I
MCA221004: Web Technology

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week Practical : 02hrs/week	03 01	InSem Exam: 20Marks Continuous Comprehensive Evaluation: 20Marks EndSem Exam:60Marks TermWork: 25Marks Practical Exam: 50Marks

Prerequisite Courses, if any: Nil

Course Objectives:
1. To learn the fundamentals of web essentials and markup languages
2. To become familiar with the client side technologies-JavaScript in web development
3. To introduce XML concept in web application
4. To get familiar with JSON to the *code for creating JavaScript objects*

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Explain the fundamental programming skills required to design Web applications	2-Understand
CO2	Apply JavaScript concepts	3-Apply
CO3	*Differentiate between XML, HTML and JSON documents*	3-Apply
CO4	Demonstrate the concepts of server-side web applications using PHP	3-Apply
CO5	Implement web application using angular	3-Apply

COURSE CONTENTS

Unit I	Introduction	07hrs	COs Mapped - CO1

Introduction to Web Technology, Hypertext Markup Language and its components, HTML tags and attributes, HTML 5 and its essentials, HTML5- Next Generation of Web Development: Headings, paragraphs, line break, colors and fonts, links, frames, lists, tables, images and forms

Unit II	JavaScript	07hrs	COs Mapped – CO2

Exploring the features of JavaScript, Programming fundamentals of JavaScript: data types, control Structures: if..else, switch case, loop controls: for, while, for..in ,Functions and dialog boxes, JavaScript-Number Properties, JavaScript string properties, JavaScript-array properties

Unit III	XML and JSON	07hrs	COs Mapped – CO3 And CO4

Exploring XML, comparing XML with HTML, advantages and disadvantages, structure of XML documents, entity references, XML parser, Description of DTD

What is JSON and Working of JSON, Create a JSON File, JSON Documentation: Documenting a JSON element, acceptable values and element nesting, an alternative to indenting

Unit IV	PHP	07hrs	COs Mapped – CO4

Introduction to Web Development with PHP, The architecture of a web application, structure of PHP application, control statements, strings and numbers, arrays, functions, Design a database in PHP, use of SQL with MySQL database

Unit V	Fundamentals of Angular	08hrs	COs Mapped – CO5

Angular Application Architecture, use of NgModule, Angular Components, Angular Templates, Data Binding, Types of Data Binding, Modules Component Working, Directives, Structure Directives, Template Routing, Theme Implementation in Angular Framework, Angular Forms, Services, Inject Services, Angular Server Communication With Backend Server, Working of APIs (GET, POST, PUT, DELETE), Complete Web application In Angular Framework

Text Books

1. Marty Hall and Larry Brown, "Core Web Programming" 2nd Edition, Volume I and II, Pearson Education, 2001
2. HTML5 covers css3, Javascript, Xml, XHTML, Ajax, PHP and JQuery, Black Book, Dreamtech Press; 2nd edition
3. Fanis Prodromou, "Mastering Angular Reactive Forms: Build Solid Expertise in Reactive Forms using Form Control, Form Group, Form Array, Validators, Testing and more ... Real-World Use Cases", Bpb Publications, ISBN-10 : 9391030246

Reference Books

1. Jeffrey C. Jackson, "Web Technologies–A Computer Science Perspective", Pearson Education, 2006.
2. CSS - Definitive Guide. By Eric Meyer, Oreilly Publication
3. Ralph Moseley & M. T. Savaliya, "Developing Web Applications", Wiley publications, ISBN 13 : 9788126538676
4. Robin Nixon, "Learning PHP, Mysql and Javascript with JQuery, CSS & HTML5", O'REILLY, ISBN: 13:978-93-5213-015-3
5. DoguhanUluca , "Angular 8 for Enterprise-Ready Web Applications ", April 2020

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	1	-	3	2	1	1	1	1
CO2	3	3	1	-	1	-	2	2	-	1	-	1
CO3	2	2	2	-	1	-	1	2	-	1	-	1
CO4	3	3	3	1	3	2	1	2	-	1	-	1
CO5	3	1	1	-	1	-	1	2	1	1	-	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Micro Project - 1	**10**
2	Quiz – 1 on unit 4,5	**5**
3	Assignment – 1 on unit 1,2,3 Assignment – 2 on unit 4,5	**5**

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write an HTML code to display your CV on a web page	CO1
2	Design the following static web pages required for an online book store web site 1) HOME PAGE: The static home page must contain three frames 2) LOGIN PAGE 3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table 4) REGISTRATION PAGE	CO1
3	Write *JavaScript* to validate the following fields of the Registration page. 1. First Name (Name should contains alphabets and the length should not be less than 6 characters). 2. Password (Password should not be less than 6 characters length). 3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) 4. Mobile Number (Phone number should contain 10 digits only). 5. Last Name and Address (should not be Empty).	CO2
4	Write a program to design Cricket Scorecard website (Live score display) using XML AND JSON	CO3
5	Write a program to calculate Electricity bill using functions in PHP Conditions: • For first 50 units – Rs. 3.50/unit • For next 100 units – Rs. 4.00/unit • For next 100 units – Rs. 5.20/unit For units above 250 – Rs. 6.50/unit	CO4
6	Design and Implement Timer Application using angular JS, HTML, CSS	CO5

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3. Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory- Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

F. Y. M.C.A.	
Pattern 2022 Semester: I	
MCA221005: Software Engineering	

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 03 hrs/week	**03**	**In Sem Exam: 20 Marks** **Continuous Comprehensive Evaluation: 20 Marks** **End Sem Exam: 60 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:
1. To learn the Basic Principles of Software Engineering
2. To understand the Software Requirements Specification.
3. To understand the Software Configuration Management.
4. To learn Professional practices and ethics.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Identify process model for software development	1-Knowledge
CO2	Describe software requirements for a given application	1-Knowledge
CO3	Design software system	3-Apply
CO4	Apply software metrics to evaluate the software system performance	3-Apply
CO5	Apply software configuration management	3-Apply

COURSE CONTENTS

Unit I	**Introduction and Overview**	**07hrs**	**COs Mapped - CO1**

Introduction to Software Engineering, Types of Software, Software Processes, Software life cycle models: Waterfall, Incremental Process Model, Evolutionary Process models, Concurrent Models and An Agile view of Process, The Unified Process
Case Study: Agile Tools- JIRA

Unit II	**Software Requirements Engineering**	**07hrs**	**COs Mapped - CO2**

Requirements Engineering Tasks, Processes in the requirement engineering, Kano Diagram, Eliciting requirements, Collaborative Requirements Gathering, Usage Scenarios, Problem Analysis, Software Requirement and Specifications, Developing use cases, object oriented analysis, class-based modelling, behavioral and non-behavioral requirements, Software Prototyping
Case Study: Study SRS of Online Exam Portal/Management System

Unit III	**Design and Reliability Models**	**07hrs**	**COs Mapped – CO3**

Design Concepts, The Design Model, Pattern based Software Design, Software Architecture and Design, Architectural Styles, A Brief Taxonomy of Architectural Styles; Components based design and Database design. Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design,

Object Oriented Design, User Interface Design, Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation.

Unit IV	Software Metrics	07hrs	COs Mapped – CO4

Introduction to software metrics, Size metrics like LOC, Token count, Function Count, Data Structure Metrics, Information Flow metrics, Object oriented metrics, Use-case oriented metrics, Web Engineering Project Metrics, Analysis of metrics, Metrics for Maintenance and metrics for Source Code Defining Software Scope and checking feasibility, Resources Management, Reusable Software Resources, Environmental Resources, Software Project Estimation and Decomposition Techniques.

Unit V	Software Configuration Management and Ethics in Software Engineering	08hrs	COs Mapped – CO4, CO5.

Software Configuration Management: Software Configuration Management, The SCM repository, The SCM Process, Configuration Management for software system.
Leadership of Software Engineer: Different approaches to Leadership, Styles of Leadership, Emotional Intelligence. **Software Engineering Ethics:** Ethical Leadership, Common Ethical Dilemmas, Making Ethical Decisions, Codes of Ethics and Professional Practices.

Suggested Free Open Source Tools: CF Engine Configuration Tool, Puppet Configuration Tool

Text Books

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd edition, McGraw Hill Int. Ed., 1992.
2. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2001.

