Government College of Engineering, Karad				
First Year (Sem – I) Master of Computer Applications				
MC3101:Data Structure				
Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand basic data structures, their implementation and some of their standard applications
2.	Implement linear and non-linear Data Structures
3.	Perform various operations on Data Structures like searching, sorting and their complexities
4.	Analyse problem techniques, select appropriate Data Structure and design the Algorithms for the problem.

	Course Contents	CO	Hrs
Unit 1	**Basic Concepts**: Data, Data representation and types, Notation of Data Structure, Linear, and Non-linear Types data structure operations, Array, Records, and Pointers.	**CO1**	**(5)**
Unit 2	**Linked Lists**: Linked Representation in memory, traversing and searching a linked list, insertion and deletion from a linked list, singly and doubly linked list.	**CO1,CO2**	**(7)**
Unit 3	**Stacks and Queues**: Definitions, array representation of stacks, arithmetic expression: polish notation, application of stack, queues, DE queues, priority queues.	**CO1,CO2,CO4**	**(6)**
Unit 4	**Trees**: Binary trees, representing binary trees in memories, traversing binary trees, binary search trees, searching and inserting in binary trees, deleting in a binary search tree, path lengths, Huffman's algorithm, general trees	**CO2,CO3,CO4**	**(10)**
Unit 5	**Graphs**: Graph theory terminology, sequential representation of graphs, adjacency matrix, path matrix, Wars hall's algorithm for shortest path, Link representation of graphs, operation on graphs, traversing a graph	**CO2,CO3,CO4**	**(6)**
Unit 6	**Searching and sorting**: Searching techniques, sorting-insertion, selection, merge, radix sort, searching and data modification.	**CO3,CO4**	**(7)**

Text Books Author name, Book name, publisher, edition, isbn (Chapter no)

1.	Lipschutz, Data structure, MGH (Unit 1-6)
2.	A. Tanenbaum, Data and file structure, PHI (Unit 1-6)

Reference Books

1.	Tremblay, Data structure using C++
2.	M.T Goodrich, Data structure and algorithm using C++ ,Wiley India Education ISBN: 9788126512607

Useful Links

1.	http://www.nptel.ac.in
2.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	0	0	2	0	0	0	0	0	0	2	0	0
CO 2	3	1	2	0	0	0	0	0	0	0	0	0	1	2	0
CO 3	1	2	3	0	0	2	0	0	0	0	0	0	1	2	0
CO4	1	2	3	0	0	2	0	0	0	0	0	0	1	2	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	4	4	12
Apply	4	4	12
Analyse	4	4	12
Evaluate	4	4	12
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3102 : Mathematical Foundations of Computer Science

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand fundamental mathematical concepts and terminologies such as sets, Relations, functions
2.	Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.
3.	Relate matrices and linear transformations, compute Eigen values and Eigen vectors of linear transformations.
4.	Obtain a probability distribution of random variable in the given situation and to perform statistical inference in several circumstances.

	Course Contents	CO	Hrs
Unit 1	**Relations, Ordered Sets and Lattices:** Introduction Set theory Basics, Product Set, Relations, Pictorial Representatives of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations.	**CO1**	**(5)**
Unit 2	**Linear Equations**: Fields, Systems of Linear Equations, Matrices and Elementary Operations, Row-reduced Echelon Matrices, Matrix Multiplications, Invertible Matrices **Vector Spaces**: Vector Spaces, Subspaces, Bases and Dimensions, Coordinates.	**CO1,CO2**	**(6)**
Unit 3	**Linear Transformations:** The Algebra of Linear Transformations, Isomorphism, Representation of Transformations by Matrices, Eigenvalues, Eigen Vector, Orthogonality.	**CO2**	**(7)**
Unit 4	**Random Variables:** Discrete random variables: Random variables and their event spaces, Analysis of program MAX, Discrete random vectors, Independent random variables Continuous random variables: The exponential distribution, Reliability and failure rate, Functions of a random variables, Order statistics, Distribution of sum		
Unit 5	**Probability:** Introduction, Random Experiment, Sample Space, Event Probability of Event, Compound Event, Conditional Probability, Random Variable and Discrete Probability Distribution	**CO2, CO3**	**(10)**
Unit 6	**Statistical Inference**: Introduction, Parameter estimation, Hypothesis testing. **Regression and Analysis of Variance:** Introduction, Least-squares curve fitting, The coefficients of determination, and Confidence intervals in linear regression.	**CO2, CO3**	**(6)**
		CO2, CO3	**(6)**

Text Books

1.	Seymour Lipschutz and Marc Lars Lipson ,"Theory and Problems of Discrete Mathematics", Tata McGraw Hill Publications,3rd Edition(Unit No. 1)
2.	Kenneth Hoffman and Ray Kunze,"Linear Algebra", Pearson Publications,2nd edition(Unit No. 2,3)
3.	K. Trivedi, "Probability and Statistics with Reliability, Queuing, and Computer Science Applications", Wiley Publication,2nd edition(Unit No.4,5,6)

Reference Books

1.	Irwin and Marylees Miller,"John E. Freund's Mathematical Statistics with Applications", Pearson Publication, 8th edition.
2.	Michael Artin, "Algebra", Pearson Publication, 2nd edition.
3.	W. Feller, "An Introduction to Probability Theory and Its Applications", Wiley Publication, 2nd edition.

Useful Links

1.	http://www.nptel.ac.in/Discrete Mathematical Structure
2.	http://www.ocw.mit.edu/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	4	4	12
Apply	4	4	12
Analyse	4	4	12
Evaluate	4	4	12
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3103 : Software Engineering And Quality Assurance

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand and implement SDLC in their academic projects
2.	Implement any Software Process Model for building project
3.	Assess the quality of software product and apply the concepts in preparing the quality plan & documents.

	Course Contents	CO	Hrs
Unit 1	**Introduction to Software Engineering:** The Evolving Role of Software, A Generic View of process-Software Engineering, a process framework, Personal and Team Process Models, Process Technology, Product and Process. **Software Process Models:** Prescriptive Models, The Waterfall Models, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Agile View Of Process.	**CO1**	**(08)**
Unit 2	**Software Requirement Engineering:** A Bridge to Design And Construction, Requirement Engineering Task, Initiating The Requirement Engineering Process, Eliciting Requirement, Developing Use Cases, Building the Analysis Models, Negotiating Requirement, Validating Requirement.	**CO1,CO2**	**(06)**
Unit 3	**Software Design Engineering:** Design Process and Design Quality, Design Concepts, The Design Model, Pattern-Based Software Design, Software Architecture, Architectural Design, Mapping Data Flow into Software Architecture. **Software Modelling Component-Level Design:** What is Component, Designing Class-Based Components, Designing Conventional Components, The Golden Rules, User Interface Analysis and Design	**CO1,CO2**	**(08)**
Unit 4	**Software Testing:** Testing as an Engineering Activity, Software Testing Principles, Tester Role in Software Development, Artefacts of testing (Faults, errors, and Failures), Limitations ofTesting, Challenges in Software Testing, White Box And Black Box Testing.	**CO2, CO3**	**(06)**
Unit 5	**Software Quality:** Software Quality, Software Control, Quality Assurance, Quality Assurance Analyst, Quality Factor, Quality Management, Methods of Quality Management, Core components of Quality, Cost Aspect of Quality.	**CO2, CO3**	**(06)**
Unit 6	**Quality Assurance:** Quality Planning, Quality plan objectives, Planning process overview, Business Plan and Quality Plan, TQM (Total Quality Management), TQM concepts, Zero defect movement **Quality Standards:** Quality Models/Standards, Standards and guidelines, Types of Models, ISO Standards, CMMand CMMI, Six Sigma concepts, Quality Challenge, National Quality Awards.	**CO3**	**(06)**

Text Books

1.	Roger S. Pressman,"Software Engineering – a practitioner's approach", MGH.
2.	Yogesh Singh,"Software Testing", Cambridge University Press, 2011
3.	Sagar Naik, Piyu Tripathy," Software Testing and Quality Assurance", Wiley

Reference Books

1.	Shoomar,"Software Engineering",PHI
2.	Award," System Analysis and Design", TMH
3.	William Perry, "Effective methods for Software Testing", Wiley
4.	Milind Limaye,"Software Quality Assurance, McGraw-Hill Publication

Useful Links

1.	http://www.nptel.ac.in, Software Engineering,
2.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3

Assessment Pattern **(with revised Bloom's Taxonomy)**

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	4	4	12
Create	3	3	9
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3104: Python Programming

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate Proficiency in Python Programming Fundamentals.
2.	Effectively Utilize Data Collections and Control Structures in Python.
3.	Apply Object-Oriented Programming (OOP) Principles to Develop Python Applications.
4.	Master File Handling, I/O Operations, and Error Handling in Python.

