JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR
Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere
Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in
An Autonomous Institute, with NAAC "A" Grade
Department of Computer Applications (MCA)
"Powered by Progress, Inspired by Vision"
Session 2022-23

VISION	MISSION
"To be the source of bringing out globally competent pioneering computing professionals, researchers, innovators and entrepreneurs and thereby succeed and contribute value to the knowledge-based economy and society."	1. To offer high-grade, value-based Post-graduate programme in the field of Computer Applications. 2. To develop the youth into professionals who can work in team, possess high analytical abilities, and help in solving complex problems of various domains through principles of computer science and applications. 3. To bridge the gap between industry and academia by framing curricula and syllabi based on industrial and societal needs.

TEACHING &EVALUATIONSCHEME
FIRSTYEARMASTEROFCOMPUTERAPPLICATION (MCA)
SEMESTER-I

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			EVALUATION			Credit
				L	T/A	P	CA	ESE	Total	
1	PCC	MC1T001	Computer Architecture & Organization	4	-		40	60	100	4
2	PCC	MC1T002	Data Structures & Algorithms	4	-		40	60	100	4
3	PCC	MC1T003	Object Oriented Programming using JAVA	3	-		40	60	100	3
4	PCC	MC1T004	Operating System	4	-		40	60	100	4
5	AEC	MC1A001	Discrete Mathematics & Graph Theory	3	-		40	60	100	3
6	PCC	MC1L005	Data Structure and Algorithms LAB	-	-	4	60	40	100	2
7	PCC	MC1L006	Object Oriented Programming using JAVA Lab	-	-	4	60	40	100	2
				18	**0**	**8**	**320**	**380**	**700**	**22**

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01T01

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01T01**	**Computer Architecture& Organization**	3	0	0	3

Prerequisites for the course	
1.	Basic Knowledge of Computer Hardware, Architecture, Memory etc.

Prior Reading Material/Useful links	
1.	https://onlinecourses.nptel.ac.in/noc22_cs10/preview
2.	Computer Organization and Architecture, 6th Edition, William Stallings
3.	Computer Architecture - A Quantitative Approach,5th edition, John L. Hennessy, David A. Patterson.

Course Outcomes:

Sr. No	Course Outcome	CO statement
1	CO1	Interpret the functional architecture of computing systems. (Understanding) Classify and compute the performance of machines.
2	CO2	Explore addressing modes, instruction formats and program control statements.
3	CO3	Understand arithmetic logic for ALU implementation. Understand the basics of hardwired and micro-programmed control of the CPU.
4	CO4	Build large memories using small memories for better performance. Write ISA level code for RISC and CISC machines.
5	CO5	Identify, compare and assess issues related to ISA, memory, control and I/O functions. (Applying, Analyzing, Evaluating)

Syllabus:

Course Contents		Hours
Unit I- Basic Structure of Computers	Basic Structure of Computers: Functional Units, Basic Operational Concepts, Bus Structures, Software, Multiprocessors and MulticomputerMachine Instructions: Instruction Sets: Machine Instruction Characteristics, Types of Operands, Types of Operations, Memory Locations and Addresses, Memory Operations, Machine program sequencing, addressing modes and encoding of information, Assembly Language, Stacks, Queues and Subroutine.	6

Unit II-The Memory System and Computer Peripherals	Some Basic Concepts, Semiconductor RAM Memories, Memory system considerations, Semiconductor ROM Memories, Memory interleaving, Cache Memory, Mapping techniques, Virtual memory, Memory Management requirements. I/O Devices, DMA, Interrupt handling, online storage, File services, Processors: Families of microprocessors Chips, s, Introduction to Pipelining. Parallel Processing: The Use of Multiple Processors, Symmetric Multiprocessors, Multithreading and Chip Multiprocessors, Clusters.	6
Unit III-Micro-programmed Control	Control Unit Operation: Micro-operations, Control of the Processor, Hardwired Implementation, and Micro-programmed control, Basic Concepts, Microinstruction Sequencing & Execution,Microinstructions, grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices, Introduction to Microprogramming, Macro Processor.	6
Unit IV-Arithmetic	Number Representation, Addition of Positive numbers, Logic Design for fast adders, Addition and Subtraction, Arithmetic and Branching conditions, Multiplication of positive numbers, Signed Operand multiplication, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations.	8
Unit V-Addressing Mode	Addressing, x86 and ARM Addressing modes, Instruction Formats, x86 and ARM Instruction Formats, Assembly language.	8

Text Books	
1.	Computer Organization 4 th Edition, 2001 V. Carl Hamacher, McGraw Hill
2.	William Stallings: "Computer Organization and Architecture", (8/e) Pearson Education.

Reference Books	
1.	Behrooz Parhami: "Computer Architecture", Oxford University Press
2.	J. P. Hayes: "Computer Architecture and Organization" , McGraw Hill
3.	D. A. Patterson, J. L. Hennessy: "Computer Architecture" Morgan Kauffmann, 2002
4.	Hwang and Briggs: "Computer Architecture and Parallel Processing" McGraw-Hill

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01T02

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01T02**	Data Structure &Algorithm	3	0	0	3

	Prerequisites for the course
1.	Knowledge of computer programming languages, such as C or Java.
2.	Knowledge of basic algebra, calculus, and statistics.
3.	Experience with database systems, such as MySQL or MongoDB. With these

	prerequisites in place, you're ready to learn about data structures.