Reference Books

References Books
1. R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
2. P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
3. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
4. James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons
5. Sommerville, "Software Engineering ", Addison Wesley, 1999.
6. Waman S. Jawadekar, "Software Engineering, Principles and Practice", Tata McGraw Hill Education Pvt. Ltd. 2012.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3	2	3	-	-	-	-	-	-	3
CO2	3	3	-	2	-	-	-	-	-	-	-	3
CO3	3	2	3	-	-	-	-	-	-	-	-	3
CO4	3	3	-	3	-	3	3	3	-	-	-	2
CO5	3	3	2	2	3	-	-	-	-	-	-	3

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Case Study – 1 on unit 3 and 4	10
2	Seminar – 1 on unit 5	05
3	Assignment – 1 on unit 1,2,3 Assignment – 1 on unit 4,5	05

F. Y. M.C.A.
Pattern 2022   Semester: I
MCA221006: Python Programming

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 01 hr/week Practical : 02 hrs/week Tutorial : 01hr/week	01 01 01	TermWork: 25Marks Tutorial: 25Marks

Prerequisite Courses, if any: ---

Course Objectives:
  1. To acquire programming skills in core Python
  2. To understand decision-making and functions in python
  3. To explore libraries and database operations in python

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Illustrate basic programming constructs in python	1-Knowledge
CO2	Apply user defined functions and file handling methods in python	3-Apply
CO3	Apply data visualization and plotting techniques	3-Apply
CO4	Evaluate the data using appropriate python libraries	5- Evaluate

COURSE CONTENTS

Unit I	Basics of Python Programming	4hrs+4hrs Tutorial	COs Mapped - CO1, CO2…

Introduction: Features of Python, Installation, Interactive Shell, Program Structure and fundamentals of Python programming.
Variables, strings, functions, loops, and conditions in Python. The nuances of collection, lists, sets, dictionaries, conditions and branching.
Data in Python: Objects and classes in Python including reading and writing files, loading, working, and saving data with pandas.

Unit II	Python Libraries	4hrs+4hrs Tutorial	COs Mapped - CO1, CO2, CO4

Python Libraries-I: Implementation of multi-dimensional arrays in NumPy, Manipulation of DataFrames in pandas.
Python Libraries-II: Implementation of Scrapy Python Library for large scale web scrapping.

Unit III	Python for Data Visualization	4hrs+4hrs Tutorial	COs Mapped - CO3, CO4

Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three dimensional plotting – geographic data – data analysis using Scikit, statmodels and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh.

Text Books

1. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.
2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2013.

3. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, 1st Edition, 2013.

Reference Books

1. Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning, 1st Edition, 2011.
2. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly, 2nd Edition, 2015.
3. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1st Edition, 2017.
4. Tony Gaddis, "Starting out with Python", Pearson, 3rd Edition, 2014

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3	1	3	-	-	1	-	2	-	1
CO2	2	3	2	1	3	-	-	1	-	2	-	1
CO3	2	3	2	2	2	-	-	2	-	3	-	1
CO4	3	3	2	2	2	1	-	2	-	2	-	1

Guidelines for Continuous Assessment of Tutorial		
Sr. No.	Components for Continuous Assessment	Marks Allotted
1	Mini Project - 1	10
2	Tutorial assignment - 6	15

List of Tutorial Assignments		
Sr. No.	Title	CO Mapped
1	Case study for Data Preparation and processing	CO1
2	Assignment based on use of Libraries	CO2, CO4
3	Assignment based on Importing Packages	CO2, CO4
4	Plotting of graphs using Matplotlib	CO3, CO3
5	Use of package Scikit, Seaborn	CO3
6	Assignment based on use of Statmodels	CO3

**List of Laboratory Experiments / Assignments**
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Demonstrate program creation in Python through usage of appropriate constructs and OOPs concepts.	**CO1, CO2**
2	Apply the concepts of data structures and string functions in python program.	**CO3**
3	Apply the concepts of file handling and exception handling	**CO4**
4	Evaluate and visualize the data using appropriate python libraries.	**CO5**
5	Develop GUI based applications with database connectivity in Python.	**CO6**

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

F. Y. M.C.A.
Pattern 2022   Semester: I
MCA221007: Business Communication

Teaching Scheme:		**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week		**01**	**TermWork: 25Marks**

Prerequisite Courses, if any: -Nil

Course Objectives:
6. To facilitate holistic growth
7. To make the students aware, about the importance, the role and the content of business communication skills
8. To develop the ability of effective communication through individual and group activities
9. To expose students to right attitudinal and behavioral aspects and to build the same through various activities

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Express effectively through verbal/oral communication	3-Apply
CO2	Apply leadership and interpersonal skills.	3-Apply
CO3	Apply ethics and etiquettes in IT Profession	3-Apply
CO4	Write precise reports and technical documents	6-Create

COURSE CONTENTS			
Unit I	**Verbal and Nonverbal Communications**	**03hrs**	**COs Mapped - CO1**
planning, preparation, delivery and feedback and assessment of activities like: Public speaking, Group Discussions, Oral Presentation skills, Perfect interview, listening and observation skills, Body Language, Use of presentation graphics, Use of presentation aids, study of Communication Barriers		
Unit II	**Written Communications**	**03hrs**	**COs Mapped – CO4**
	Written Communications: Technical Writing – Technical reports, Project Proposals, Technical Articles, Technical Manuals, Newsletters. Official / Business Correspondence: Business Letters, Memos, Progress Reports, Minutes of Meeting, Event Reporting, Use of Style, Grammar and Vocabulary for effective Technical writing, Use of Tools, Guidelines for technical Writing and Publication		
Unit III	**Leadership and Interpersonal Communications**	**03hrs**	**COs Mapped – CO2,CO3**
	Leaders – their skills, roles, and responsibilities, Vision, Empowering, delegation, motivating others, organizational skills, Problem Solving and conflict management, team building, interpersonal skills. Organizing and conducting meetings, decision making, giving support		
Unit IV	**Ethics and Etiquettes**	**03hrs**	**COs Mapped – CO3**
	Business Ethics, Etiquettes in social as well as office settings, E-mail etiquettes, Telephone Etiquettes, and ethics as an IT Professional, Civic Sense		
Text Books			

1. Simon Sweeney, "English for Business Communication‖", Cambridge University Press, ISBN 13:978-0521754507

Reference Books

1. John Collin, "Perfect Presentation", Video Arts MARSHAL
2. Raman, Sharma, "Technical Communications", OXFORD. ISBN 0-19-566804-9
3. R Sharma, K. Mohan, "Business correspondence and Report writing", Tata McGraw-Hill ISBN 0-07-044555-9

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	3	1	-	3	1	3	3
CO2	-	-	-	-	-	3	1	-	3	1	3	3
CO3	-	-	-	-	-	3	1	-	3	1	3	3
CO4	-	-	-	-	-	3	1	-	3	1	3	3

List of Laboratory Experiments / Assignments

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	Students should select any one topic from following ideas and present: a. Book review. b. Biographical sketch. c. Any topic such as an inspirational story/personal values/beliefs/current topic	CO1,CO2, CO3
2	Students will present to a group from following ideas: a. Multimedia based oral presentation on any topic of choice (Business/Technical). b. Public speaking exercise in the form of debate or elocution on any topic of choice	CO1,CO2, CO3
3	Students will undergo two activities related to verbal/nonverbal skills from following: a. Appearing for mock personal interviews. b. Participating in Group Discussions on current affairs/social issues/ethics and etiquettes. c. Participating in Games, Role Playing exercises to highlight nonverbal skills	CO1,CO2, CO3
4	Students will submit two written technical documents from following: a. Project proposal. b. Product brochure. c. Literature survey on any one topic. d. User manual.	CO1,CO2, CO4
5	Students will submit one written business documents from following: a. A representative Official correspondence. b. Minutes of meeting. c. Work progress report	CO1,CO2, CO4
6	Students will participate in two activities from following: a. Team games for team building. b. Situational games for Role Playing as leaders, members. c. Organizing mock events. d. Conducting meetings	CO1,CO2, CO4

Guidelines for Laboratory Conduction

Multiple set of activity based assignments can be prepared and distributed among batches. Every student must be given adequate opportunity to participate actively in each activity. An exercise can be designed to allow multiple skills exposure for example a group task encouraging discussions, team building, value sharing, leadership and role play.