	Course Contents	CO	Hrs
Unit 1	**Introduction to Python Programming Language:** Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions	**CO1**	**(06)**
Unit 2	**Data Collections and Language Component:** Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical, Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections.	**CO2**	**(08)**
Unit 3	**Object and Classes:** Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes	**CO2,CO3**	**(08)**
Unit 4	**Functions:** Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda,	**CO2,CO3,CO4**	**(06)**
Unit 5	**Modules**: Introduction, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function	**CO1,CO2**	**(06)**
Unit 6	**I/O and Error Handling In Python:** Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions	**CO4**	**(06)**

Text Books

1.	Eric Matthes ,"Python Crash Course" (2nd Edition), (Unit 1,2)
2.	Mark Lutz , "Learning Python" (5th Edition), (Unit 3)
3.	Al Sweigart , "Automate the Boring Stuff with Python" (2nd Edition), (Unit 4,5)
4.	John Zelle, "Python Programming: An Introduction to Computer Science" (3rd Edition), (Unit 6)

Reference Books

1.	Luciano Ramalho , "Fluent Python" (1st Edition)
2.	David Beazley and Brian K. Jones , "Python Cookbook" (3rd Edition)
3.	Brett Slatkin , "Effective Python: 59 Specific Ways to Write Better Python" (2nd Edition)
4.	Wes McKinney , "Python for Data Analysis" (2nd Edition)

Useful Links

1.	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
2.	https://www.youtube.com/watch?v=eWRfhZUzrAc

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3
CO 4	1	2	1	2	3	0	0	0	0	0	3	3	3	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	5	5	12
Apply	3	3	9
Analyse	4	4	12
Evaluate	4	4	10
Create	0	0	0
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3105 : Computer Networks

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Know about various protocols, models in Networks
2.	Understand Network hardware, Media Types (cables , Wireless)
3.	Design, implement and analyze simple computer networks.
4.	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN.

	Course Contents	CO	Hrs
Unit 1	**Introduction: Computer Network:** Overview of Computer Network, Network hardware and software, Reference model-OSI and TCP/IP and their comparison Network layer-network layer design issues, various routing Algorithms and congestion control algorithms, Networking layer in the internet.	**CO1**	**(08)**
Unit 2	**Transport layer:** The transport services, elements of transport protocols, internet transport protocols, ATM – AAL layer protocols, Performance issues.	**CO1,CO2**	**(08)**
Unit 3	**TCP/IP:** TCP/IP architecture, the internet protocols, IPv4 , Ipv6, DHCP and Mobile IP , internet routing protocols , multicast routing ,The network layer in ATM networks	**CO1,CO2,CO4**	**(08)**
Unit 4	**The Application layer:** Network security – principle of cryptography, secret key and public key algorithm, digital scanners, Domain name system-The DNS name space, resource records, name server, simple network management Protocol.	**CO2,CO3**	**(08)**
Unit 5	**SNMP model:** SNMP model, Electronic mail- architecture and services, Message formats and message transfer, email privacy Usenet news- user view of Usenet and Usenet implementation.	**CO2,CO3,CO4**	**(04)**
Unit 6	**Multimedia Information and Networking**: Lossless data compression, Video on Demand, Transmission in ATM network, Communication satellites. Additional issues related to security	**CO2,CO3**	**(04)**

Text Books

1.	Andrew. S. Tanenbaum, “Computer Networks”, PHI Publication,5th edition(Unit No. 1,2,3,4)
2.	Alberto,Leon –Garcia and Indrawidjaja, “Communication Networks- Fundamental concepts and key architectures”, Tata Mc-Graw Hill(Unit No. 5,6)

Reference Books

1.	Behrouz A. Forouzan “Data Communications and Networking ” , Tata McGraw Hill,2nd edition
2.	AchyutGodbole, “Data Communications and Networks”, Tata McGraw Hill,5th edition
3.	Craig Zacker, “Complete Reference Networking”, Tata McGraw Hill,8th edition

Useful Links

1.	http://www.nptel.ac.in

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	1	0	0	0	0	0	0	0	0	0	2	0	0
CO 2	3	2	2	0	0	0	0	0	0	0	0	0	2	2	0
CO 3	3	2	2	0	0	0	0	0	0	0	0	0	1	2	0
CO 4	2	3	3	1	0	0	0	0	0	0	1	2	2	1	1

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	4	4	12
Create	3	3	9
TOTAL	20	20	60

Government College of Engineering, Karad				
First Year (Sem – I) Master of Computer Applications				
MC 3106:Data Structure Lab				
Laboratory Scheme			**Examination Scheme**	
Practical	02 Hrs/week		ISE	50
Total Credits	01			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Analyse problem techniques, select appropriate Data Structure and design the Algorithms for the problem.
2.	Implement sequential and linked representation of linear data structure.
3.	Implement nonlinear data structure like tress and graph**.**
4.	Implement various operations on Data Structures like searching, sorting and their complexities

	List of Experiments	CO
Experiment 1	Program to implement array operations (Insert, Delete, Display)	**CO1**
Experiment 2	Program to sort an array using bubble sort.	**CO1**
Experiment 3	Program to search an element in array in array using linear & binary search.	**CO1,CO2**
Experiment 4	Program to implement linked list & its operations (Insert, Delete, Display).	**CO1,CO2**
Experiment 5	Program to search an element from linked list.	**CO2**
Experiment 6	Program to implement stack operation (PUSH, POP & Show).	**CO2**
Experiment 7	Program for conversion of infix expression to postfix expression.	**CO2**
Experiment 8	Program to evaluate postfix expression.	**CO2**
Experiment 9	Program to sort an array using quick sort method.	**CO2**
Experiment 10	Program to implement queue.	**CO2,CO3**
Experiment 11	Program for traversing of a binary tree (Preorder, Inorder, Postorder).	**CO2,CO3**
Experiment 12	Program to implement binary search tree.	**CO2,CO3**
Experiment 13	Program to sort an array using merge sort.	**CO2,CO3**
Experiment 14	Program to sort an array using insertion & selection sort.	**CO2,CO3**
Experiment 15	Program to sort an array using radix sort method.	**CO2,CO3**

List of Submission

1 .Total number of experiment based on syllabus: 10

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	1	2	0	1	0	0	0	0	0	0	1	2	1	0
CO 2	2	1	2	0	1	0	0	0	0	0	0	0	2	1	0
CO 3	2	1	1	0	0	0	0	0	0	0	0	0	2	1	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	8	
Understand	10	
Apply	8	
Analyse	6	
Evaluate	10	
Create	8	
TOTAL	50	

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3107: Python Programming Lab

Laboratory Scheme			Examination Scheme	
Practical	04 Hrs/week		ISE	25
			ESE	50
Total Credits	02			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate Proficiency in Python Programming Fundamentals.
2.	Effectively Utilize Data Collections and Control Structures in Python.
3.	Apply Object-Oriented Programming (OOP) Principles to Develop Python Applications.
4.	Master File Handling, I/O Operations, and Error Handling in Python.

	List of Experiments	CO
Experiment 1	Introduction to Python Programming and Python Data Types. Write a Python program that takes the user's name as input and prints a personalized greeting message like "Hello, [Name]! Welcome to the world of Python programming."	**CO1**
Experiment 2	Conditional Statements (if, if-else, if-elif-else, nested if, match-case). Write a Python program that prompts the user to enter their age. Based on the age entered, the program should display a message like "You are a child," "You are a teenager," "You are an adult," or "You are a senior citizen."	**CO2**
Experiment 3	Loops (while loop, for loop, nested loop). Write a Python program to generate the Fibonacci sequence up to a given number 'n' using a while loop.	**CO2**
Experiment 4	Collections (List, Tuple, Set, and Dictionary). Write a Python program to create a shopping list for a user. The program should allow the user to add items to the list, remove items, and display the final list of items.	**CO2**
Experiment 5	Functions. Write a Python function to check if a given string is a palindrome (reads the same backward as forwards).	**CO1**
Experiment 6	Modules/Libraries (NumPy, Pandas, etc). Write a Python program that uses NumPy to create a 2D array representing a student's marks in different subjects. The program should calculate the total marks and average marks for each student.	**CO2**
Experiment 7	Input/Output. Write a Python program that reads a text file containing a list of names and writes only the unique names to another file.	**CO4**
Experiment 8	File Handling. Write a Python program to read a CSV file containing information about students (roll number, name, marks) and calculate the average marks for all students.	**CO4**
Experiment 9	Exception Handling. Write a Python program that takes two numbers as input and performs division. Handle the ZeroDivisionError and ValueError gracefully, displaying appropriate error messages to the user.	**CO4**
Experiment 10	Class and Object. Create a Python class representing a bank account. The class should have methods to deposit money, withdraw money, and display the account balance.	**CO3**
Experiment 11	Inheritance. Create a Python class representing a shape and derive subclasses like rectangle, circle, and triangle. Each subclass should have methods to calculate its area and perimeter.	**CO3**
Experiment 12	Overloading, Overriding. Create a Python class representing a vehicle and demonstrate method overloading to handle different types of vehicles (car, bike, truck). Also, demonstrate method overriding to display unique features for each type of vehicle.	**CO3**

	List of Submission
	Total number of experiment based on syllabus: 10

Text Books

1.	Eric Matthes ,"Python Crash Course" (2nd Edition)
2.	Mark Lutz , "Learning Python" (5th Edition)
3.	Al Sweigart , "Automate the Boring Stuff with Python" (2nd Edition)
4.	John Zelle, "Python Programming: An Introduction to Computer Science" (3rd Edition)