Prior Reading Material/useful links	
1.	https://www.brainkart.com/subject/Object-Oriented-Programming-and-Data-Structures_165/
2.	https://www.geeksforgeeks.org/data-structures/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand the concept of ADT.
2	CO2	Identify data structures suitable to solve problems.
3	CO3	Develop and analyze algorithms for stacks, queues.
4	CO4	Develop algorithms for binary trees and graphs.
5	CO5	Implement sorting and searching algorithms.
6	CO6	Implement symbol table using hashing techniques

Syllabus:

Course Contents		Hours
Unit I	**Complexity Analysis:** Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms. **Hashing:** Implementation of Dictionaries, Hash Function, Collisions in Hashing, Open Addressing, Analysis of Search Operations	[7Hrs]
Unit II	**ADT Array-Searching and sorting on arrays:** Linear search, binary search on a sorted array. Bubble sort, Insertion sort, merge sort and analysis; Emphasis on the comparison based sorting model, Radix sort, and bucket sort.	[8Hrs]
Unit III	**Stacks and Queues:** Abstract data types, sequential and linked implementations, representative applications such as parenthesis matching, towers of Hanoi, finding path in a maze, simulation of queuing systems, equivalence problem.	**[7Hrs]**
Unit IV	**Linked Lists:** Abstract data type, sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, exception and iterator classes for lists, doubly linked lists, circular lists, skip lists applications of lists in bin sort, radix sort, sparse tables	**[7Hrs]**
Unit V	**Trees and Graphs:** Trees: Rooted trees, Path length in rooted tree, Binary search trees, Spanning trees and cut set, Minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations, heap sort, heaps in Huffman coding, leftist trees. Graph Algorithms: Graphs and their Representations, Graph Traversal Techniques: Breadth First Search (BFS) and Depth First Search (DFS), Applications of BFS and DFS, Minimum Spanning Trees (MST)	**[7Hrs]**

Text Books	
1.	Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson ucation,1997
2.	Reema Thareja, Data Structures Using C, Second Edition, Oxford University Press, 2011.

Reference Books	
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2.	Aho, Hopcroft and Ullman, Data Structures and Algorithms‖, Pearson Education,1983
3.	Stephen G. Kochan, :Programming in C‖, 3rd edition, Pearson Education
4	Ellis Horowitz, SartajSahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008

Useful Links	
1.	https://www.youtube.com/results?search_query=Data+structure+using+OOPs
2.	https://www.youtube.com/watch?v=z9bZufPHFLU&list=PLfqMhTWNBTe0b2nM6JHVCnAkhQRGiZMSJ
3.	https://www.youtube.com/watch?v=cnT1oW5_ePM&list=PLfqMhTWNBTe0b2nM6JHVCnAkhQRGiZMSJ&index=3

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01T03

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01T03**	Object Oriented Programming using JAVA	3			3

Prerequisites for the course	
1.	Basic understanding of programming concepts and fundamentals.
2.	Basic Knowledge of Computer & Algorithms

Prior Reading Material/useful links	
1.	https://www.coursera.org/projects/java-beginners-getting-started-
2.	https://www.udemy.com/course/mastering-object-oriented-design-in-java/
3	https://www.udemy.com/course/oop-learnit/

Course Outcomes:

Sr.	Course	CO statement

No	Outcome number	
1	CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.
2	CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3	CO3	Proposed the use of certain technologies by implementing them in the Java programming language to solve the given problem
4	CO4	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
5	CO5	Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

Syllabus:

Course Contents		Hours
Unit I	**Basics of OOP:** Abstraction, Inheritance, Encapsulation, Classes, subclasses and super classes, Polymorphism and Overloading, message communicationProcedure-Oriented vs. Object-Oriented Programming concept. **Introduction to Java Programming :** Basics of Java, Background/History of Java, Java and the Internet, Advantages of Java , Java Virtual Machine & Byte Code , Java Environment Setup ,Java Program Structure	**[7 Hrs]**
Unit II	**Primitive Data Types :** Integers, Floating Point type, Characters, Booleans , User Defined Data Type , Identifiers & Literals , Declarations of constants & variables , Type Conversion and Casting , Scope of variables & default values of variables declared , Wrapper classes , Comment Syntax , Garbage Collection **Arrays of Primitive Data Types:** Types of Arrays,Creation, concatenation and conversion of a string,Decision & Control Statements, Different Operators	**[7 Hrs]**
Unit III	**Class :**Defining classes, fields and methods, creating objects, accessing rules, this keyword, static keyword, method overloading, final keyword **Constructor:**Constructors: Default constructors, Parameterized constructors, Copy constructors, Passing object as a parameter, constructor overloading	**[7 Hrs]**

Unit IV	**Basics of Inheritance**: Inheritance, Types of inheritance: single, multiple, multilevel, hierarchical and hybrid inheritance, concepts of method overriding, extending class, super class, Abstract Class **Package :** Creating package, importing package, access rules for packages, class hiding rules in a package, Defining interface, inheritance on interfaces, implementing interface, multiple inheritance using interface	**[8 Hrs]**
Unit V	**Exception Handling :**Introduction, Built in classes for Exception Handling, Mechanism of Exception Handling in Java, Error Handling Exception Classes **Multithreading :** Creating thread, extending Thread class, implementing Runnable interface, life cycle of a thread, Thread priority & thread synchronization, exception handing in threads	**[7 Hrs]**

Text Books	
1.	Herbert Schildt, The Complete Reference-Java, Tata Mcgraw-Hill Edition, Eighth Edition, 2014.
2.	Nicholas S. Williams, Professional Java for Web Applications, Wrox Press, 2014.
3.	Complete Reference J2EE by James Keogh mcgraw publication

Reference Books	
1.	*The Java™ Programming Language : Arnold, Ken, Gosling James, Addison-Wesley Professional 4th Edition.*
2	Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath .
3.	Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication.
4.	Spring in Action 3rd edition , Craig walls, Manning Publication.
5	Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication

Useful Links	
1.	https://www.udemy.com/course/java-programming-complete-beginner-to-advanced/
2.	https://www.simplilearn.com/java-full-stack-developer-certification-training-course
3	https://www.javatpoint.com/github

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01T04

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01T04**	**Operating Systems**	3	0	0	3

Prerequisites for the course	
1.	Good knowledge of C, Computer Organization and Architecture, x86 Assembly level programming.