Guidelines for Student's Lab Journal

The student must prepare the journal in the form of report elaborating the activities performed. Students must submit the report of all conducted activities conducted. The brief guidelines for report preparations are as follows:
1. One activity report must be of maximum 3 pages;
2. Combined Report of all activities with cover pages, table of contents and certificate (signed by instructor) is to be submitted in hardcopy format only.
3. The report must contain:
- General information about the activity

- Define the purpose of the activity
- Summarize the process (methods) during the activities
- Describe what you learned (outcomes) during the activities as a student

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion of assignment, performance, punctuality, neatness, enthusiasm, participation and contribution in various activities- presentations, team activity, group discussion, Group exercises and interpersonal skills and similar other activities/assignments and Well presented, timely and complete report. Recommended Assessment and Weightage Parameters: (Attendance 30%, Assignments/activities-Active participation and proactive learning 50% and report 20%)

F. Y. M.C.A.	
Pattern 2022 Semester: II	
MCA222001: Object Oriented Programming	

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory : 04 hrs/week **Practical: 04 hrs/week**	**04** **02**	**InSem Exam: 20Marks** **Continuous Comprehensive** **Evaluation: 20Marks** **EndSem Exam: 60Marks** **Practical Exam: 50 Marks** **Termwork: 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:
10. To learn the syntax and semantics of the C++ and Java programming language.
11. To understand object-oriented paradigm such as data abstraction, encapsulation, inheritance, dynamic binding, and polymorphism.
12. To study Java SDK environment to create, debug and run simple Java programs.
13. To learn generic classes with C++ templates and how to use exception handling in C++ programs.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Illustrate the fundamental programming structures	2-Understand
CO2	Explain multithreading and exception handling	2-Understand
CO3	Demonstrate inheritance and polymorphism	3-Apply
CO4	Design Applet and java application using AWT	3-Apply
CO5	Implement class, interface and package	3-Apply

COURSE CONTENTS			
Unit I	**Basics of Programming**	**08hrs**	**COs Mapped - CO1 , CO5**
Concept of Object Oriented Programming, Difference between C & C++. OOP and it advantages. Standard input and standard output operators. Defining Classes in C++, data members & member function, instantiating and using Classes. Exception Handling, Constructor and Destructor - Using Constructors, Multiple Constructors and Initialization, Copy Constructor, Using Destructor to Destroy Instances			
Unit II	**Inheritance and Polymorphism**	**10hrs**	**COs Mapped - CO1, CO3, CO5**
Inheritance and Polymorphism - Defining Base and Derived Classes. Access Modifiers – private, public and protected. Overloading and Overriding, Operator Overloading (arithmetic operators only) Virtual Function & Polymorphism, Friend Function, Static Function, this pointer			
Unit III	**Java as Object Oriented Programming Language- Overview**	**08hrs**	**COs Mapped - CO1, CO5**
Features of Java, the Java Programming environment – (JDK, command line tools), Fundamental Programming structures in Java, Class, Object, Using predefined classes, Defining your own classes, constructors, static data member and methods, inner classes and anonymous classes, introduction to			

interface, its structure and implementation.

Unit IV	**Inheritance and Multithreading in Java**	**10hrs**	**COs Mapped - CO1, CO3,CO5**

Inheriting variables and methods in class, inheritance and constructors, abstract class and final class, object wrapper and autoboxing, inheritance and interfaces, introduction to packages, introduction to Multithreading, life cycle of a thread, thread states, thread properties, methods in Threads and Runnable, setting priority of threads, synchronization and inter thread communication, introduction to exception handling, predefined and user defined exceptions.

Unit V	**Applet ,AWT and Swing**	**12hrs**	**COs Mapped – CO4, CO5**

Introduction to applet, life cycle of applet, development and execution of simple applet, drawing simple geometry shapes in applet, Introduction to AWT, events, listeners, event handling methods, a small application to demonstrate use of controls – label, button, check box, text, radio button, layout. Introduction to swing, difference between swing and AWT, Japplet class, icons, small application using Jlablecontrol, JtextField, Jbutton, Jcheckbox, Jcombobox, Jradiobutton.

Text Books
1. Bjarne Stroustrup, "The C++ Programming language", 3rd Edition, Pearson Education. ISBN 9780201889543. 2. Deitel, "C++ How to Program", 4th Edition, Pearson Education, ISBN:81-297-0276-2
3. Steven Holzner et al. "Java 2 Programming", Black Book, Dreamtech Press.
4. H.M. Deitel, P.J. Deitel, "Java - How to Program", PHI Publication, 6th Edition

Reference Books
1. Robert Lafore, "Object-Oriented Programming in C++", 4th Edition, Sams Publishing, ISBN:0672323087 (ISBN 13: 9780672323089)
2. E. Balgurusamy, "Object oriented programming in C++ ", Tata McGraw Hill, ISBN: 9780071072830,
3. Herbert Schildt, "C++ The complete reference", 8th Ed., McGraw Hill Professional, ISBN:978-00-72226805
4. E. Balagurusamy, "Programming with Java – A Primer", Tata – McGraw-Hill Publication, 4th Edition, 2010.
5. Jim Keogh, "The Complete Reference- J2EE",TMH, ISBN 0-07-222710-9.
6. Bruce Eckel, "Thinking in Java", PHI Publication, ISBN 0-13-187248-6.
7. Patric Naughton, Michael Morrison, "The Java Handbook", McGraw Hill Publication, ISBN 007235447x

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	3	-	-	3	3	-	3	-	3	1
CO2	3	3	3	-	-	3	3	-	3	-	3	1
CO3	3	3	3	-	-	3	3	-	3	-	3	1
CO4	3	3	3	-	-	3	3	-	3	-	3	1
CO5	3	3	3	-	-	3	3	-	3	-	3	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Quiz – 1 on unit 3 and 4	5 Marks
2	Assignment – 1 on unit 1,2,3 Assignment – 1 on unit 4,5	5 Marks
3	Micro Project - 1	10 Marks

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Create a class named weather report that holds a daily weather report with data members day_of_month, hightemp, lowtemp,a mount_rain and amount_snow. Use different types of constructors to initialize the objects. Also include a function that prompts the user and sets values for each field so that you can override the default values. Write a menu driven program in C++ with options to enter data and generate monthly report that displays average of each attribute.	CO1, CO5

2	A Book shop maintains the inventory of books that are being sold at the shop. The list includes details such as title, author, publisher, price and available stock. Write a program in C++ which will have a class called books with suitable member functions for
	   i. Add
	   ii. Update
	   iii. Search a book
	   iv. Purchase a book (update the stock and display the total cost)
	   v. Record number of successful/unsuccessful transactions (use static data members to keep count of transactions) Use new operator in constructors to allocate memory space required.
		CO1, CO5

3	Design a base class with name, date of birth, blood group and another base class consisting of the data members such as height and weight. Design one more base class consisting of the insurance policy number and contact address. The derived class contains the data members' telephone numbers and driving license number. Write a menu driven program to carry out the following things: i. Build a master table ii. Display iii. Insert a new entry iv. Delete entry v. Edit vi. Search for a record	CO1, CO2, CO3,CO5

4	Design a class 'Complex 'with data members for real and imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operations of two complex numbers using operator overloading.
	   i. Addition and subtraction using friend functions
	   ii. Multiplication and division using member functions
		CO1, CO5

5	Write a program in Java with class Rectangle with the data fields width, length, area and colour. The length, width and area are of double type and colour is of string type. The methods are get_length(), get_width(), get_colour() and find_area(). Create two objects of Rectangle and compare their area and colour. If the area and colour both are the same for the objects then display "Matching Rectangles", otherwise display "Non-matching Rectangle".	CO1,CO5
6	Write a program in Java to implement a Calculator with simple arithmetic operations such as add, subtract, multiply, divide, factorial etc. using switch case and other simple java statements. The objective of this assignment is to learn Constants, Variables, and Data Types, Operators and Expressions, Decision making statements in Java.	CO1,CO5
7	Write a program in Java to create a player class. Inherit the classes Cricket_player, Football_player and Hockey_player from player class. The objective of this assignment is to learn the concepts of inheritance in Java.	CO1, CO3, CO5