Reference Books			
1.	Luciano Ramalho , "Fluent Python" (1st Edition)		
2.	David Beazley and Brian K. Jones , "Python Cookbook" (3rd Edition)		
3.	Brett Slatkin , "Effective Python: 59 Specific Ways to Write Better Python" (2nd Edition)		
4.	Wes McKinney , "Python for Data Analysis" (2nd Edition)		
Useful Links			
1.	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview		
2.	https://www.youtube.com/watch?v=eWRfhZUzrAc		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	1	1	0	1	2	2	1	0	1	1	2	2	0	1
CO 2	1	2	2	2	1	1	1	1	2	0	0	1	1	2	1
CO 3	0	1	1	1	2	0	2	2	1	2	0	0	1	1	1
CO 4	0	1	1	0	1	0	2	1	0	0	2	0	1	1	0

Assessment Pattern **(with revised Bloom's Taxonomy)**

Knowledge Level	ISE	ESE
Remember	4	8
Understand	5	10
Apply	4	8
Analyse	3	6
Evaluate	5	10
Create	4	8
TOTAL	25	50

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3108 : Web Programming & Scripting Lab

Teaching Scheme			Examination Scheme	
Practical	02 Hrs/week		ISE	25
Tutorial	01 Hrs/week		ESE	50
Total Credits	02			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Develop web pages using HTML, CSS, and JavaScript to create interactive and dynamic content.
2.	Utilize server-side scripting (e.g., PHP) to process user inputs and interact with databases.
3.	Implement AJAX techniques to enable seamless data exchange and improve user experience.
4.	Apply JQuery to simplify DOM manipulation and enhance the functionality of web applications.

	Course Contents	CO	Hrs
Unit 1	**Overview of Internet Technology:** Internet, web site, www, server, client, IP address, TCP/IPprotocol.WhatisHTML,History,creating,installing,viewing,andcheckingweb pages, TAGS, core HTMLelements. **HTML links and addressing:** What are URL's, linking in HTML, Anchor attributes, Image maps. **Presentation and layout:** Image preliminaries, HTML image basics, maps and buttons, Text colors and background: Fonts colors in HTML, color attributes for bod, background images. Forms posting methods (get, post)	**CO1**	**(06)**
Unit 2	**IntroductiontoScriptingLanguages:** ScriptingLanguages,Similaritiesanddifferencebetween Scripting Languages and Programming Languages, Advantages and Disadvantages of Scripting Langiages, Use of Scripting Languages. **JavaScript:**Introduction to JavaScript, Variables, Arrays, Loops, Conditional Statements, Functions, Cookies, DOM, Events, Object Oriented JavaScript, Internal & External JavaScript.	**CO 2**	**(08)**
Unit 3	**JQuery:** Introduction, Data Types, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions, Selectors, use of Selectors, DOM Attributes, DOM Traversing, CSS Methods, DOM Manipulation Methods, Effects	**CO 4**	**(06)**
Unit 4	**AJAX:** Ajax Basics, Ajax Components, DOM, Passing Data, Server Side Code, API, Ajax Applications, Ajax/Javascript Frameworks, Ajax Applications Client side validations, multi device compatibility, cross browser compatibility	**CO3**	**(06)**
Unit 5	.**PHP:**PHPBasicsyntax,PHPdataTypes,PHPVariables,PHPConstants,PHPExpressions,PHP Operators, PHP Control Structures, PHP Loops, PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array	**CO2, CO3**	**(10)**
Unit 6	**PHP Advanced:** Functions, PHP Functions, Syntax, Arguments, Variables, References, Pass by Value & Pass by references, Return Values, Variable Scope, PHP include(), PHP require(), PHP Form handling, PHP GET, PHP POST,PHP Form Validation, PHP Form Sanitization, PHP Cookie handling, PHP Session Handling, PHP Login Session, Managing user ACL, Strings and Patterns, Matching, Extracting, Searching Replacing, Formatting. (react/Angular)	**CO2**	**(10)**

Tutorials

A set of Tutorial/ problems based on above syllabus is to be submitted

Sample List of Experiments:		CO
Experiment 1	To create a web page using basic HTML tags.	**CO1**
Experiment 2	To create a web page using link, button & map tags.	**CO1**
Experiment 3	To create a web page using table & multimedia tags.	**CO1**
Experiment 4	To create a web page using css.	**CO1**
Experiment 5	Create a form, put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150, Mandatory fields, Input Numbers only).	**CO2**
Experiment 6	To create a text box and submit button of event handling submitform () using AJAX.	**CO2**
Experiment 7	Develop a dynamic webpage demonstrating the use of AJAX and APIs.	**CO2**

Experiment 8	Program to PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi- Dimensional Arrays, Array Functions.	**CO2**
Experiment 9	String Handling in PHP.	**CO2**
Experiment 10	Program to PHP Form handling, PHP GET, PHP POST, PHP FormValidation, PHP Form Sanitization.	**CO2,CO3**
List of Submission:		
	Minimum 10 experiments to be performed and evaluated Journal.	

Text Books	
1.	Jon Duckett ,"Web Design with HTML, CSS, JavaScript and jQuery", Wiley Publication,2014
2.	Lynn Beighley and Michael Morrison ,"Head First PHP and MySQL" , O'Reilly Publication,2011
3.	Eric Matthews ,"Python Crash Course ", 3rd edition, No Starch Press
Reference Books	
1.	DT Editorial Services ,"HTML5,BlackBook(CoversCSS3,JavaScript,XML,XHTML,AJAX,PHP,jQuery)", 2nd edition, Dreamtech Press.
2.	Alan Forbes ,"The Joy of PHP: A Beginner's Guide", 2nd edition,2015
Useful Links	
1.	https://nptel.ac.in/courses/106105084/25
2.	https://nptel.ac.in/courses/106105084/13
3.	https://nptel.ac.in/courses/117106113/34

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3
CO 4	1	2	1	2	3	0	0	0	0	0	3	3	3	2	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	4	8
Understand	4	8
Apply	5	10
Analyse	4	8
Evaluate	4	8
Create	4	8
TOTAL	25	50

Government College of Engineering, Karad				
First Year (Sem – I) Master of Computer Applications				
MC3109 : Seminar				
Teaching Scheme			**Examination Scheme**	
Tutorials	01 Hrs/week		ISE	25
Total Credits	01			

Course Outcomes (CO)	
At the end of this course, the students will be able to:	
1.	Develop and support a relevant and informed thesis, or point of view, that is appropriate for its audience, purpose, discipline, and theme.
2.	Demonstrate effective writing skills and processes by employing the rhetorical techniques of academic writing, including invention, research, critical analysis and evaluation, and revision.
3.	Incorporate and document appropriate sources in accordance with the formatting style proper for the discipline and effectively utilize the conventions of standard written English.

	Course Contents	**CO**
	The aim of the seminar is to make the students study something extra other than curriculum. They are expected to go through the latest trend pertaining to computer and allied fields and deliver the seminar by preparing report. The other important aim of the seminar is to encourage and develop the faculties of personality, aptitude and knowledge of the students.	**CO1,CO2,CO3**

Tutorials	
1.	Seminar presentation and report writing by individual student.

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	0	0	0	2	3	0	0	0	0	2	3	3	3	1	2
CO 2	0	0	0	2	3	0	0	0	0	2	3	3	3	2	3
CO 3	0	0	0	1	3	0	0	0	0	1	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	2	-
Understand	4	-
Apply	6	-
Analyse	10	-
Evaluate	12	-
Create	25	-
TOTAL	50	-

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3110 : Soft Skills & Business Communication

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		ISE	25
Total Credits	01			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Master Effective Written Communication, Including Emails, Letters, and Stories/Blogs, with Proper Grammar and Vocabulary Usage.
2.	Demonstrate Enhanced Language Proficiency in Grammar, Phonics, Syllables, and Tenses for Confident Communication.
3.	Develop Managerial Skills, Leadership, Team Management, and Aptitude skills, Understand Corporate Expectations for Employability.
4.	Cultivate Strong Verbal Communication Skills through Group Discussions, JAM, Role Plays, and Debates for Effective Interaction

	Course Contents	CO	Hrs
Unit 1	**Learning the fundamentals of grammar** Module-I: Phonics & Syllable, Root words, Module-II:Parts of Speech Module-III:Tense	**CO1,CO2**	**(08)**
Unit 2	**Writing Skills** Module-I: Email Module-II: Passage writing Module-III: Letter Module-IV: Story/Blog	**CO1,CO2**	**(06)**
Unit 3	**Fill in the blanks** Module-I: Article Based Module-II: Preposition Based Module-III: Vocabulary based Module-IV: Cloze test	**CO1,CO2**	**(08)**
Unit 4	**Managerial Skill development** Module-I: Basic Employability Skills Module-II: Leadership Development Module-III: Team Management & Team Building Module-IV: Corporate Expectations	**CO3**	**(06)**
Unit 5	**Speaking** Module-I: Group Discussions Module-II: JAM / Role Play Module-III: Debate	**CO4**	**(06)**
Unit 6	**Logical Reasoning** Module-I:Logical Revision-1-Blood Relation,Direction Sense, Number- Letter series Module-II:Seating Arrangement Module-III:Complex Arrangement	**CO3**	**(06)**