Prior Reading Material/useful links	
1.	https://www.tutorialspoint.com/operating_system/index.htm
2.	https://www.geeksforgeeks.org/operating-systems/
3	https://www.javatpoint.com/operating-system

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Identify the significance of operating system in computing devices.
2	CO2	Demonstrate the communication between application programs and hardware devices through system calls.
3	CO3	Compare and illustrate various process scheduling algorithms.
4	CO4	Apply appropriate memory and file management schemes.
5	CO5	Illustrate various disk scheduling algorithms

Syllabus:

Course Contents		**Hours**
Unit I	Evolution of operating systems, Types of operating systems. The process concept, system programmer's view of processes, operating system's views of processes, operating system services for process management	**[7 Hrs]**
Unit II	Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Inter process Communication, Communication in Client – Server Systems, Multithreading Models, Threading Issues	**[7 Hrs]**
Unit III	Scheduling concepts, scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling.	**[7 Hrs]**
Unit IV	Memory Management, Contiguous allocation, static-swapping, overlays, dynamic partitioned memory allocation, demand paging, page replacement, segmentation. Non-contiguous allocation, paging, Hardware support, Virtual Memory.	**[8 Hrs]**
Unit V	A Simple file system, General model of a file system, Symbolic file system, Access control verification, Logical file system, Physical file system, Allocation strategy module, Device strategy module, I/O initiators, Device handlers, Disk scheduling.	**[7 Hrs]**

Text Books	
1.	J.L. Peterson and A. Silberchatz, "Operating System Concepts", Addison Wesley.
2.	Harvey M. Dietel, "An Introduction to Operating System", Addison Wesley.
3.	C. Crowley, "Operating Systems - A Design Oriented Approach", Irwin Publishing

Reference Books	
1.	W. Stallings, "Operating systems", Prentice Hall.
2.	A.S. Tannenbaum, "Modern Operating system", PHI

Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc19_cs50/preview
2.	https://www.mygreatlearning.com/academy/learn-for-free/courses/operating-system

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01T05

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01T05**	**Discrete Mathematics & Graph Theory**	3	0	0	3

Prerequisites for the course	
1.	Knowledge of high school level arithmetic and algebra.
2.	Good understanding of elementary algebra and arithmetic.

Prior Reading Material/useful links	
1.	https://www.javatpoint.com/discrete-mathematics-tutorial
2.	https://www.geeksforgeeks.org/discrete-mathematics-tutorial/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Construct simple mathematical proofs and possess the ability to verify them
2	CO2	Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner
3	CO3	Apply basic counting techniques to solve combinatorial problems
4	CO4	Develop logical thinking and its application to computer science.

5	CO5	Demonstrate on various logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions and integers.

Syllabus:

Course Contents		**Hours**
Unit I	Fundamental Structures and Basic Logic: Sets, Venn diagram, Cartesian product, Power sets,Cardinality and countability, Propositional logic, Logical connectives, Truth tables, Normal forms, Validity, Predicate logic, Limitations of predicate logic, Universal and existential quantification, First order logic. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.	**[7 Hrs]**
Unit II	Functions and Relations: Subjective, Injective, Bijective and inverse functions, Composition of function, Reflexivity, Symmetry, Transitivity and equivalence relations	**[7 Hrs]**
Unit III	Graph Theory: Basic terminology, Multi graphs and weighted graphs, Paths and circuits, Shortest path problems, Euler and Hamiltonian paths, Representation of graph, Isomorphic graphs, Planar graphs, Connectivity, Matching Coloring.	**[7 Hrs]**
Unit IV	Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient79 Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups	**[7 Hrs]**
Unit V	Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	**[8 Hrs]**

Text Books	
1.	C. L. Liu, Elements of Discrete Mathematics, McGraw-Hill Publication, 3rd Edition, 2008.
2.	Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw-Hill Publication, 6th Edition, 2010.
3.	Dr. Sukhendu Dey, Graph Theory with Applications, SPD Publication, 1st Edition, 2012.
4	Y. N. Singh, Discrete Mathematical Structures, Wiley Publication, 1st Edition, 2010.

Reference Books	
1.	Lipschutz, Discrete Mathematics, McGraw-Hill Publication, 3rd Edition, 2009.
2.	V. K. Balakrishnan, Schaum's Outline of Graph Theory, McGraw-Hill Publication, 1st Edition. 1997.
3.	Eric Gossett, Discrete Mathematics with Proof, Wiley Publication, 2nd Edition, 2009.

Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc20_cs82/preview
2.	https://www.youtube.com/user/dmgtplc

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01L06

Semester	Course Code	Name of the course	L	T	P	Credits
I	**MCA01L06**	Data structure Lab	0	0	2	2

Prior Reading Material/useful links	
1.	No prior knowledge needed.