8	Create an applet with three text Fields and four buttons add, subtract, multiply and divide. User will enter two values in the Text Fields. When any button is pressed, the corresponding operation is performed and the result is displayed in the third Text Fields.	CO1, CO4, CO5
9	Write a java program to create User defined exception to check the following conditions and throw the exception if the criterion does not meet. (a) User has age between 18 and 55 (b)User stays has income between Rs.50,000 – Rs. 1,00,000 per month (c) User stays in Pune/ Mumbai/ Bangalore / Chennai (d)User has 4-wheeler Accept age, Income, City, Vehicle from the user and check for the conditions mentioned above. If any of the condition not met then throw the exception.	CO1, CO2, CO5
10	Implement Java program to implement a base class consisting of the data members such as name of the student, roll number and subject. The derived class consists of the data members subject code, internal assessment and university examination marks. The program should have the facilities. i) Build a master table ii) List a table iii) Insert a new entry iv) Delete old entry v) Edit an entry vi) Search for a record. Use virtual functions.	CO1,CO3, CO5
11	Write a program to create multiple threads and demonstrate how two threads communicate with each other.	CO1,CO2, CO5
12	A Mini project in Java: A group of 4 students can develop a small application in Java.	CO1,CO2, CO3,CO4, CO5

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

F. Y. M.C.A.			
Pattern 2022 Semester: II			
MCA222002:Database Management System			
Teaching Scheme:		**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week **Practical : 04 hrs/week**		**03** **02**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam: 60Marks** **TermWork: -50Marks** **Practical Exam: 50Marks**

Prerequisite Courses, if any: Discrete Mathematics , Data Structures and Algorithms

Course Objectives:
14. To understand the fundamental concepts of database management system
15. To expose the students to SQL and PL/SQL
16. To learn normal forms and its importance
17. To introduce the concepts of Transaction Processing and to present the issues and techniques related to concurrency and recovery
18. To learn different Databases Architectures and No SQL databases

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Design ER-models for database application	3-Apply
CO2	Explain Transaction Management concepts in real-time application	2-Understand
CO3	Apply normalization to the relational database design	3-Apply
CO4	Implement database queries using SQL / PLSQL database languages	3-Apply
CO5	Analyze various database architectures and technologies	4-Analyze

COURSE CONTENTS			
Unit I	**Introduction To DBMS**	**07hrs**	**COs Mapped - CO1**
Introduction: Database Concepts, View of Data, Database System Architecture, Data Models, Database Design, ER Model: Entity, Attributes, Relationships, Constraints, Keys, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables, Relational Model: Database Schema, Keys, Relational Algebra			
Unit II	**SQL And PL/SQL**	**08hrs**	**COs Mapped - CO4**
SQL: Characteristics and advantages, SQL Data Types and Literals, DDL, DML, SQL Operators, Tables: Creating, Modifying, Deleting, Indexes, SQL DML Queries: SELECT Query and clauses, Database Modification using SQL Insert, Update and Delete Queries, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Views: Creating, Dropping, Updating using Views, PL/SQL**:** concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles and privileges			

Unit III	Relational Database Design	07hrs	COs Mapped – CO3

Relational Model: Basic concepts, Attributes and Domains, CODD's Rules
Relational Integrity: Domain, Referential Integrities, Enterprise Constraints
Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF

Unit IV	Database Transactions and Query Processing	07hrs	COs Mapped – CO2

Database Transactions:

Transaction concepts, ACID properties , Concept of Schedule, Conflict Serializability, View serializability , Cascadeless Schedules, Recoverable and Non recoverable Schedules, Concurrency Control: Lock-Based Protocols, Deadlock Handling, Timestamp-Based Protocols, Recovery methods : Shadow-Paging and Log-Based Recovery, Checkpoints
Query Processing : Query Processing, Query Optimization

Unit V	Advanced Databases	07hrs	COs Mapped – CO5

Database Architectures: Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture
Introduction: Parallel Databases, Distributed Databases, NoSQL Database, Architecture : Parallel Databases and Distributed Databases, Types and examples of NoSQL Database- Key value store, document store, graph, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL

Text Books

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Connally T, Begg C., "Database Systems", Pearson Education, ISBN 81-7808-861-4
3. Pramod J. Sadalage and Martin Fowler, "NoSQL Distilled", Addison Wesley, ISBN10: 0321826620, ISBN-13: 978-0321826626

Reference Books

1. Elmasri R. and S. Navathe, "Database Systems: Models, Languages, Design and Application Programming ", Pearson Education, 2013
2. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
3. Adam Fowler, "NoSQL For Dummies", John Wiley & Sons, ISBN-1118905628
4. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata Mc Graw Hill, 2010

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	2	1	-	-	-	-	1	-	-	1
CO2	3	2	-	-	3	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	1
CO4	3	2	2	-	-	-	-	-	1	-	-	-
CO5	3	2	2	1	3	-	-	-	1	-	-	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Open Book Test – 1 on unit 3 and 4	10
2	Quiz – 1 on unit 5	05
3	Assignments – 1 on unit 1,2,3 Assignments –2 on unit 4,5	05

	List of Laboratory Experiments / Assignments	
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Design any database with at least 4 entities and relationships between them. Draw suitable ER/EER diagram for the system.	CO1
2	Implement SQLDDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence, different constraints etc with suitable example	CO1,CO4, CO3
3	Write at least 10 SQL queries on the suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators(Arithmetic Operators, Logical Operators, Comparison Operator, Special Operator), functions (Number function, Aggregate Function, Character Function, Conversion Function, Date Function)	CO1,CO4, CO3
4	Implement Group By, Having clause and Order by clause with suitable example.	CO1,CO4, CO3
5	Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.	CO1,CO4, CO3
6	Study & Implementation of PL/SQL Create table student(Rollno, name, percentage). Insert suitable records in the table. Write a PL/SQL block of code for the following requirements:- • Accept rollno from user • Retrieve name and percentage of the students with rollno given by user. • calculate grade of that student as per follows Percentage>=80 then grade=A+ Percentage>=70 and <80 then grade=A Percentage>=60 and <70 then grade=B+ Percentage>=50 and <60 then grade=B Percentage>=40 and <50 then grade=C Percentage below 40 then grade = fail • print rollno, name, percentage and grade of student use appropriate control structure and exception handling	CO1,CO4, CO3
7	Write a PL/SQL block for following requirement and handle the exceptions. Roll no. of student will be entered by user. Attendance of roll no. entered by user will be checked in Student table. If attendance is less than 75%then display the message "Term not granted" and set the status in Student table as "D". Otherwise display message "Term granted" and set the status in Student table as "ND"	CO1,CO4, CO3

8	Study & Implementation of SQL Cursors. Consider following Employee schema. Employee(ID, Name, Age, Address, Salary) Write a PL/SQL block to increase salary of those employees having minimum salary by 5000. Display count of employees who got hike in salary. (use implicit cursor)	CO1,CO4, CO3

9	Write an explicit cursor to
	    i) display employee name, address ,salary along with age category (young or old)
	    ii) display count of young and old employees
		CO1,CO4, CO3

10	Write a Pl/SQL block to calculate gross salary on basis of basic salary. If DA is 40% of basic ,HRA is 20% of basic and PF deduction is 12% of basic salary. Gross salary=Basic Salary+DA+HRA-PF Accept basic salary from user and pass it to function, function will return gross salary	CO1,CO4, CO3
11	Create a transparent audit system for a table Employees using trigger. The system must keep track of the records that are being deleted or updated. When a record is deleted or modified in a employee table, employee id and and the date of operation are stored in the audit table, then the delete or update operation is allowed to go through	CO1,CO4, CO3
12	Study of Open Source NOSQL Database: MongoDB , Installation of MongoDB Create database in MongoDB , Create a collection named student , Insert 5 records with field (Student_ number, Name, Address , contact_number , subjects and percentage). 1) Insert 1 more document in collection with additional field of hobbies. 2) Display information of all students 3) Display details of students who have secured more than 70 percentage 4) Update percentage of student whose Student _ number is 5 5) Delete document of 'Rohan' from database 6) Demonstrate use of Save() Method	CO5
13	Design and Develop MongoDB Queries using aggregation and indexing with suitable example using MongoDB	CO5

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

F. Y. M.C.A.		
Pattern 2022 Semester: II		
MCA222003A: Elective I : Artificial Intelligence		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week **Practical : 02 hrs/week**	**03** **01**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam: 60Marks** **TermWork:25Marks -**

Prerequisite Courses, if any: Discrete Mathematics , Data Structure and Algorithms

Course Objectives:
19. To introduce basic principles, approaches and application of artificial intelligence.
20. To develop basic understanding of building block of artificial intelligence in terms of intelligent agents and knowledge representations.
21. To learn various types of search algorithm useful for artificial intelligence.
22. To develop understanding of planning and learning methods.
23. To understand Natural Language Processing and Expert systems.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Describe fundamental concepts of artificial intelligence	1-Knowledge
CO2	Apply basic principles to find solutions that require problem solving	3-Apply
CO3	Use the core concepts of knowledge for decision making methods	3-Apply
CO4	Use AI techniques for Logical Planning and explain learning methods	3-Apply
CO5	Analyze the structures and algorithms of a techniques related to language processing and explain expert systems	4-Analyze

<div align="center">COURSE CONTENTS</div>

Unit I	**Introduction to Artificial Intelligence**	**07hrs**	**COs Mapped - CO1**

Introduction to Intelligent systems, What is Artificial Intelligence, Foundations of AI, History of AI, Applications of AI, AI representation, Intelligent agent - Environment, characteristics, behaviour, concept of Rationality, structure of agents.