	Quantitative Aptitude Module-I:Revision-1-Percentage,P&L,TRW, Pipes & Cisterns Module-II:Revision-2-STD-I & STD-II Module-III:Ration&Proportion,Mixture&alligations		
Text Books			

1.	R.S. Aggarwal,"A Modern Approach to Verbal & Non-Verbal Reasoning" ,(For Logical Reasoning)
2.	R.S. Aggarwal, "Quantitative Aptitude for Competitive Examinations",(For Quantitative Aptitude)
3.	P.C. Wren and H. Martin ,"Wren and Martin's High School English Grammar and Composition",(For Learning Grammar and Parts of Speech)
4.	William Strunk Jr. and E.B. White,"The Elements of Style
5.	Jane C. Brennan "Email Writing for Business Communication" (For Writing Skills and Email Writing)
Reference Books	
1.	Dale Carnegie, "How to Win Friends and Influence People",(For Speaking and Group Discussions)
2.	Carmine Gallo," "Speak Like TED", ",(For Speaking and Group Discussions)

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3
CO 4	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	10	-
Understand	10	-
Apply	10	-
Analyse	6	-
Evaluate	6	-
Create	8	-
TOTAL	50	-

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3201 : Cloud Computing

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Explain the core concepts of the cloud computing paradigm
2.	Distinguish between different types of architectures and services in the cloud Computing.
3.	Understand the management in cloud computing.
4.	Analyze different security issues and challenges in cloud computing.

	Course Contents	CO	Hrs
Unit 1	**Basics of Cloud Computing:** Overview, Applications, Intranets and the Cloud. Your Organization and Cloud Computing- Benefits, Limitations, Security Concerns. Software as a Service (SaaS)- Understanding the Multitenant Nature Of SaaS Solutions, Understanding SOA. Platform as a Service (PaaS)- IT Evolution Leading to the Cloud, Benefits of PAAS Solutions, Disadvantages of PaaS Solutions. Infrastructure as a Service (IaaS)-Understanding IaaS, Improving Performance through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages, and Server Types.	**CO1,CO2**	**(08)**
Unit 2	**Data Storage and Security in Cloud:** Cloud file systems: GFS and HDFS, Big Table, HBase and Dynamo Cloud data stores: Data store and Simple DB, Cloud Storage-Overview, Cloud Storage Providers. Securing the Cloud- General Security Advantages of Cloud-Based Solutions, Introducing Business Continuity and Disaster Recovery. Disaster Recovery- Understanding the Threats.	**CO4**	**(08)**
Unit 3	**Virtualization:** Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Types of Hypervisors, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Centre Automation. Common Standards: The Open Cloud Consortium, Open Virtualization Format, Standards for Application Developers: Browsers (Ajax), Data (XML, JSON), Solution Stacks (LAMP and LAPP), Syndication (Atom, Atom Publishing Protocol, and RSS), Standards for Security.	**CO3**	**(06)**
Unit 4	**Cloud Service Providers:** Amazon Web Services-Elastic Compute Cloud (EC2), Simple Storage Service (S3), Simple Queue Service (SQS), Elastic Block Storage (EBS), Elastic Load Balancing (ELB), Simple DB, Relational Database Service (RDS), Virtual Amazon Cloud, Google- AppEngine, Google Storage, Windows Azure, Rackspace Cloud	**CO2**	**(06)**
Unit 5	**Cloud Applications:** Business and Consumer Applications- CRM & ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming, E-Commerce Applications, , Cloud for e-Governance, Scientific Applications- Healthcare, Biology, Geoscience etc.	**CO3**	**(06)**
Unit 6	**Future of Cloud Computing:** How the Cloud Will Change Operating Systems, Location-Aware Applications, Intelligent Fabrics, Paints, and More, The Future of Cloud TV, Future of Cloud-Based Smart Devices, Faster Time to Market for Software Applications, Home-Based Cloud Computing, Mobile Cloud, Autonomic Cloud Engine, Multimedia Cloud, Energy Aware Cloud Computing, Jungle Computing, micro services, Future Research Directions and Challenges in Cloud Computing, Case Studies.	**CO4**	**(06)**

Text Books

1.	Dr. Kris Jamsa, " Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more", Wiley Publications, ISBN: 978-0-470-97389-9
2.	Rajkumar Buyya, James Broberg, Andrzej Goscinski, ,"Cloud Computing: Principles and Paradigms", Wiley Publication, 1st Edition ,ISBN: 978-8126541256
3.	Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi ,"Mastering Cloud Computing", McGraw Hill Publication, 1st Edition ISBN: 978-1259029950

4.	Gautam Shrof, "ENTERPRISE CLOUD COMPUTING Technology Architecture, Applications, Cambridge University Press, ISBN: 9780511778476
Reference Books	
1.	Dr. Kumar Saurabh, Wiley India Pvt. Ltd,"Cloud Computing Insight into New-Era Infrastructure", 1st Edition ISBN: 978-8126528837.
2.	V. K. Pachghare,"Cloud Computing",PHI Learning, New Delhi, ISBN No. 978-81-203-5213-1
3.	Anthony T. Velte, "Cloud Computing: A Practical Approach", Tata McGraw Hill, 2017 ISBN: 978-0070683518
4.	Richard Hill, Laurie Hirsch, Peter Lake, Siavash Moshiri, "Guide to Cloud Computing: Principals and Practices", Springer, 1st Edition, ISBN: 978-1447174875
6.	Tim Mather, Subra K, Shahid L., "Cloud Security and Privacy", 1st Edition, Oreilly,ISBN: 978-0596802769
Useful Links	
1.	http://nptel.ac.in/courses/106106129/28
2.	https://cloudacademy.com/courses/
3.	https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html
4.	http://scpd.stanford.edu/search/publicCourseSearchDetails.do?method=load&courseId=11815

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	0	1	0	0	0	0	0	0	0	0	0	3	1	0
CO 2	3	1	2	0	0	0	0	0	0	2	2	0	1	3	2
CO 3	3	3	3	0	3	0	0	0	0	0	0	3	0	2	3
CO3	3	1	2	0	0	0	0	0	0	2	2	0	1	3	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	10
Evaluate	4	4	10
Create	-	-	10
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC 3202 : Object Oriented Programming

Teaching Scheme			Examination Scheme	
Lectures	3 Hrs/Week		MSE	20
Tutorials			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Analyse and design solution to a problem using object-oriented programming concepts.
2.	Understand the proper class protection mechanism to provide security.
3.	Apply knowledge to demonstrate the use of programming language to implement inheritance, polymorphism etc.
4.	Evaluate and implement the features of Object Oriented Concepts for providing programmed solutions to complex problems.

	Course Contents	CO	Hrs
Unit 1	**NET Architecture** Block diagram of .net framework, The Common Language Runtime, Advantages of Managed Code, A Closer Look at Intermediate Language & Assemblies, Support for Object Orientation and Interfaces, Distinct Value and Reference Types	CO1,CO2	8
Unit 2	**C# Basics** Compiling and Running the Program, Variables, Data Types, Flow Control, Enumerations, Namespaces, The Main() Method, Multiple Main() Methods, defining & using functions & its scope, Passing Arguments to Main(),Parameter passing technique, Array.	CO1,CO2	8
Unit 3	**Classes** Classes and Structures,Class Members, Data Members, Function Members, Methods, Member Access Modifiers,	CO2,CO3	6
Unit 4	**Objects** Creating Object, Constructors, Constructor Overloading, static Constructor, private Constructor, Destructors	CO2,CO3	4
Unit 5	**Inheritance and Polymorphism** Introduction Types of Inheritance, Implementation of Inheritance, Abstract Classes and Functions, Sealed Classes and Functions, Constructors in Derived Classes, Abstract class, Abstract methods, Sealed method and class, Polymorphism	CO2,CO3,CO4	6
Unit 6	**Operator Overloading, Exception Handling, Windows Base Applications :** Method overloading, Operator overloading, Try, catch, throw, finally, Nested try, Custom exception , Windows Forms, Control, MDI	CO3,CO4	8
Tutorials			

Text Books

1	E Balgurusamy, Programming in C#: A Primer, ISBN 9551343189 (Unit 1-6)

Reference Books

1	Simon Robinson, Christain Nagel,Karli Watson, Jay Glynn, Morgan Skinner, Bill Evjen Professional C# – WroxPublication**.**
2	Matthew A. Telle, .Net Programming Black book, Coriolis Group Books, 2002

Useful Links

1.	http://www.nptel.iitm.ac.in
2.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	0	0	0	0	0	0	0	0	0	2	0	0
CO 2	3	1	2	0	0	0	0	0	0	0	0	0	1	2	0
CO 3	1	2	3	0	0	0	0	0	0	0	0	0	1	2	0
CO 4	1	2	3	0	0	0	0	0	0	0	0	0	1	2	0