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	**CO1**	Understand the concept of ADT.
2	**CO2**	Identify data structures suitable to solve problems.
3	**CO3**	Develop and analyze algorithms for stacks, queues.
4	**CO4**	Develop algorithms for binary trees and graphs.
5	**CO5**	Implement sorting and searching algorithms.

Syllabus:

List of Experiments
1. Write a program to implement stack using arrays.
2.. Write a program to convert a given infix expression to postfix form using stacks.
3. Write a program to evaluate a given postfix expression using stacks

4. Write a program to implement circular queue using arrays.
5. Write a program to implement double ended queue (de queue) using arrays.
6. Write a program to implement a stack using two queues such that the push operation runs in constant time and the pop operation runs in linear time.
7. Write a program to implement a stack using two queues such that the push operation runs in linear time and the pop operation runs in constant time.
8. Write a program to implement a queue using two stacks such that the enqueue operation runs in constant time and the dequeue operation runs in linear time.
9. Write a program to implement a queue using two stacks such that the enqueue operation runs in linear time and the dequeue operation runs in constant time.
10. Write programs to implement the following data structures: (a) Single linked list (b) Double linked list

Program: MCA

Teaching Scheme for 1st Semester (MCA) Course Code- MCA01L07

Semester	Course Code	Name of the course	L	T	P	Credits
I	**IT4L007**	**Object Oriented Programming using JAVA (Lab)**			2	2

Prerequisites for the course	
1.	Fundamental knowledge of C/C++ would be helpful

Prior Reading Material/useful links	
1.	https://github.com/topics/java-lab
2.	https://www.coursera.org/projects/learn-programming-java

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Create classes, objects, members of a class and relationships among them needed for a specific problem
2	CO2	Implement Java application programs using OOP principles and proper program structuring
3	CO3	Demonstrate the concepts of polymorphism and inheritance.
4	CO4	Implement error handling techniques using exception handling
5	CO5	

Syllabus:

List of Experiments:	
1.	Install JDK, write a simple “Hello World” or similar java program, compilation,

	debugging, executing using java compiler and interpreter
2.	Write a Java program that takes a number as input and prints its multiplication table upto 10.
3.	Write a program in Java to find second maximum of n numbers without using arrays.
4.	Designed a class that demonstrates the use of constructor and destructor.
5.	Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
6.	Create a multilevel inheritance for classes, vehicle, brand and cost. The vehicle class determines the type of vehicle which is inherited by the class brand which determines the brand of the vehicle. Brand class is inherited by cost class, which tells about the cost of the vehicle. Create another class which calls the constructor of cost class and method that displays the total vehicle information from the attributes available in the super classes
7.	Design a package to contain the class Student that contains data members such as name, roll number and another package contains the interface Sports which contains some sports information. Import these two packages in a package called Report which process both Student and Sport and give the report.
8.	Write a java program to implement method overriding
9.	Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number
10.	Write a Java program to list all the files in a directory including the files present in all its subdirectories

TEACHING &EVALUATIONSCHEME
FIRST YEAR MASTER OF COMPUTER APPLICATION
SEMESTER -II

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			EVALUATION			Credit
				L	T/A	P	CA	ESE	Total	
1	PCC	MC2T001	Cyber Security & Cryptography	4	-		40	60	100	4
2	PCC	MC2T002	Artificial Intelligence	4	-		40	60	100	4
3	PCC	MC2T003	Data Base Management System	4	-		40	60	100	4
4	PCC	MC2T004	Data Science Using Python	3	-		40	60	100	3
5	PEC	MC2E001	Department Elective-I	3	-		40	60	100	3
6	PCC	MC2L005	Data Base Management Systems- LAB	-	-	4	60	40	100	2
7	PCC	MC2L006	Python LAB	-	-	4	60	40	100	2
				18	**0**	**0**	**320**	**380**	**700**	**22**

ELECTIVE-1

MCA02E01	Research Methodology
MCA02E02	Computer Graphics
MCA02E03	Web Development

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02T01

Semester	Course Code	Name of the course	L	T	P	Credits
II	MCA02T01	Cyber Security & Cryptography	2	1	0	20

Prerequisites for the course	
1.	Vulnerabilities in the Information Technology systems
2.	Anticipating and detecting threats
3.	Routing and switching
4	Being aware of the network architecture and protocol
5	Firewalls

Prior Reading Material/useful links	
1.	http://nptel.ac.in/courses/106105031/lecture by Dr.Debdeep Mukhopadhyay IIT Kharagpur
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand basic concepts of Cyber security.
2	CO2	Apply various standards Symmetric Encryption algorithms to provide confidentialityand Asymmetric Encryption algorithms to achieve authentication.
3	CO3	Compare and apply various authentication Techniques
4	CO4	Evaluate and communicate the human role in security systems with an emphasis on

5	CO5	Select and apply appropriate Intrusion detection and prevention techniques and toexamine various security algorithms to Interpret security incidents

Syllabus:

Course Contents		**Hours**
Unit I	**Unit 1: Introduction to Cyber Security** Overview of cyber security , Internet Governance-Challenges and constraints, Cyber threats:- Cyber Warfare-Cyber Crime-Cyber terrorism ,Cyber Espionage, Need for comprehensive cyber security policy, need for nodal authority, Cyber security regulations, Roles of international law.	**[7 Hrs]**
Unit II	**Cryptography and Block Ciphers principles.** Introduction, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security, Substitution and Transposition techniques, Symmetric and Asymmetric key cryptography, Steganography, Cryptographic independent dimensions. Cryptanalytic attack and brute force attack,Symmetric key Ciphers: Block Cipher principles, DES.	**[7 Hrs]**
Unit III	**UNIT 3 Public Key Cryptosystems and Authentication Requirements.** Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange, introductory idea of Elliptic curve cryptography. Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512) Message authentication codes: Authentication requirements, Digital signature.	**[7 Hrs]**
Unit IV	**UNIT 4 Key Management, Distribution and Cyber Security Vulnerabilities** Distribution of Public Keys, Kerberos, X.509 Authentication Service, PGP, SSL, IPSEC. Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Weak Authentication, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Ethical Hacking	**[8 Hrs]**
Unit V	**Securing Web Application Services, Servers and cyber forensic** Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Security Considerations, Challenges, Intrusion detection and Prevention Techniques, System Integrity Validation, Honey pots, password management. Introduction to Cyber Forensics.	**[7 Hrs]**

Text Books	
1.	William Stallings, “Crpyptography and Network security Principles and Practices”, Pearson/PHI.
2.	Wade Trappe, Lawrence C Washington, “ Introduction to Cryptography with coding theory”, Pearson.
3.	.J. Katz and Y. Lindell, Introduction to Modern Cryptography, CRC press, 2008.

Reference Books	
1.	Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.
2.	Golreich O, Foundations of Cryptography, Vol.1.2, Cambridge University Press, 2004
3.	Menezes, et.al, Handbook of Applied Cryptography, CRC Press, 2004.

Useful Links	
1.	http://nptel.ac.in/courses/106105031/lecture by Dr.Debdeep Mukhopadhyay IIT Kharagpur
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02T02

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02T02**	Artificial Intelligence	3	0	0	3

Prerequisites for the course	
1.	Requires some programming experience and some mathematical fluency.
2.	Need a very strong background in linear algebra

Prior Reading Material/Useful links	
1.	https://see.stanford.edu/Course/CS229
2.	https://www.cognitivelearningbook.org/

Course Outcomes:

Sr. No	Course Outcome	CO statement
1	CO1	Understand about knowledge for the design of robotics.
2	CO2	Explore the understanding about robot kinematics and robot programming.
3	CO3	Demonstrate on different applications of Robots.
4	CO4	Apply and analyze about force and torque sensing.
5	CO5	Learn about application of robot.

Syllabus:

Course Contents		Hours
Unit I	Introduction to Artificial Intelligence ,Features of AI , Agents and Environments, structure of agents, problem solving agents, problem formulation,AI techniques- search knowledge.	**[7 Hrs]**
Unit II	Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.	**[7 Hrs]**
Unit III	Knowledge Representation; Learning, Uncertainty, probabilistic reasoning-Bayesian Network, probabilistic reasoning over time-Inference in temporal Model, Hidden Markov models- Kalman filters, Dynamic Bayesian Network, speech recognition	**[7 Hrs]**
Unit IV	Learning: Concept of learning, learning automation, genetic algorithm, learning byinductions, neural nets. Programming Language: Introduction to programming Language. Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic	**[8 Hrs]**
Unit V	AI in Cognitive Robotics: Robotic perception, localization, mapping-configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics. Case study of AI in robotics	**[7 Hrs]**

Text Books	
1.	Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approach, Pearson Education, India.
2.	Negnevitsky, M, Artificial Intelligence: A guide to Intelligent Systems,. Harlow: Addison-Wesley,2002.
3.	E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed..
4.	Nilsson, N. J. (1986). Principles of artificial intelligence. Morgan Kaufmann.

Reference Books	
1.	Craig, J. J. (2009). Introduction to robotics: mechanics and control, 3/E. Pearson Education India.
2.	6. D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
3.	7. Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.

Useful Links	
1.	https://nptel.ac.in/courses/106105077/
2.	https://www.coursera.org/courses?query=robotics%20engineer

3	https://www.coursera.org/specializations/artificial-intelligence-overview

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02T03

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02T03**	**Database Management System**	3	0	0	3

Prerequisites for the course	
1.	Most entry-level computer engineers have a bachelor's degree in computer engineering

Prior Reading Material/useful links	
1.	https://archive.nptel.ac.in/courses/106/105/106105175/
2.	https://www.javatpoint.com/dbms-tutorial
3	https://www.coursera.org/courses?query=database%20management
4	https://www.scaler.com/topics/course/dbms/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Demonstrate the basic elements of a relational database management system.
2	CO2	Ability to identify the data models for relevant problems
3	CO3	Understand the internal storage structures which will help in physical DB design.
4	CO4	Apply the fundamental concepts of transaction processing- concurrency controltechniques and recovery procedure.
5	CO5	Implementon SQL Queries

Syllabus:

Course Contents		Hours
Unit I	**Database Management System – Concepts and Architectures** Database System Applications, Purpose of Database Systems, View of Data , Data Abstraction (Instances and Schemas), data Models , the ER Model , Relational Model, Database Languages (DDL , DML, DCL, and TCL). Data base design and ER diagrams, ER Model , Entities, Attributes, and Entity sets ,Relationships and Relationship sets , ER Design Issues.	[6Hrs]

Unit II	**Relational Query Languages** Introduction to the Relational Model , Structure , Database Schema, Keys Schema Diagrams, Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions (GROUPBY – HAVING, Nested) Sub queries, joins , Triggers.	[6Hrs]
Unit III	**Normalization** Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyee/Codd normal form, Higher Normal Forms, Introduction, Multi-valued dependencies and Fourth normal form.	[7Hrs]
Unit IV	**Transaction Concept** Introduction What is a Transaction? , Transaction Properties , Transaction Management with SQL , The Transaction Log Concurrency Control , Concurrency control with Locking Methods , Types of Locks , Two-Phase Locking to Ensure Serializability , Deadlocks, , Concurrency Control Methods.	[8Hrs]
Unit V	**File organization :** File organization, various kinds of indexes. Query Processing , Measures of query cost , Selection operations, Join operations, join operations, set operation and aggregate operation .	[8Hrs]