Unit II	**Search Techniques**	**08hrs**	**COs Mapped – CO2**

Solving Problems by Searching: Study and analysis of various searching algorithms. Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search, Depthlimited search, Iterative deepening depth-first search, Bidirectional search Informed (Heuristic) Search Strategies: Greedy best first search A* search: Minimizing the total estimated solution cost, Conditions for optimality: Admissibility and consistency, Optimality of A*, Heuristic Functions, Hill climbing, Constraint satisfaction problem.

Unit III	**Knowledge Representation**	**07hrs**	**COs Mapped – CO3**

Definition of knowledge, properties for knowledge representation system, predicate calculus-connectives, variables and quantification, Predicates and arguments, ISA hierarchy, Introduction to non-monotonic logic, TMS(truth maintenance system), Statistical and probabilistic reasoning

Unit IV	**Planning and Learning Methods**	**07hrs**	**COs Mapped – CO4**

Planning: Introduction : Search in planning, search vs planning, planning as problem solving, components of a planning, Forward planning, Nonlinear planning using constraint posting, Hierarchical planning**.**
Learning: Introduction, Learning methods, Introduction to Neural Networks, Working of a Neuron, The basic components of ANN, Issues related to Neural computation, Feedforward Networks, Backpropogation Algorithm, Applications of Neural Network**s**

Unit V	Natural language processing and Expert systems	**07hrs**	**COs Mapped – CO5**

Natural Language Processing: Language Models, Steps in NLP, Syntactic Analysis (Parsing), Semantic interpretation, Discourse and pragmatic Processing, Text Classification. Discourse and pragmatic Processing, Implementation aspects of Syntactic Analysis (Parsing)
Expert Systems: What is Expert system, Utilization and functionality of Expert system, Architecture of Expert system, Components of Expert system, Case study based on Expert System

Text Books

1.Peter and Norvig, "Artificial Intelligence: A Modern Approach", ISBN-0-13- 103805.

Reference Books

1. Elaine Rich, Kevin Knight and Nair, "Artificial Intelligence", ISBN-978-0-07- 008770-5, TMH.

2. Saroj Kausik, "Artificial Intelligence", ISBN:- 978-81-315-1099-5, Cengage Learning.

3. Padhy, "Artificial Intelligence and Intelligent Systems", Oxforfd University Press.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	2	-	-	-	-	1	-	-	-
CO2	3	3	2	2	2	-	1	-	1	-	-	1
CO3	3	3	-	2	-	-	-	-	1	-	-	-
CO4	3	3	2	3	2	-	1	-	1	-	-	1
CO5	3	1	2	2	3	-	1	-	1	-	-	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Group Presentation -1 on any suitable topic of the course	10
3	Quiz - 1 on unit 5	05
4	Assignment -1 on unit 1,2,3 Assignment -1 on unit 4,5	05

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Implement 3 missionaries and 3 cannibals problem depicting appropriate graph. Use A* algorithm.	**CO1**
2	Write a program to solve 8 Puzzle problem	**CO2**
3	Write a program to solve 4-Queen problem.	**CO3**
4	Write a program to solve Traveling Salesman problem.	**CO4**
5	Write a program to implement a Tic-Tac-Toe game	**CO5**
6	Implement any one of the following Expert System • Medical Diagnosis of 10 diseases based on adequate symptoms • Identifying birds of India based on characteristics	**CO5**

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

F. Y. M.C.A. **Pattern 2022 Semester: II** **MCA222003B: Elective I: Information Retrieval**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week **Practical: 02 hrs/week**	**03** **01**	**InSem Exam: 20Marks** **Continuous Comprehensive** **Evaluation: 20Marks** **EndSem Exam: 60Marks** **TermWork: 25Marks**
Prerequisite Courses, if any: Discrete Mathematics, Data Structure and Algorithm		

Course Objectives:
24. To Understand fundamentals of Information Retrieval
25. To learn performance evolution metric for IR
26. To study modeling and retrieval evaluation

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Describe the concept of Information retrieval	1-Remember
CO2	Define the standard methods for Web indexing and retrieval	1-Remember
CO3	Execute retrieval process of text and multimedia data	3-Apply
CO4	Demonstrate performance of any information retrieval system.	3-Apply

Unit I	**Introduction**	**07hrs**	**COs Mapped - CO1**

Introduction to Information Retrieval: Goals and history of IR, Components of an IR system**,** Early Developments – The IR Problem , Information versus Data Retrieval, The Software Architecture of the IR System, The nature of unstructured and semi-structured text, Inverted index and Boolean queries.

Unit II	**Text Indexing, Storage and Compression**	**07hrs**	**COs Mapped - CO1, CO3**

Text encoding: tokenization, stemming, stop words, phrases, index optimization. Index compression: lexicon compression and postings, Lists compression. Gap encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, merge sort, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

Unit III	**Modeling and Retrieval Evaluation**	**08hrs**	**COs Mapped – CO3**

Basic IR Models , Boolean Model ,TF-IDF (Term Frequency/Inverse Document Frequency) Weighting, Vector Model , Probabilistic Model , Latent Semantic Indexing Model , Neural Network Model , Retrieval Evaluation , Retrieval Metrics , Precision and Recall , Reference Collection , User-based Evaluation , Relevance Feedback and Query Expansion , Explicit Relevance Feedback.

Unit IV	**Web Mining**	**07hrs**	**COs Mapped – CO2**

Web Structure, content and usage mining, Web Crawling, Indexes, Search engines; spidering; metacrawlers; directed spidering; link analysis (e.g. hubs and authorities, Google PageRank), Information Extraction, spam filtering, XML retrieval.

Unit V	Performance metrics	07hrs	COs Mapped – CO4

Recall, precision, and F-measure; Evaluations on benchmark text collections, TREC Tracks. Social Networks : Social Web, Blogs, Wikis, Forums, Social Network analysis, Recommender systems, Information Filtering, Collaborative filtering and content-based recommendation of documents and products.

Text Books

1. Yates & Neto, "Modern Information Retrieval", Pearson Education, ISBN 81-297-0274-6 (2011).
2. David A. Grossman and Ophir Frieder "Information Retrieval: Algorithms and Heuristics", Second Edition, Springer 2004.

Reference Books

1. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze , "Introduction to Information Retrieval" (available online at http://nlp.stanford.edu/IR-book/)

2. Information Retrieval: Implementing and Evaluating Search Engines. Stefan Buttcher, Charlie Clarke, Gordon Cormack, MIT Press, 2010.