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember				
Understand	03	03	03	15
Apply	04	04	03	20
Analyse	04	04	03	15
Evaluate	04	04	01	10
Create				
TOTAL	15	15	10	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3203: Research Methodology

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand basic concepts of various research areas
2.	Identify appropriate research topics concerned to Engineering field
3.	Select and define appropriate research problem and its related parameters and. prepare a project proposal to investigate expected results/outcomes from a project
4.	Develop a skill of writing/publishing a research paper/topic in conferences and reputed journals

	Course Contents	CO	Hrs
Unit 1	Introduction: Meaning and objectives of research, Types of research, Research approaches, Research process, Research problem, Selection of research problem, Defining research problem, Literature review, Meta-analysis, Effect sizes, Integrating research findings, identification of research gaps, Errors in research	**CO1**	**(06)**
Unit 2	Research Design: Meaning, need, and features of good design, Dependent, independent, and extraneous variables, Experimental and control groups, Treatments, Experiment, Research designs in exploratory studies, Research designs in descriptive studies, Experimental research designs (informal and formal), Replication, Randomization, Blocking	**CO1,CO2**	**(07)**
Unit 3	Sampling: Need for sampling, Population, Sample, Normal distribution, Steps in sampling, External validity and threats, Sampling error, Probability sampling, Random sampling, Systematic sampling, Stratified sampling, Cluster sampling, Student's t-distribution, Standard error, Determination of sample size Measurement Techniques: Measurement scales, Errors in measurement, Content validity, Criterionrelated validity, Construct validity (convergent and discriminant), Reliability, Rating scales, Paired comparison, Differential scales, Summated scales, Cumulative scales, Factor scales	**CO3**	**(07)**
Unit 4	Data Collection and Analysis: Primary data collection through observations and interviews, Questionnaire surveys, Secondary data collection, Data processing, Measures of central tendency and dispersion, mean, median, mode, range, variance, standard deviation, inter-quartile range, histogram, box-plot, normal probability plot, Measures of association	**CO3,CO4**	**(06)**
Unit 5	Hypothesis Testing: Null and alternative hypothesis, Level of significance, Type I and type II error, Two-tailed and one-tailed tests, Procedure of hypothesis testing, Power of hypothesis test, Hypothesis testing of means, Hypothesis testing of mean difference	**CO3,CO4**	**(06)**
Unit 6	Analysis of Variance: Introduction, One-way ANOVA, Two-way ANOVA, Preparation of ANOVA Table and calculation of F-ratio	**CO4**	**(08)**

Tutorials

Text Books

1.	C.R. Kothari, "Research Methodology Methods and Techniques", 2/e, New Age Publication(Unit No. 1 to 6)
2.	Montgomery, Douglas C. &Runger, George C," Applied Statistics & Probability", Wiley Publication(Unit No.3 to 5)
3.	Bendat and Piersol, "Random data: Analysis and Measurement Procedures", Wiley, 6th edition.(Unit no.3)

Reference Books

1.	Ranjit Kumar, "Research Methodology- A Step-By-Step Guide for Beginners",(Pearson Education, Delhi),
2.	Trochim, William M.K., "Research Methods", (Biztantra, Dreamtech Press, New Delhi), 2/e
3.	Richard I Levin amp; David S. Rubin, "Statistics for Management", 7/e. Pearson Education, 2005
4.	Krishnaswamy, K. N., Sivakumar, AppaIyer and Mathirajan, M.), "Management Research Methodology: Integration of Principles, Methods and Techniques" ,Pearson Education,
5	Donald R. Cooper, Pamela S. Schindler, "Business Research Methods", 8/e, Tata McGraw-Hill Co. Ltd., 2006

Useful Links

1.	https://www.explorable.com/research-methodology
2.	http://www.socscidiss.bham.ac.uk/methodologies.html
3.	http://www.humanities.manchester.ac.uk/studyskills/methodology.html
4.	http://www.palgrave.com/choosing-appropriate-research-methodologies

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	1	2	0	2	2	2	2	0	1	0	2	2	0	1
CO 2	2	2	1	2	3	1	1	1	2	0	1	1	0	2	1
CO 3	1	1	1	1	2	1	1	0	1	2	1	1	1	1	2
CO 4	0	1	1	0	1	0	2	0	0	0	2	0	1	1	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	1	1	5
Understand	2	2	5
Apply	5	5	5
Analyse	4	4	10
Evaluate	4	4	10
Create	4	4	15
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3204 : Database Management System

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand basic database concepts, structure and operation of the relational data model.
2.	Construct simple and moderately advanced database queries using SQL.
3.	Apply logical database design principles, E-R diagrams and database normalization.
4.	Know the concept of a database transaction, concurrency control, backup and recovery, data object locking and protocols and database security

	Course Contents	CO	Hrs
Unit 1	**Introduction: Database-**System Applications, Purpose of Database Systems, Database Users and Administrators **Overview of the Design Process-** The Entity-Relationship Model, Constraints Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Extended ER features	**CO1**	**(06)**
Unit 2	**Introduction to the Relational Model:** Structure of Relational Databases, Database Schema, Schema Diagrams, Relational Query Languages**,** Relational Operations, Database Design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF), Loss less joins and dependencypreserving decomposition **Relational Algebra** – Fundamental Operations	**CO3**	**(06)**
Unit 3	**Introduction to SQL-**Overview of the SQL Query Language **-** SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database **Intermediate SQL-** Join Expressions, Views, Transactions, Integrity Constraints **Advanced SQL-** Functions and procedures, Triggers	**CO2**	**(08)**
Unit 4	**Storage and File Structure** Overview of physical storage media, Magnetic disk RAID, Tertiary storage, File organization, Organization of records in files, Data dictionary storage	**CO3**	**(08)**
Unit 5	**Transaction And Concurrency control-** Concept of transaction, ACID properties, Serializibility, States of transaction, Concurrency control, Locking techniques, Time stamp based protocols, Multiple Granularity, Deadlock handling	**CO4**	**(06)**
Unit 6	**Crash Recovery and Backup-** Failure classifications, storage structure, Recovery & atomicity, Recovery Algorithm, Failure with loss of Nonvolatile, Remote Backup System **Security and privacy** Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control, Encryption, Additional issues related to security	**CO4**	**(06)**

Text Books

1.	Korth, Sudarshan , "Database System Concept", McGraw Hill (6th Edition) (Unit1,2,3)
2.	Ramakrishnan&Gehrke , "Database Management Systems", McGraw Hill (3rd Edition) (Unit4,5,6)

Reference Books

1.	C.J.Date, "Introduction to database systems", Pearson Education (8th Edition)
2.	ElmasriNavathe, "Fundamentals of Database Systems", Addison Wesley (7th Edition)
3.	Nilesh Shah, "Database Systems using Oracle", PHI (1st Edition)

Useful Links

1.	https://onlinecourses.nptel.ac.in/noc19_cs46/preview
2.	https://aws.amazon.com/training/learn-about/databases/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3
CO 4	2	2	1	2	2	0	0	0	0	0	3	3	2	2	2

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	4	4	12
Create	3	3	9
TOTAL	20	20	60

Government College of Engineering, Karad

Second Year (Sem – II)Master of Computer Application

MC3215 (Elective-I): Artificial Intelligence

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Identify and describe problems that are amenable to solution by AI methods.
2.	Identify appropriate AI methods to solve a given problem and implement basic AI algorithms.
3.	Solve the problems using neural networks techniques and apply fuzzy logic techniques to find solution of uncertain problems.
4.	Analyze the genetic algorithms and their applications.

	Course Contents	CO	Hrs
Unit 1	**Introduction of Artificial Intelligence:** What is Artificial Intelligence, Use of AI in daily life, Goals, Application and History of AI, Limitations of AI. **Intelligent Agent:**Agents in AI, Types of AI Agents, Structure of Agents, PEAS Representation, Agent Environment in AI, Features of Environment, Turing Test in AI, Chatbots and features for a machine to pass the Turing test.	**CO1**	**(05)**
Unit 2	**Problem SolvingMethods:**Problems, problem spaces and search: Define the problem as a state space search, Production systems, Problem characteristics, Production system characteristic, Issues in design of search program **Search Algorithms:** Terminologies, Properties and features of Search Algorithms, Uninformed and Informed Search Algorithms, Hill Climbing Algorithms	**CO1,CO,**	**(07)**
Unit 3	**Representation of Knowledge:**What is Knowledge Representation, what to represent, Types of Knowledge, Knowledge Cycle in AI, Different approaches and Networks of Knowledge representation **Propositional Logic:** Propositional logic in AI, Syntax of propositional logic, Logical Connectives, Precedence, Limitation of Propositional Logic, Inference in AI, Inference Rules and types of Inference Rules, First-order logic, forward and backward chaining in AI	**CO3**	**(08)**
Unit 4	**Reasoning in AI:** Reasoning, Types of reasoning, Uncertainty, Causes of uncertainty, Probabilistic reasoning, Bayes's theorem and Bayesian Belief Network in AI **Neural Network:** Artificial Neural Network: Introduction, Fundamental Concept, Artificial Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron, Basic Models of Artificial Neural Network Supervised Learning Network-Linear Separability, Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network. Unsupervised Learning Networks	**CO3,CO4**	**(08)**
Unit 5	**Introduction to Fuzzy Logic:** Classical Sets and Fuzzy Sets:Introduction to Fuzzy Logic, Classical Sets (Crisp Sets),Fuzzy Sets Classical Relations and Fuzzy Relations: Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations Membership Functions: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments Defuzzification: Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods **Fuzzy Inference System**: Truth Values and Tables in Fuzzy Logic, Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules), Aggregation of Fuzzy Rules, Fuzzy Inference Systems (FIS)- Construction and Working Principle of FIS, Methods of FIS.	**CO3,CO4**	**(10)**
Unit 6	**Genetic Algorithm:** Basic concepts, Difference between genetic algorithm and traditional methods, Simple genetic algorithm, Working principle, Procedures of GA, Genetic operatorsreproduction, Mutation, crossover. **Subsets of AI:** Subsets of AI, Types of Machine learning, NLP, Deep learning, Expert Systems, Components of Expert Systems, Applications and Limitation of Expert systems.	**CO4**	**(06)**