Text Books	
1.	Database System Concepts, Seventh Edition, Avi Silberschatz,Henry F. Korth,S. Sudarshan,McGraw-Hill
2.	Fundamentals of Database Systems, Elmasri Navathe Pearson Education
3.	Database System Concepts" by Abraham Silberschatz and S Sudarshan
4	Introduction to Database Management Systems" by Kahate

Reference Books	
1.	Data base System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except IIIth)
2.	An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.

Useful Links	
1.	https://archive.nptel.ac.in/courses/106/105/106105175/
2.	https://www.coursera.org/courses?query=database%20management
3	https://www.geeksforgeeks.org/dbms/
4	https://www.scaler.com/topics/course/dbms/

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02T04

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02T04**	**Data Science using Python**	2	0	0	2

Prerequisites for the course	
1.	Intermediate to Advanced knowledge in statistics is desired for data science work.

Prior Reading Material/Useful links	
1.	https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-analysis-using-statistical-learning-techniques/
2.	https://www.youtube.com/watch?v=I10q6fjPxJ0

Course Outcomes:

Sr. No	Course Outcome	CO statement
1	CO1	Understand the fundamentals of Data Science.
2	CO2	Apply Data Cleaning and Data Pre-processing Strategies
3	CO3	Compare and choose data visualization method for effective visualization of data
4	CO4	Apply the queries for Data Visualization
5	CO5	Implementation on the process of Line chart , Bar chart, Histogram, scatter plot, Pie chart.

Syllabus:

Course Contents		Hours
Unit I	**Introduction toData science:** Introduction to Data Science, Process of Data Science, types of Data, Big Data Vs Small Data, Basic terminologies of DS, Structured vs. Unstructured, Data Roles and Responsibility of Data scientist.	7
Unit II	**Introduction to python:** Need of python in data science, Python for data Scientist, Virtual environment for python, variables, rules for python variables, Fundamentals of Python and working with script.	7
Unit III	**Data cleaning using python:**Overview of data cleaning,Steps Involved in Data Cleaning: Data inspection and exploration,Handling missing data, Handling outliers, Data transformation, Advantages & disadvantages of Data Cleaning.	7
Unit IV	**Data Processing with Python :**Need of Numpy in data Processing, Powerful properties of numpy , Types of arrays, basic Operations using Numpy, Need of Pandas in data processing.	7
Unit V	**Data Visualizationusing Matplotlib Library –**Introduction to matplotlib plots, different types of matplotlib plots: Line chart , Bar chart, Histogram, scatter plot, Pie chart.	8

Text Books	
1.	“Python Data Science Handbook Essential Tools for Working With Data" by Jake Vander Plas , O'Reilly Media, November 2021
2.	"Python for Data Analysis - Data Wrangling with Pandas, NumPy, and IPython" by Wes McKinney was published by O'Reilly Media, 30 December 2020.
3	"Think Python - How to Think Like a Computer Scientist" by Allen B. Downey, O’Reilly Media, August 2021.

Reference Books	
1.	Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O’Reilly.
2.	Lure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1Cambridge University Press.
3	Laura Igual and Santi Segui, Introduction to Data Science: A Python Approach to Concepts, Techniques

Useful Links	
1.	https://www.coursera.org/learn/statistical-analysis-hypothesis-testing-sas
2.	https://www.coursera.org/projects/statistical-analysis-using-python-numpy

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02E01

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02E01**	**Research Methodology**	3	0	0	3

Prerequisites for the course	
1.	Basic knowledge about searching, market etc.
2.	Basic knowledge of data gathering, collection

Prior Reading Material/useful links	
1.	https://onlinecourses.nptel.ac.in/noc23_ge36/preview https://onlinecourses.nptel.ac.in/noc22_ge08/preview
2.	https://www.scribbr.com/dissertation/methodology/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Knowledge about basic data collection methods with emphasis on

		secondary and survey research.
2	CO2	Understand the format of primary data collection instruments.
3	CO3	Elaborate uses of basic data analysis techniques.
4	CO4	Familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
5	CO5	Identify the overall process of designing a research study from its inception to its report.

Syllabus:

Course Contents		**Hours**
Unit I	**Fundamentals of research;** Meaning, Objectives, Research process, Methods and Methodology, Criteria of good research, Reviewof literatures: Primary source, Secondary source, Identifying gap areas from literature review, Searchinge- resources, using search engines, Searching data base.	**[7 Hrs]**
Unit II	**Types of Research;** Pure research, applied research, Exploratory Research, Descriptive research, Diagnostic research, Quantitative and Qualitative research etc.	**[7 Hrs]**
Unit III	**Research Sampling and Design:** Sampling of data: Concept of sampling, Probability sampling techniques, Non probability sampling techniques, Sampling error, Research Design: Meaning, Need, Types of research design-Exploratory Research Design, components of research design and features of good research design,	**[7 Hrs]**
Unit IV	**Methods, Collection and Analysis of Data:** Types of data, Methods of data collection- Interview Method, Mailing Method, Observation Method, Survey Method etc.; Primary and secondary sources of data, Sampling- meaning and methods, Classification and Tabulation, Graphical presentation, Application of computer in research data analysis.	**[8 Hrs]**
Unit V	**Presentation of Research**: Citation Styles- APA, MLA etc., Research ethics and Plagiarism, Indexing of journal and research output, Report writing steps in report writing, layout of report writing, reference and bibliography.	**[7 Hrs]**

Text Books	
1.	Research Methodology, Methods and Techniques by C.R Kothari, 2nd Edition.
2.	Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes
3.	Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p

Reference Books	
1.	The Science of Education Research, Eurasia Publishing House, New Delhi by George J. (1964),

2.	Advanced focus Group Research, Sage Publication, India Ltd, New Delhi by Fern Edward F. (2001)
3.	Research Methodology in Management, Himalaya Publishing House, New Delhi by Michael 5V.P.