3. Search Engines: Information Retrieval in Practice. Bruce Croft, Donald Metzler, and Trevor Strohman, Pearson Education, 2009.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	-	-	1	1	-	1	1	-	-
CO2	1	2	1	-	2	-	-	1	-	1	1	-
CO3	2	3	1	1	1	1	-	1	-	-	-	-
CO4	1	2	1	2	-	-	-	1	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Group Presentation -1 on any suitable topic of the course	10
2	Quiz - 1 on unit 4 and 5	05
4	Assignment -1 on unit 1,2,3 Assignment -1 on unit 4,5	05

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Build a simple Boolean Retrieval model for a small test collection of documents.	CO1,CO3
2	Build a vector space-based information retrieval system.	CO1,CO3
3	Implement Domain specific Search Engine	CO1,CO2
4	Design and development of Question/Answering System	CO1,CO3
5	Perform Social media analytic	CO1,CO3, CO4

Guidelines for Laboratory Conduction

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1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

F. Y. M.C.A. **Pattern 2022 Semester: II** **MCA222003C: Elective I: Augmented Reality and Virtual Reality**	

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week Practical : 02hrs/week	03 01	InSem Exam: 20Marks Continuous Comprehensive Evaluation: 20Marks EndSem Exam:60Marks TermWork: 25Marks

Prerequisite Courses, if any:

Course Objectives:
27. To learn basics of computer graphics and animation
28. To understand how VR systems work and list the applications of VR
29. To understand how AR systems work and list the applications of AR
30. To learn AR and VR techniques

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Explain fundamentals of computer vision, computer graphics and human-computer interaction techniques related to VR/AR	2-Understand
CO2	Describe geometric modeling and virtual environment	2-Understand
CO3	Demonstrate virtual reality system using various types of hardware and software	3-Apply
CO4	Implement Virtual/Augmented Reality applications	3-Apply
CO5	Differentiate VR/AR technology	4-Analyze

COURSE CONTENTS			
Unit I	**Introduction to Computer Graphics**	08hrs	COs Mapped - CO1

Definition, Application, Pixel and Frame buffer, Raster and Random Scan display, display devices-CRT, Color CRT Monitors ,Conversion of line- DDA algorithm of line drawing, Circle drawing, Scan conversion of circle Bresenham's line and circle drawing algorithm Polygon Filling- Scan line polygon filling algorithm,
Animation – What is Animation, Uses of animation ,Types of Animation, Graphic Animation, Computer Animation-2D and 3D Animation, Basics Principles of animation, Techniques of animation

Unit II	**Introduction to Augmented Reality**	07hrs	COs Mapped – CO1

What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality
Augmented Reality Concepts- How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

Unit III	**Augmented Reality Techniques**	07hrs	COs Mapped – CO4,CO5

Marker-based approach- Introduction to marker-based tracking, types of markers, marker camera pose and identification, visual tracking, mathematical representation of matrix multiplication
Marker types- Template markers, 2D barcode markers, imperceptible markers.
Marker-less approach- Localization based augmentation, real world examples
Tracking methods- Visual tracking, feature based tracking, hybrid tracking, and initialisation and recovery

Unit IV	Introduction to Virtual Reality	07hrs	COs Mapped - CO1, CO2…

Concepts of Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality

Unit V	Representing the Virtual World	07hrs	COs Mapped - CO2, CO4

Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner. Output -- Visual /Auditory / Haptic Devices, Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Menu, Object Grasp.
 case study: GHOST (General Haptics Open Software Toolkit) software development toolkit

Text Books

1.Steven M. LaValle, "Virtual Reality", Cambridge University Press, 2016

2.William R Sherman andAlan B Craig, "Understanding Virtual Reality: Interface, Application and Design ", (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

3. Allan Fowler, "AR Game Development‖", 1st Edition, A press Publications, 2018, ISBN 978-1484236178

Reference Books

1. Alan B Craig, William R Sherman and Jeffrey D Will," Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.

2.Schmalstieg / Hollerer ,"Augmented Reality: Principles & Practice" , Pearson Education India; 1st edition (12 October 2016),ISBN-10: 9332578494

3.Burdea, G. C. and P. Coffet.," Virtual Reality Technology", 2nd Edition. Wiley-IEEE Press, 2003/2006

4.Alan B. Craig," Understanding Augmented Reality, Concepts and Applications", Morgan Kaufmann, 2013.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-		-	-	-
CO2	2	3	2	1	2	-	-	-	-	-	-	-
CO3	3	2	3	3	2	-	1	-	-	-	-	-
CO4	3	3	2	3	3	2	1	-	-	-	-	1
CO5	2	-	-	-	-	-	-	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Group Presentation -1 on any suitable topic of the course	10
2	Quiz - 1 on unit 5	05
3	Assignment -1 on unit 1,2,3 Assignment -1 on unit 4,5	05

	List of Laboratory Experiments / Assignments	
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Installation of Unity and Visual Studio, setting up Unity for VR development, understanding documentation of the same	CO3
2	Demonstration of the working of HTC Vive, Google Cardboard, Google Daydream and Samsung gear VR.	CO3
3	Develop a scene in Unity that includes: i. a cube, plane and sphere, apply transformations on the 3 game objects. ii. add a video and audio source	CO4
4	Develop a scene in Unity that includes a cube, plane and sphere. Create a new material and texture separately for three Game objects. Change the colour, material and texture of each Game object separately in the scene. Write a C# program in visual studio to change the colour and material/texture of the game objects dynamically on button click.	CO4
5	Develop a scene in Unity that includes a sphere and plane. Apply Rigid body component, material and Box collider to the game Objects. Write a C# program to grab and throw the sphere using VR controller.	CO4
6	Develop a simple UI(User interface) menu with images, canvas, sprites and button. Write a C# program to interact with UI menu through VR trigger button such that on each successful trigger interaction display a score on scene.	CO4
	Guidelines for Laboratory Conduction	

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor may also set one assignment or mini-project beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Use of DVD containing students programs maintained by course in-charge is highly encouraged.

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

<div align="center">

F. Y. M.C.A.
Pattern 2022   Semester: II
MCA222004: Advanced Web Technology

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Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week **Practical : 02 hrs/week**	**03** **01**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam:60Marks** **TermWork: 25Marks**

Prerequisite Courses, if any: Web Technology

Course Objectives:
1. To introduce the basic concepts of angular Js.
2. To become familiar with ReactJs and Node.js
3. To learn the Express.js for building the web applications
4. To introduce students with Firebase concepts and their real life uses

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Explain the feature of ECMAScript6	2-Understand
CO2	Identify the runtime environment that provides the foundation for creating and running an application	2-Understand
CO3	Write a single page, multi-page, or hybrid web applications using Express.js	3-Apply
CO4	Use ReactJs in real life scenario	3-Apply
CO5	Design modern database platforms that are reliable, practical, and scalable for application developers	3-Apply

<div align="center">

COURSE CONTENTS

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Unit I	ECMAScript 6	**07hrs**	**COs Mapped - CO1**

The let keyword, The const keyword, Arrow Functions, For/of, Map Objects, Set Objects, Classes, Promises, Default Parameters, Function Rest Parameter, Arrays methods , New Math Methods, New Number Properties, New Number Methods, New Global Methods, Object entries, JavaScript Modules

Unit II	**Node.js**	**07hrs**	**COs Mapped – CO2**

Introduction to Node.js: advantages of Node.js, traditional web server model, Node.js process model , setup Dev Environment,Node.js Modules: Functions, Buffer, Module, Module Types, Core Modules, Local Modules, Module.Exports, Node Package Manager, Built-in Modules, HTTP module, File Module, Events, creating web server

Unit III	**ExpressJS**	**08hrs**	**COs Mapped – CO3**

Basics of ExpressJS , Restful services, Introducing Express, Building your First Web Server, Nodemon, Environment Variables, Route Parameters,Handling HTTP GET Request, Handling HTTP POST

Request , Calling Endpoints Using Postman, Input Validations, Handling HTTP PUT Request, Handling HTTP DELETE Request ,Project- Build the Genres API

Unit IV	ReactJs	07hrs	COs Mapped – CO3

Work flow of ReactJs, Scope of ReactJs, Advantages of ReactJs, React Components overview, Containers and components, ReactJs Environment Setups, Best IDE for ReactJs, Write optimized code in ReactJs, ReactJs browser plugins overview, Use of ReactJs forms and UI

Unit V	*Database connectivity with MongoDB and Firebase*	07hrs	COs Mapped – CO5

MongoDB:
Basic Database Skills, Databse Drivers - Mongoose, MongoDB compass, MongoDB Concepts, MongoDB CRUD Operations
Firebase Basic:
Read Data, Write the data, Query the Data, Indexing Data, Firebase Development Environment and Authorization and Validation

TextBooks

1. Mehul Mohan, "Advanced Web Development With React"
2. Mario Casciaro, "Node.js Design Patterns: Design and implement production-grade Node.js applications using proven patterns and techniques", 3rd Edition, July 2020
3. AzatMardanov, "Express.js Guide: The Comprehensive Book on Express.js", November 2013