Text Books	
1.	Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Second Edition, Mc Graw Hill- 2008
2.	Stuart Russel, Peter Norvig, “Artificial Intelligence– A Modern Approach”, Second Edition, PHI/Pearson Education.
Reference Books	
1.	Kumar Satish, “Neural Networks” Tata McGraw Hill
2.	Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India
3.	Artificial Intelligence, 3rd Edition, Elaine Rich, Kevin Knight, S.B. Nair, Tata McGraw Hill
4.	Simon Hhaykin, “Neural networks - A comprehensive foundations”, Pearson Education 2nd Edition 2004.
Useful Links	
1.	https://www.javatpoint.com/artificial-intelligence-tutorial
2.	https://nptel.ac.in/courses/106/105/106105077/
3.	https://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	1	0	0	0	0	0	0	0	0	2	0	0
CO 2	3	2	0	2	0	0	0	0	0	0	0	0	1	0	0
CO 3	2	2	0	2	0	0	0	0	0	0	0	0	1	0	0
CO 4	2	1	0	1	0	0	0	0	0	0	0	0	1	0	0

Assessment Pattern (with revised Bloom’s Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	3	3	9
Apply	3	3	9
Analyse	3	3	9
Evaluate	4	4	12
Create	3	3	9
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3225 : Elective-I (Enterprise Resource Planning)

Teaching Scheme		Examination Scheme	
Lectures	03Hrs/week	MSE	20
Tutorials	00Hrs/week	ISE	20
Total Credits	03	ESE	60
		Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate a good understanding of the basic issues in ERP system.
2.	Make basic use of Enterprise software, and its role in integrating business functions
3.	Analyze the strategic options of ERP identification & adaption
4.	Design the ERP implementation strategies.

	Course Contents	CO	Hrs
Unit 1	**Enterprise Resource Planning**: Introduction to ERP, Characteristics of ERP, ERP Types, Disadvantages of non-ERP systems, Need of ERP Advantage of ERP, Risks of ERP, Growth of ERP	**CO1**	**(06)**
Unit 2	**ERP Modules:** Finance, Production Planning, Control and Management, Sales and Distribution, Human Resource Management, Inventory Control System, Quality Management, Plant Maintenance.	**CO2**	**(09)**
Unit 3	**ERP Implementation Life Cycle:** Evaluation and selection of ERP package, Project planning, Implementation, Team Training and Testing, End User Training and Going Live Post Evaluation and Maintenance.	**CO3**	**(06)**
Unit 4	**ERP Market and Vendors:** ERP Marketplace and Marketplace Dynamics, Comparison of Current ERP Packages and Vendors	**CO3**	**(02)**
Unit 5	**ERP and related technologies:** Business Process Re-Engineering (BPR), Management Information System (MIS), Decision Support System (DSS), Executive Support System (ESS) Data Warehousing, Data Mining, On-Line Analytical Processing (OLAP), Supply Chain Management, Customer Relationship Management.	**CO4**	**(09)**
Unit 6	**Case Studies:** Factors for Success in ERP System Implementations, Customization of ERP for different types of Industries, Post Implementation review of ERP packages - in Manufacturing, Services and Others Organizations. Case Studies: Government e-Marketplace (GeM), HPCL, Tata Steel Ltd, Cadbury	**CO4**	**(08)**

Tutorials

A set of Tutorial / problems based on above syllabus is to be performed and submitted

Text Books

1.	V.K.Garg & N. K. Venkitakishnan ,"Enterprise Resource Planning –Concepts & Practice", (Second Edition)PHI Learning Private Ltd. ISBN: 978-81-203-2254-7
2.	Alexis Leon ,"Enterprise Resource Planning", (Fourth Edition) Mc Graw Hill ISBN: 978-9353167820

Reference Books

1.	V. K. Garg & N. K. Venkitakishnan ,"ERPWARE – ERP Implementation Framework",Prentice-Hall of India Pvt.Ltd. ISBN: 978-8120315525
2.	Daniel E ,"Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic Commerce, and Risk", O'Leary, Cambridge University Press, ISBN: 978-0521791526
3.	K. Ganesh, Sanjay Mohapatra, S. P. Anbuudayasankar, P. Sivakumar, "Enterprise Resource Planning: Fundamentals of Design and Implementation (Management for Professionals)", Springer Nature, ISBN: 978-3319059266

Useful Links

1.	http://www.nptel.ac.in/
2.	http://www.ocw.mit.edu/
3.	https://www.erpfocus.com/erp-product-comparison.html
4.	https://www.hdfcbank.com/personal/resources/learning-centre/sme/what-are-the-different-types-of-erp-systems-in-india
5.	https://www.linkedin.com/pulse/case-study-cadbury-how-erp-system-can-transform-your-business--1c/

Mapping of COs and Pos

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	3	0	3	0	0	0	0	0	3	1	2	0	0
CO 2	2	3	2	0	0	0	0	0	0	0	1	0	1	2	0
CO 3	1	2	1	0	0	0	0	0	0	0	0	0	1	2	0
CO4	2	3	2	0	0	0	0	0	0	0	1	0	1	2	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	10
Evaluate	4	4	10
Create	-	-	10
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3235 : Elective-I (Computer Organisation And Architecture)

Teaching Scheme			Examination Scheme	
Lectures	3 Hrs/Week		MSE	20
Tutorials	-		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Understand the Structure and Operational Concepts of Computers, including Von Neumann Architecture and Data Representation.
2.	Analyse Computer Arithmetic, Instruction Set Architecture, and Different CPU Design Approaches (CISC vs. RISC).
3.	Master Register Transfer and Micro-Operations, and Design Control Units using Micro-Programmed Control Techniques.
4.	Comprehend Input/output Interfaces, Multiprocessor Characteristics, and Cache Coherence in Multicomputer Systems.

	Course Contents	CO	Hrs
Unit 1	**Structure Of Computers:** Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes. **Computer Arithmetic:** Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations	**CO1**	**(8)**
Unit 2	**Basic Computer Organization And Design:** Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC	**CO1,CO2**	**(8)**
Unit 3	**Register Transfer And Micro-Operations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.	**CO1,CO2**	**(4)**
Unit 4	**Micro-Programmed Control:** Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.	**CO1,CO2**	**(4)**
Unit 5	**Register Transfer And Micro-Operations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.	**CO1,CO2**	**(8)**
Unit 6	**Input Output:** I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. **Multiprocessors:** Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.	**CO4**	**(8)**

Tutorials

Text Books

1.	M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

Reference Books

1.	Carl Hamacher, ZvonksVranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2.	William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.
	Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc
	John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

Useful Links

1.	http://nptel.ac.in/courses/106103068/
2.	http://nptel.ac.in/courses/106103068/pdf/coa.pdf

3.	http://www.srmuniv.ac.in/downloads/computer_architecture.pdf
4.	http://williamstallings.com/ComputerOrganization/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	2	3	0	0	0	0	3	3	3	1	2	0
CO2	3	1	0	2	3	0	0	0	0	3	3	3	2	3	0
CO3	2	2	1	1	3	0	0	0	0	3	3	3	1	3	0
CO4	1	0	1	3	3	0	0	0	0	0	0	0	1	0	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	10
Evaluate	4	4	10
Create	-	-	10
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3245: Elective-I(Information Retrieval & web mining)

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
Tutorials	00 Hrs/week		ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate genesis and diversity of information retrieval situations for text and hyper media
2.	Describe hands-on experience store, and retrieve information from www using semantic approaches
3.	Demonstrate the usage of different data/file structures in building computational search engines
4.	Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia.