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02E02

Semester	Course Code	Name of the course	L	T	P	Credits
3	MCA02E02	Computer Graphics	3	0	0	3

	Prerequisites for the course
1.	Knowledge of computer programming languages, such as C or Java.
2.	Knowledge of basic algebra, calculus, and statistics.

Prior Reading Material/useful links	
1.	https://www.tutorialspoint.com/computer_graphics/computer_graphics_quick_guide.htm
2.	https://www.javatpoint.com/computer-graphics-tutorial
3.	https://www.coursera.org/articles/computer-graphics

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Understand the scope of computer graphics and also identified the field related to computer Graphics
2	CO2	Demonstrate on the concepts on transforms including translation, rotation, scaling, shearing and reflection.
3	CO3	Design algorithms for different geometric shapes, lines , circle, ellipse.
4	CO4	Implement the basics programing of Graphics Programming using OPENGL
5	CO5	Apply 2D Clipping algorithms for regular and irregular windows and various types of curves.

Syllabus:

Course Contents		Hours
Unit I	**Introduction to Computer Graphics:** Overview of Computer Graphics, Computer Graphics Application and Software, Graphics Areas, Graphics Pipeline, Graphics API's, Numerical issues, Efficiency Display and Hardcopy Technologies, Display Technologies – Raster scan Display System	[7Hrs]
UNIT II	**Basic Raster Graphics:** Algorithms for Drawing 2D primitives, aliasing and ant aliasing, Polygon filling methods: Scan Conversion	[7Hrs]

	Algorithms: Simple Ordered edge list, Edge Fill, Fence fill and Edge Flag Algorithm, Seed fill Algorithms: Simple and Scan Line Seed Fill Algorithm, Halftoning techniques.	
Unit III	**Graphics Programming using OPENGL:** Why OpenGL, Features in OpenGL, OpenGL operations, Abstractions in OpenGL – GL, GLU & GLUT, 3D viewing pipeline, viewing matrix specifications, a few examples and demos of OpenGL programs, Animations in open GL.	**[7Hrs]**
Unit IV	**2-Dgeometric transformations:** Basic transformations, matrix representations, composite transformations, other transformations, transformations between coordinate systems, affine transformations, transformation functions, Raster methods for transformations. Two-Dimensional viewing : viewing coordinates, Window-to viewport coordinate transformation, viewing functions, clipping : point, line, polygon, curve, text, exterior.	**[8Hrs]**
Unit V	**Normalized Device Coordinates and Viewing Transformations:**3D System Basics and 3D Transformations, 3D graphics projections, parallel, perspective, viewing transformations.3D graphics hidden surfaces and line removal, painter's algorithm, Z -buffers, Warnock's algorithm. **Animations & Realism 10 Animation Graphics:** Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening, Light Scources.	**[7Hrs]**

Text Books	
1.	Fundamentals of Computer Graphics, Peter Shirley and Steve Marschner, Third Edition. (A.K.Peters Publication house)
2.	Procedural Elements of Computer Graphics III Edition, Rogers, McGraw Hill.
3	Computer Graphics - Principles and Practice, J. D. Foley, A. Van Dam, S. K. Feiner and J.F. Hughes, Second Edition in C, Pearson Education.

Reference Books	
1.	Computer Graphics with OpenGL, Donald D. Hearn, M. Pauline Baker, Warren Carithers, Fourth Edition, Pearson Education.
2.	Computer Graphics, Hearn and Baker, PHI, India.

Useful Links	
1.	https://elearn.nptel.ac.in/shop/nptel/computer-graphics/
2.	https://www.udemy.com/course/computer-graphics
3.	https://www.coursera.org/courses?query=computer%20graphics
4.	https://www.geeksforgeeks.org/computer-graphics-2/

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02E03

Semester	**Course Code**	**Name of the course**	**L**	**T**	**P**	**Credits**

II	MCA02E03	DepartmentalElective-1Web Development & Design	3	0	0	3

Prerequisites for the course	
1.	Enough knowledge of Hyper Text Markup Language or HTML. One should have proper knowledge of HTML tags and attributes.
2.	CSS for styling a page. HTML without CSS is useless. One should know how to use CSS properly.
3.	Javascript. Javascript is the most important part of web development according to me. Javascript is used for building logics, and according to these logics your page is going to behave. Moreover, Javascipt is used in front-end development as well as back-end development.