ReferenceBooks

1. Narayan Prusty, "Learning ECMAScript 6" eBook
2. Robin Wieruch, "The Road to Learn React", January 2018
3. Valentin Bojinov, "RESTful Web API Design with Node.js -: A step-by-step guide in the RESTful world of Node.js", January 2016
4. Rick L.. "Express.js: Guide Book on Web framework for Node.js", March 2016
5. Houssem Yahiaoui , "Firebase Cookbook", November 2017
6. Adam Bretz & Colin J Ihrig, "Full Stack Javascript Development with MEAN", SPD, ISBN-13: 978-0992461256

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	1	-	3	2	-	1	-	1
CO2	3	3	1	-	1	-	3	2	-	1	-	1
CO3	3	3	3	-	3	-	1	2	-	1	-	1
CO4	3	3	3	1	3	2	1	2	-	1	-	1
CO5	3	1	1	-	1	-	3	2	-	1	-	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
2	Open Book Test – 1 on unit 3 and 4	5
3	Quiz – 1 on unit 5	5
4	Assignment – 1 on unit 1,2,3 Assignment – 2 on unit 4,5	5

List of Laboratory Experiments / Assignments		
Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	Write a ECMAScript program that will return 1 if the array is sorted in ascending order, -1 if it is sorted in descending order or 0 if it is not sorted	CO1
2	Write a ECMAScript program to convert an asynchronous function to return a promise	CO1
3	Read and Write a file in Node.js	C2
4	Design a simple API using Express.js	CO3
5	Develop a Single Page Application as "College website" using ReactJs	CO4
6	Build a ToDo Application with React and MongoDB /Firebase	CO5

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor may also set one assignment or mini-project beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Use of DVD containing students programs maintained by course in-charge is highly encouraged.

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	30

Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks

F. Y. M.C.A.			
Pattern 2022 Semester: II			
MCA222005: UI/UX Design			
Teaching Scheme:		**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week		**03**	**InSem Exam: 20Marks** **Continuous Comprehensive** **Evaluation: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Software Engineering

Course Objectives:
31. To learn the factors that determine how people use technology
32. To study the usable software-enabled user-interfaces
33. To achieve efficient, effective, and safe interaction

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Describe user interface and user experience fundamentals	1-Knowledge
CO2	Recognize the quality of service and data visualization	2-Understand
CO3	Examine the data-driven UI designs and user experiences	4-Analyze
CO4	Test the usability of a design through usability evaluations	4-Analyze

COURSE CONTENTS

Unit I	Introduction and Overview	07hrs	COs Mapped - CO1

The Human –I/P, O/P channels, Human Memory, thinking, emotion, individual difference (diversity), human psychology
Introduction to User experience and user interaction-Usability of interactive systems, goals and measures, Universal Usability, Characteristics of graphical and web user interfaces, guidelines, principles and theories of good design, User Experience- Concept of UX, Trends in UX, 6 Stages used to UX design , Applications of UX design

Unit II	Design Process	08hrs	COs Mapped – CO1, CO4

Managing design processes, organizational design to support usability, pillars of design, development methodologies, Human considerations in Design, Usability- principles to support usability, assessment in the design process, Usability problems, practical measures of usability, objective measures of usability, golden rules of interface design, Evaluating Interface Design –Introduction, Expert reviews, Usability testing, Acceptance tests, Legal issues

Unit III	Interaction Styles	(07hrs)	COs Mapped – CO1,CO3

Direct manipulation and virtual environment, Develop system menus and navigation schemes-Structure of menus, Function of menus, content of menus, phrasing the menu, navigating menus, kinds of graphical menus, form fill-in and dialog boxes, command-organization , functionality, strategies and structure, naming and abbreviations, interaction devices, collaboration and social media participation

Unit IV	Implementation support and Screen Based Controls	07hrs	COs Mapped – CO3

Implementation support:

Support, training and learning, requirement of user support, element of windowing systems, Individual window design, multiple window design, command organization strategies command menus, natural languages in computer

Screen Based Controls:

Selection control-Radio buttons, check boxes, list boxes, Read-only controls- text boxes, Operable controls - buttons, slider, tab, scroll bar, clear text and messages, text for web pages, Graphics, icons and images, Presentation controls-Static text fields, Group boxes, column headings, tool tips, progress indicators

Unit V	Design Issues	07hrs	COs Mapped - CO2

Quality of service- Models of response time impacts, user productivity, variability in response time, Balancing function and fashion- Error messages, display design, web page design, window design, color, Information visualization – data type by task taxonomy, challenges for information visualization, societal and individual impact of user interface

Text Books

1. Creative Tim ,"Fundamentals of Creating a Great UI/UX", 1st Edition
2. Jon Yablonski, "Laws of UX: Using Psychology to Design Better Products & Services" , O'REILLY Publication
3. Jenifer Tidwell, Charles Brewer, Aynne Valencia "Designing Interfaces: Patterns for Effective Interaction Design", O'REILLY Publication

Reference Books

1. Shneiderman, Plaisant,Cohen, Jacobs, "Designing the User Interface-Strategies for Effective Human Computer Interaction", 5th Edition PEARSON Publication

2. Wilbert O. Galitz "The Essential Guide to User Interface Design", 2nd Edition, WILEY Publication

3. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, "Human–Computer Interaction, 3rd Edition,

4. Alan Coopen, "The essentials of interaction"

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	-	-	1	1	-	1	1	-	-
CO2	1	2	2	-	2	-	-	1	-	1	1	-
CO3	2	3	2	1	1	1	-	2	-	-	1	-
CO4	1	2	1	2	-	-	-	1	1	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Micro Project - 1	10
2	Quiz – on unit 4 and 5	05
3	Assignments -1 on unit 1,2,3 Assignments -1 on unit 4,5	05

F. Y. M.C.A.
Pattern 2022   Semester: II
MCA222006: Audit Course

Teaching Scheme:	Credit Scheme:	Examination Scheme:
-	-	**Grade**

Course Guidelines

In addition to credits, it is recommended that there should be audit course, in preferably in second semester in order to supplement students' knowledge and skills. Student will be awarded the master's degree if he/she earns specified total credit and clear the audit course specified in the curriculum. The student will be awarded grade as AP on successful completion of audit course. The student may opt for one of the audit course in second semester. List of options offered is provided. Each student has to choose one audit course from the list. Evaluation of audit course will be done at institute level itself. Method of conduction and method of assessment for audit courses are suggested.

Criteria

The student registered for audit course shall be awarded the grade A,B,C,D and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the institute and satisfactory performance and secured a passing grade in that audit course. No grade points are associated with grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself

Guidelines for Conduction and Assessment (Any one or more of following but not limited to)

- Lectures/ Guest Lectures
- Visits (Social/Field) and reports
- Demonstrations
- Surveys
- Mini-Project
- Hands on experience on focused topic

Course Guidelines for Assessment (Any one or more of following but not limited to)

- Written Test
- Quiz
- Demonstrations/ Practical Test
- Presentations, Publication and Report

Audit Course Options

Audit Course Code	Audit Course Title
MCA222006A	Entrepreneurship Management
MCA222006B	Foreign Language
MCA222006C	College to Corporate
MCA222006D	Environmental Studies

F. Y. M.C.A.
Pattern 2022   Semester: II
MCA222006A: Audit Course : Entrepreneurship Management

Teaching Scheme:		Credit Scheme:	Examination Scheme:
		-	Grade

Prerequisite Courses, if any: Nil

Course Objectives:
34. Gain knowledge of the context, concepts and process of entrepreneurship
35. Conceive and develop entrepreneurial opportunities
36. Determine the feasibility of a new business concept

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Define concepts of entrepreneurship development	1-Knowledge
CO2	Explain entrepreneurial venture	1-Knowledge
CO3	Identify entrepreneurial opportunity	1-Knowledge
CO4	Recognize roles of government in entrepreneurship development	1-Knowledge
CO5	Implement project management concepts	3-Apply

COURSE CONTENTS

Unit I	Entrepreneurial Development Perspective	-	COs Mapped - CO1

Content of Unit I

Concepts of Entrepreneurship Development, Evolution of the concept of Entrepreneur, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager,4. Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development

Unit II	Creating Entrepreneurial Venture	-	COs Mapped - CO1, CO2

Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Basic Government Procedures to be complied

Unit III	Project Management	-	COs Mapped - CO1, CO5

Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding

Unit IV	Entrepreneurship Development and Government	-	COs Mapped – CO4

Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available.