	Course Contents	CO	Hrs
Unit 1	Introduction: Basic Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing. Automatic Classification: Measures of Association, Classification Methods, Cluster Hypothesis (Self-study: Clustering Algorithms, Single Link Algorithm	**CO1**	**(06)**
Unit 2	Indexing, Modeling and Searching Techniques: Indexing & searching: Inverted file, Suffix trees & suffix arrays, Signature Files, Scatter storage or hash addressing, Clustered files. Modeling: Basic concepts, Boolean Model, Vector Model, probabilistic Model Searching strategies: Boolean Search, Serial search, cluster based retrieval. Query languages: Types of queries, Patterns matching, structural queries.	**CO1,CO2**	**(07)**
Unit 3	Text and Multimedia Languages: Introduction, Metadata, Text, Mark-up Languages, Multimedia, Trends and Research Issues.	**CO3**	**(07)**
Unit 4	Retrieval and Text Operations: Retrieval Evaluation: Precision and recall, alternative measures. Text Operations: Introduction, Document Pre-processing, Document Clustering, Text Compression, Comparing Text Compression techniques	**CO1,CO4**	**(06)**
Unit 5	Distributed and Multimedia IR: Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, web issues. Multimedia IR: Introduction, Data Modeling, Query languages, Generic multimedia indexing approach, One dimensional time series (Self-study: Two dimensional color images, Automatic feature extraction)	**CO3**	**(06)**
Unit 6	Searching the Web: Searching the Web: Challenges, Characterizing the Web, Search Engines, Browsing, Matasearchers, Finding needle in the Haystack, Searching using Hyperlinks	**CO3,CO4**	**(08)**

Tutorials

Text Books

1.	C.J. Rijsbergen, "Information Retrieval", Butterworth-Heinemann publisher, 2nd edition, 1979 ISBN-13: 978-0408709293. (Unit:1
2.	Yates, Neto, "Modern Information Retrieval", Pearson Education, 1stedition, 2010, ISBN 81-297-0274-6. (Unit:2,3,4)
3.	Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, 2nd edition, Springer, 2011, ISBN-10: 3642194591. (Unit: 5,6)

Reference Books

1.	Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, 2nd edition, Springer, 2011, ISBN-10: 3642194591. (Unit: 5,6)
2.	Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, “Introduction to Data Mining”, Pearson/Addison Wesley, 2006, ISBN-10: 0321321367.
3.	Anthony Scime,“Web Mining: Applications and Techniques”, IDEA group publishing.
4.	SoumenChakrabarti, “Mining the Web: Discovering Knowledge from Hypertext Data”.

Useful Links			
1.	https://nptel.ac.in/courses/106/101/106101007/ Prof. Pushpak Bhattacharya		
2.	https://nptel.ac.in/courses/106/105/106105174/ Prof. Pabitra Mishra.		
3.	http://openlib.org/home/krichel/courses/lis618/readings/rijsbergen79_infor_retriev.pdf		
4.	http://people.ischool.berkeley.edu/~hearst/irbook/print/chap10.pdf		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	1	2	0	2	2	2	2	0	1	0	2	2	0	1
CO 2	2	2	1	2	3	1	1	1	2	0	1	1	0	2	1
CO 3	1	1	1	1	2	1	1	0	1	2	1	1	1	1	2
CO 4	0	1	1	0	1	0	2	0	0	0	2	0	1	1	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	10
Evaluate	4	4	10
Create	-	-	10
TOTAL	20	20	60

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3255: Elective-I (Design and Analysis of Algorithms)

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		MSE	20
			ISE	20
Total Credits	03		ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Categorize problems based on their characteristics and practical importance.
2.	Develop Algorithms using iterative/recursive approach
3.	Design algorithm using an appropriate design paradigm for solving a given problem
4.	Implement algorithms using various design strategies and determine their order of growth

	Course Contents	CO	Hrs
Unit 1	**Introduction:** Algorithms and structured programming, analysing algorithms, asymptotic behaviour of an algorithm, Order notations, time and space complexities (polynomial, logarithmic and exponential), average and worst case analysis, lower and upper bounds	**CO2**	**(8)**
Unit 2	**Algorithm design strategies:** Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.	**CO1,CO2,CO3**	**(10)**
Unit 3	**Dynamic Programming:**General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components – biconnected components	**CO2,CO3**	**(8)**
Unit 4	**Back Tracking:**General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.	**CO2,CO3**	**(6)**
Unit 5	**Lower Bound Theory:**Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.	**CO3,CO4**	**(8)**

Text Books

1.	E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms", Galgotia, New Delhi, 2nd edition,1999,(Unit No. 1 to 5)

Reference Books

1.	G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, 3rd edition
2.	A.V. Aho, J.E. Hopcroft, J.D. Ullmann, "The design and analysis of Computer Algorithms", Addison Wesley, Boston,2nd edition.

Useful Links

1.	http://www.cise.ufl.edu/~raj/BOOK.html

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	0	0	0	0	0	0	0	0	0	2	0	0
CO 2	3	1	2	0	0	0	0	0	0	0	0	0	1	2	0
CO 3	1	2	3	0	0	0	0	0	0	0	0	0	1	2	0
CO 4	3	1	2	0	0	0	0	0	0	0	0	0	1	2	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	2	1	5
Understand	2	3	5
Apply	3	3	10
Analyse	4	3	10
Evaluate	4	4	15
Create	5	5	15
TOTAL	20	20	60

Government College of Engineering, Karad				
First Year (Sem – II) Master of Computer Applications				
MC3206: SWAYAM/MOOC COURSE				
Teaching Scheme			**Examination Scheme**	
Contact Hours	-			
			ESE	100
Total Credits	1			

Course Outcomes (CO)	
At the end of this course, the students will be able to:	
1.	Explore the new technology of their interests.
2.	Evaluate the technical and practical knowledge required in industries.
3.	Implement the knowledge learnt from this course in real time projects.

Nature of Project		**CO**
	The student should choose any one of the SWAYAM/MOOC course of their choice from the knowledge domains mentioned below. It is necessary that every student should take prior permission of the course to be chosen from the DBoS.	**CO1,CO2,CO3**
	Credits earned by the students in the respective course are transferred to the credit 1 as per the departmental policy for this course.	
Useful Links:		
1	https://nptel.ac.in/	
2	https://swayam.gov.in/	
Knowledge Domains	1. Technical Courses 2. Management Courses 3. Soft Skills	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ESE
Remember	10
Understand	20
Apply	20
Analyse	20
Evaluate	15
Create	15
TOTAL	100

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3207 : Object Oriented Programming Lab

Teaching Scheme			Examination Scheme	
Practical	2 Hrs/week		**ISE**	25
Tutorials				
Total Credits	1		**ESE**	-

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Apply and implement major object oriented concepts.
2.	Understand and implement windows based applications using c# programming concepts.
3.	Analyse design and development solution to real world problems applying OOP Concepts.
4.	Apply knowledge to demonstrate the use of programming language to implement inheritance, polymorphism etc.

	Course Contents	CO
Experiment 1	Write a program using c# to produce the following output. 1 2 3 4 5 6 7 8 9 10	**CO1**
Experiment 2	Write a function that takes two values, num1 and num2 as command line arguments and return multiplication of these two numbers.	**CO1**
Experiment 3	Write a program to find sum of the elements of each row of the given matrix.	**CO1,CO2**
Experiment 4	Write a program to generate the mark sheet of the student using class	**CO1,CO2**
Experiment 5	Write a program to implement constructor.	**CO2**
Experiment 6	Write a program to illustrate multiple inheritances with virtual methods.	**CO2,CO4**
Experiment 7	Write a program of operator overloading.	**CO2,CO3**
Experiment 8	Write a program to demonstrate exception handling for stack overflow.	**CO2,CO3,CO4**
Experiment 9	Write a program to implement abstract class.	**CO2,CO3,CO4**
Experiment 10	Write a program to illustrate polymorphism technique.	**CO3,CO4**
Tutorials		
List of Submission		
1	Total number of Experiments based on syllabus : 10	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1	3	2	3	3	1	0	1	0	0	0	0	0	3	0	0
CO 2	2	0	2	0	2	0	0	0	0	0	0	0	0	3	0
CO 3	3	2	0	0	0	2	0	0	0	0	0	0	0	3	0
CO4	2	0	2	0	2	0	0	0	0	0	0	0	0	3	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	4	8
Understand	4	8
Apply	4	8
Analyse	4	8
Evaluate	4	8
Create	5	10
TOTAL	25	50

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3208 : Database Management Systems Lab

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		ISE	25
			ESE	25
Total Credits	01			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate fundamental concepts of relational databases
2.	Understand view, index, exceptions, joins in RDBMS
3.	Construct simple and moderately advanced database queries using SQL
4.	Apply triggers, functions, procedures, cursors in RDBMS