Prior Reading Material/useful links	
1.	https://www.developerupdates.com/blog/5-useful-websites-every-website-developer-should-know
2.	https://www.webfx.com/blog/web-design/websites_for_web_development/
3.	https://www.fabriziovanmarciano.com/design-and-developer-websites/

Course Outcomes:

Sr. No	**Course Outcome number**	**CO statement**
1	CO1	Understand the basic tags of HTML, CSS, and JavaScript
2	CO2	Execute the different Syntax and Tags present in HTML, CSS, and JavaScript
3	CO3	Analyze difference between various web design Languages
4	CO4	Evaluate the design of Different Forms
5	CO5	Design the web site form

Syllabus:

Course Contents		**Hours**
Unit I	**Introduction to Web Technologies** Introduction to Web Technologies, Careers in Web Technologies and Job Roles, How the Website Works? Client and Server Scripting Languages, Domains and Hosting, Responsive Web Designing, Types of Websites (Static and Dynamic Websites) , HTTP Request / Response.	**[8 Hrs]**
Unit II	**Introduction to HTML** What is HTML, HTML Documents, What is Markup Language, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.	**[7 Hrs]**
Unit III	**Elements of HTML** Introduction to elements of HTML, Working with Text Working with Lists, Tables and Frames; Working with Hyperlinks, Images and Multimedia; Working with Forms and controls.	**[7 Hrs]**

Unit IV	**Introduction to Cascading Style Sheets** Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties), CSS Color, Creating page Layout and Site Designs.	**[7 Hrs]**
Unit V	**Introduction Java Script** Introduction to Java Side Scripting, JAVA Script Types, Variables, Operators, Conditions Statements, Java Script Loop, JS Popup Boxes Using Java Script in Realtime, Validation of Forms, Web Hosting Basics.	**[7Hrs]**

Text Books	
1.	A beginner's guide to HTML, CSS, Javascript, and Web Graphics, by Jennifer Niederst Robbins
2.	Marijn Haverbake's Eloquent Javascript:

Reference Books	
1.	Reference Book: Web Developer's Reference Guide. By: Joshua Johanan, Talha Khan, Ricardo Zea.
2.	Head First HTML and CSS guided by Elizabeth Robson and Eric Freeman
3.	Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics Guided by Jennifer Robbins
4.	Reference Book: Web Developer's Reference Guide. By: Joshua Johanan, Talha Khan, Ricardo Zea.

Useful Links	
1.	W3 School web Development: https://www.w3schools.com/whatis/whatis_icons.asp

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02L05

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02L05**	**Database Management System lab**			2	2

Prerequisites for the course	
1.	Basic SQL , basic knowledge about the computer systems

Prior Reading Material/useful links	
1.	SQL tutorial:- https://www.w3schools.com/sql/
2.	PL/SQL tutorial :- http://www.plsqltutorial.com

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	CO1	Elaborate basic database concepts, applications, data models, schemas and instances.
2	CO2	Emphasize the importance of normalization in databases.
3	CO3	Demonstrate their skills In converting the entity-relationship diagrams into relational tables.
4	CO4	Analyze the business requirements and producing a viable model for the implementation of the database.
5	CO5	Develop database modeling for a problem.

Syllabus:

List of Experiments
1. Introduction SQL and Oracle Installation.
2. Draw E-R diagram and convert entities and relationships to relation table for a given scenario. a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college).
3. Perform the following::- Data constraints (Primary key, Foreign key, Not Null) Data insertion into a table. .
4. Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback).
5. Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.
6. Implementation of different types of operators in SQL
7. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).
8. For a given set of relation schemes, create tables and perform the following Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause.
9. Write a Pl/SQL program using FOR loop to insert ten rows into a database table
10. Writing SQL and PL/SQL queries to retrieve information from the databases.
11. Study and Implementation of triggers
12. CASESTUDY (Student Progress Monitoring System or any other)

Text Books	
1.	Database System Concepts, Seventh Edition,AviSilberschatz,Henry F. Korth,S. Sudarshan,McGraw-Hill
2.	Fundamentals of Database Systems, Elmasri Navathe Pearson Education

Reference Books	
1.	Introduction to Database Management Systems" by Kahate

Useful links	
1.	SQL tutorial:- https://www.w3schools.com/sql/
2.	PL/SQL tutorial :- http://www.plsqltutorial.com

Program: MCA

Teaching Scheme for 2ND Semester (MCA) Course Code- MCA02L06

Semester	Course Code	Name of the course	L	T	P	Credits
II	**MCA02L06**	**Python for Data Science(Lab)**	0	0	2	2
	Prerequisites for the course					
1.	Basic understanding of python programming.					

Prior Reading Material/useful links	
1.	https://www.projectpro.io/article/python-projects-for-data-science/462
2.	https://www.youtube.com/watch?v=I10q6fjPxJ0
3.	https://data-flair.training/blogs/data-science-project-ideas/

Course Outcomes:

Sr. No	Course Outcome number	CO statement
1	**CO1**	Understand basic principles of Python with data Science.
2	**CO2**	Implement object-oriented concepts and handling of data.
3	**CO3**	Implement data visualization method for effective visualization of data
4	**CO4**	Create user defined functions, strings, lists and perform searching & sorting.
5	**CO5**	Implement Oriented programming features of Python and process data sets.

Syllabus:

List of Experiments
1. Write python programs to understand Expressions, Variables, Quotes, Basic Math operations, Strings
2.Perform Basic String Operations & String Methods, List etc.
3.Write python programs to understandtypecasting.
4. Python Program to Map Two Lists into a Dictionary
5. Write python programs to understand different Object-oriented features in Python i.e Inheritance & Polymorphism, Exception handling
6. Write a python program to create a data frame for given data set.
7. Write a python program to create the list, change the value of list, create list with different data

types.
8. Python Program to Map Two Lists into a Dictionary
9. Develop python program for Correlation coefficient.
10. To draw basic plots in Python program using Matplotlib.