Role of following agencies in the Entrepreneurship Development - District Industries Centers (DIC),

Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB)

Unit V	Opportunity / Identification and Product Selection	-	COs Mapped - CO1, CO2,CO3

Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information

Text Books

1. Entrepreneurship: New Venture Creation - David H. Holt

2. Entrepreneurship - Hisrich Peters

3. The Culture of Entrepreneurship - Brigitte Berger

4. Project Management - K. Nagarajan

5. Dynamics of Entrepreneurship Development - Vasant Desai

6. Kaulgud, Aruna (2003). Entrepreneurship Management. Vikas Publishing House, Delhi. 38

Reference Books

1. Dr. P. C. Shejwalkar , " Entrepreneurship Development"

2. Shrinivas Pandit, "Thought Leaders "

3. Steven Brandt, " Entrepreneurship, 3rd Edition"

4. S. N. Chary, " Business Gurus Speak "

5. Gurmit Narula , "The Entrepreneurial Connection"

6. Taneja (2004), "Entrepreneurship", Galgotia Publishers

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	-	-	-	-	-	-	-	-	-	3
CO2	-	2	1	1	-	-	-	-	-	-	-	3
CO3	1	-	-	-	-	2	-	2	-	-	-	3
CO4	-	-	-	-	-	1	-	-	-	2	-	3
CO5	1	2	1	-	-	-	-	-	1	1	-	3

F. Y. M.C.A. (Autonomous Syllabus 2022 Course)			
Pattern 2022 Semester: II			
MCA222006B: Audit Course: Foreign Language			
Teaching Scheme:		**Credit Scheme:**	**Examination Scheme:**
-		-	Grade
Prerequisite Courses, if any: Nil			

Course Objectives:
37. To study the needs of an ever growing industry with respect to language support.
38. To get introduced to Japanese society and culture through language.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Define the concept of intercultural competence in Japanese language	1-Knowledge
CO2	Use the Hiragana of Japanese language	3-Apply
CO3	Explore the Japanese language cultural	3-Apply

COURSE CONTENTS

Unit I	**Introduction to Japanese Language**	-	**COs Mapped - CO1, CO2,CO3**

Introduction to Japanese Language. Hiragana basic Script, colours, Days of the week

Unit II	**Hiragana**	-	**COs Mapped - CO1, CO2,CO3**

Hiragana : modified Kana, double consonant, Letters combined with ya, yu, yo
Long vowels, Greetings and expressions

Unit III	**Self-Introduction**	-	**COs Mapped - CO1, CO2,CO3**

Self-Introduction, Introducing other person, Numbers, Months, Dates, Telephone numbers, Stating one's age.

Reference / Text Books

1. Minna No Nihongo, "Japanese for Everyone" Elementary Main Text book 1-1 (Indian Edition) Goyal Publishers and Distributors Pvt. Ltd.

Useful Links

1. http://www.tcs.com(http://www.tcs.com/news_events/press_releases/Pages/TCS-Inaugurates-Japancentric-Delivery-Center-Pune.aspx)
2. https://www.youtube.com/watch?v=GidU26YEQuc
3. https://nptel.ac.in/courses/121/104/121104005/

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	1	2	-	2	3	1	2
CO2	-	-	-	-	1	1	2	1	2	3	1	2
CO3	-	-	-	-	1	1	2	2	1	3	1	2

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

F. Y. M.C.A. (Autonomous Syllabus 2022 Course)
Pattern 2022   Semester: II
MCA222006C: Audit Course : College to Corporate

Teaching Scheme:		Credit Scheme:	Examination Scheme:	
-		-	Grade	

Prerequisite Courses, if any: Nil

Course Objectives:
1. Prepare the learner for the corporate world and perform better in the recruitment process

Course Outcomes: On completion of the course, students will be able to–

		Course Outcomes	Bloom's Level
	CO1	Describe the concept of financial accounting	1-Knowledge
	CO2	Demonstrate better performance in the recruitment process	3-Apply
	CO3	Use the soft skills in various domain	3-Apply
	CO4	Implement basic communication skills in real world	3-Apply

COURSE CONTENTS

Unit I	Overview of Financial Systems	-	COs Mapped - CO1

Financial Awareness Basics, Overview of Financial Systems, Introduction to financial markets

Unit II	Aptitude and Reasoning	-	COs Mapped – CO2

Coordinate geometry- Set theory, ratio, proportion, compound interest, Mensuration-speed, time , distance, Logical Reasoning

Unit III	Soft Skills	-	COs Mapped – CO3

Introduction to soft skills, Time Management, Presentation Skill, Resume Writing Skills, Group Discussion Skills

Unit IV	Professional Communication	-	COs Mapped - CO4

Introduction to Workplace Communication, Professional Communication and Conduct, Email Communication

Text Books

1. Joseph Grenny, Al Switzler, Ron McMillan, "Crucial Conversation" Publisher: McGraw-Hill Education
2. Anne Taylor, "Soft Skills Hard Results: A Practical Guide to People Skills for Analytical Leaders".

Reference Books

1. Dev Ramsey, "The Total Money Makeover"
2. R. S. Agrawal, "Quantitative Aptitude"

	Strength of CO-PO Mapping											
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	-	-	-	-	3	2	-	3	-		-
CO2	1	-	-	-	-	3	2	-	3	-	-	-
CO3	1	-	-	-	-	3	2	-	3	1	-	1
CO4	1	-	-	-	1	3	1	1	3	1	-	1

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

Teaching Scheme:		Credit Scheme:	Examination Scheme:
-		-	Grade

Prerequisite Courses, if any: Nil

Course Objectives:
2. Understand the importance of ecological balance for sustainable development.
3. Recognize the impacts of developmental activities and mitigation measures.
4. Understand and realize the multi-disciplinary nature of the environment, its components, and inter-relationship between man and environment
5. Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Identify different types of environmental pollution and control measures	1-Knowledge
CO2	Comprehend the importance of ecosystem and biodiversity	2-Understand
CO3	Compare the exploitation and utilization of conventional and non-conventional resources	2-Understand
CO4	Correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention	4-Analyze

COURSE CONTENTS

Unit I	**Introduction**	-	**COs Mapped - CO1**

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Function, Energy flow, Ecological succession, Forest, grassland, desert and aquatic ecosystems - Introduction, characteristic
features, structure and function. Balanced ecosystem Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment

Unit II	**Natural Resources**	-	**COs Mapped - CO1,CO3**

Natural Resources: Introduction, Renewable and non-renewable, Forest, water, mineral, food, energy and land resources, Individual and conservation of resources, Equitable use of resources.

Unit III	**Biodiversity**	-	**COs Mapped - CO1, CO2**

Genetic, Species and ecological diversity, Biogeographical classification of India, Value and hot spots, Biodiversity at global, national and local levels, India as mega biodiversity nation, Threats to biodiversity, Endangered and endemic species of India, Conservation of Biodiversity, Endangered and endemic species, Conservation of biodiversity.

Unit IV	**Environmental Pollution**	-	**COs Mapped -**

				CO1,CO4

Definition, Causes, effects and control measures of the pollution, Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. Global Environmental Issues: Population Growth, Urbanization, Land Management, Water and Waste Water Management, Role of Individual in Prevention of Pollution, Pollution case studies

Unit V	**Air Pollution & Automobile Pollution**	**-**	**COs Mapped - CO1,CO4**

Definition, Effects , Global Warming, Acid rain & Ozone layer depletion, controlling measures. Solid Waste Management, E - Waste Management & Biomedical Waste Management -Sources, Characteristics & Disposal methods.

Text Books

1.Bharucha, E., "Textbook of Environmental Studies", Universities Press (2005),ISBN-10:8173715408.

Reference Books

1. MahuaBasu, "Environmental Studies", Cambridge University Press, ISBN-978-1-07- 5317-3.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	-	-	-	-	-	1	-	-	1	1	-	-
CO3	-	-	-	-	-	1	-	-	1	1	1	-
CO4	-	-	-	-	-	1	-	-	1	1	-	1