	Course Contents	CO
Experiment 1	Basic Data Types- Char, varchar/varchar2, long, number, Fixed Commands to create table, Alter table, Drop table.	**CO1**
Experiment 2	Commands for record handling - Insert, Update, Delete, Select with operators like arithmetic, comparison, logical operators, Ordering the records with order by, Grouping the records.	**CO1**
Experiment 3	SQL functions - Date, Numeric, Character, conversion Group functions avg, max, min, sum, count Set operations- Union, Union all, intersect, minus.	**CO1,CO2**
Experiment 4	Exceptions-Predefined and User-defined exceptions.	**CO1,CO2**
Experiment 5	Join concept- Simple, equi, non equi, self, outer join.	**CO2,CO3**
Experiment 6	Nested queries and Sub-queries	**CO2,CO3**
Experiment 7	View - Intro, create, update, dropIndex -Introduction, create	**CO2,CO3**
Experiment 8	Primary introduction to DBA, User create, granting privileges (Grant, Revoke, Commit, Rollback, Savepoint)	**CO3,CO4**
Experiment 9	To demonstrate the use of package in PL/SQL.	**CO3,CO4**
Experiment 10	Database Triggers- Definition, syntax, parts of triggers, Types of triggers, enabling & disabling triggers	**CO3,CO4**
Experiment 11	Sub programs- Cursors, Procedures- Definition, creating, Parameter	**CO4**
Experiment 12	Function- Definition & implementation	**CO4**

List of Submission

	Minimum 10 experiments to be performed and evaluated Journal

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	1	1	0	1	2	2	1	0	1	1	2	2	0	1
CO 2	1	2	2	2	1	1	1	1	2	0	0	1	1	2	1
CO 3	0	1	1	1	2	0	2	2	1	2	0	0	1	1	1
CO 4	0	1	1	0	1	0	2	1	0	0	2	0	1	1	0

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	4	8
Understand	4	8
Apply	4	8
Analyse	4	8
Evaluate	4	8
Create	5	10
TOTAL	25	50

Government College of Engineering, Karad

First Year (Sem – I) Master of Computer Applications

MC3109 : Java Programming Lab

Teaching Scheme			**Examination Scheme**	
Practical	02 Hrs/week		ISE	25
Tutorials	01 Hrs/week		ESE	-
Total Credits	02			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing etc.
2.	Design and develop Web applications
3.	Designing applications using pre-built frameworks

	Course Contents	**Hours**
Tutorials		
	A set of Tutorial/ problems based on above syllabus is to be submitted	
Sample List of Experiments:		**CO**
Experiment 1	Program to Class and Method.	**CO1**
Experiment 2	Program to Packages & Interfaces.	**CO1**
Experiment 3	Program using JDBC demonstrating the use of prepared statement.	**CO1**
Experiment 4	Develop a program demonstrating the use of generic servlet class.	**CO1,CO2**
Experiment 5	Develop a program demonstrating the use of HTTP Servlet class.	**CO1,CO2**
Experiment 6	Develop a program demonstrating the use of cookies management.	**CO2**
Experiment 7	Develop a dynamic webpage demonstrating the use of JSP.	**CO1**
Experiment 8	Write applet to draw human face.	**CO1**
Experiment 9	Program to create an extended AWT component.	**CO3**
Experiment 10	Develop a program to demonstrate the communication between client and server using socket programming.	**CO1**
Experiment 11	Develop a program demonstrating the use of Swing.	**CO1**
Experiment 12	Develop a program demonstrating the use of Struts.	**CO3**
Experiment 13	Develop a program demonstrating the use of Java Beans.	**CO3**
Tutorials		
	A set of Tutorial/ problems based on above syllabus is to be submitted	
List of Submission:		
	Minimum 10 experiments to be performed and evaluated Journal.	

Text Books	
1.	E. Balagurusamy, "Programming with Java" McGraw-Hill (6th edition)
2.	John P. Flynt, "Java Programming", Thomson (2nd edition)
Reference Books	
1.	Cay Horstmann, "Big Java", Wiley India (2nd edition)
2.	Harvey Deitel "Core Java", Pearson (11th edition)
Useful Links	
1.	https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
2.	https://www.edureka.co/java-j2ee-training-course

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	0	2	3	0	0	0	0	0	3	3	3	1	2
CO 2	3	1	0	2	3	0	0	0	0	0	3	3	3	2	3
CO 3	2	2	1	1	3	0	0	0	0	0	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	4	8
Understand	4	8
Apply	4	8
Analyse	4	8
Evaluate	4	8
Create	5	10
TOTAL	25	50

Government College of Engineering, Karad

First Year (Sem – II) Master of Computer Applications

MC3210: Mini Project

Teaching Scheme			Examination Scheme	
Practical	02 Hrs/week		ISE	25
Tutorial	00 Hrs/week		ESE	25
Total Credits	01			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Demonstrate knowledge of the distinction between critical and noncritical systems.
2.	Demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
3.	Demonstrate proficiency in rapid software development techniques.

	Nature of Project	CO
	The project batches of 2-3 students should be formed, which will work on the project allocated by the department. The batch must complete it during first semester only. Term work submission should be done in the form of a joint report. The term work assessment will be done jointly by teachers appointed by Head of the Institution. The oral examination will be conducted by an internal and external examiner as appointed by the University.	**CO1,CO2,CO3**
1	Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.	
2	Two mid-term evaluations should be done, which includes presentations and demos of the work done.	
Project Report Format:	Project report should be of 15 to 20 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.	
	1. Page Size: Trimmed A4 **2. Top Margin:** 1.00 Inch **3. Bottom Margin:** 1.32 Inches **4. Left Margin:** 1.5 Inches **5. Right Margin:** 1.0 Inch **6. Para Text:** Times New Roman 12 Point Font **7. Line Spacing:** 1.5 Lines **8. Page Numbers:** Right Aligned at Footer. Font 12 Point. Times New Roman **9. Headings:** Times New Roman, 14 Point Bold Face **10. Certificate:** All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/ Director. **11. Index of Report:** **a.** Title Sheet **b.** Certificate **c.** Acknowledgement **d.** Table of Contents **e.** List of Figures **f.** List of Tables **12. References:** References should have the following format For Books: “Title of Book”, Authors, Publisher, Edition For Papers: “Title of Paper”, Authors, Journal/Conference Details, Year	
Useful Links:		
1	http://www.geeksforgeeks.org/	
2	https://in.udacity.com/	
3	https://graphics.stanford.edu/~seander/bithacks.html	
4	https://www.youtube.com/results?search_query=mycodeschool	
5	https://www.hackerrank.com/	
Tutorials:		
	Eight tutorials based on project is to be submitted.	

Mapping of COs and POs

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CO 1	2	3	3	3	0	0	0	0	0	0	0	1	3	1	2
CO 2	3	2	3	1	3	0	3	0	0	3	3	2	3	2	3
CO 3	3	1	3	2	0	0	2	2	0	2	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	5	5
Understand	5	5
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10
TOTAL	10	10

Government College of Engineering, Karad

Second Year (Sem – III) M. C. A.

MC3211: Professional Communications

Laboratory Scheme			Examination Scheme	
Practical	02 Hrs/week		ISE	50
			ESE	-
Total Credits	01			

Course Outcomes (CO)

At the end of this course, the students will be able to:

1.	Develop professional skills to communicate effectively & confidently.
2.	Develop advanced language skills to face the campus interviews with good confidence.
3.	Build awareness to face the real time challenges in the corporate world.

	Course Contents	Hours
Unit 1	**LSRW-I** Module-I: Listening Module-II:Speaking Module-III:Reading Module-IV:Writing	**(06)**
Unit 2	**Advance Grammer/Verbal Ability** Module-I: Sentence Completion,Sentence Improvement Module-II: Parajumbles Module-III: Reading Comprehension Module-IV: Cloze Test	**(06)**
Unit 3	**Interview Preparation** Module-I: Resume Writing Module-II: Interview Techniques Module-III: Mock Interview	**(06)**
Unit 4	**Personality Development** Module-I: Goal Setting Module-II: Attitude Building Module-III: Personality & Its Traits Module-IV: Building effective digital profile	**(06)**
Unit 5	**Presentation Skill** Module-I: Mock GD Module-II: Grooming & Etiquettes Module-III: Presentation Techniques	**(06)**
Unit 6	**Logical Reasoning** Module-I:Clocks & Calenders Module-II: Syllogism Module-III: Series & Pattern Completion **Quantitative Aptitude** Module-I: Permutation & Combination Module-II: Probability Module-III: Geometry & Mensuration	**(10)**

Tutorials			
	A set of Tutorial/ problems based on above syllabus is to be submitted		

Text Books

1.	R.S. Aggarwal,"A Modern Approach to Verbal & Non-Verbal Reasoning" ,(For Logical Reasoning)
2.	R.S. Aggarwal, "Quantitative Aptitude for Competitive Examinations",(For Quantitative Aptitude)
3.	P.C. Wren and H. Martin ,"Wren and Martin's High School English Grammar and Composition",(For Learning Grammar and Parts of Speech)
4.	William Strunk Jr. and E.B. White,"The Elements of Style
5.	Jane C. Brennan "Email Writing for Business Communication" (For Writing Skills and Email Writing)

References

1.	Dale Carnegie, "How to Win Friends and Influence People",(For Speaking and Group Discussions)
2.	Carmine Gallo," "Speak Like TED", ",(For Speaking and Group Discussions)

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO 2	3	2	2	1	3	0	3	0	0	3	3	2	3	2	3
CO 3	3	1	3	2	0	0	2	2	0	2	3	3	3	1	3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	5	5
Understand	5	5
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10
TOTAL	10	10