

VEMU Institute of Technology

(UGC-Autonomous)

Affiliated to
Jawaharlal Nehru Technological University
Anantapur



Course Structure

(R23) Regulations

For

Master of Computer Applications

(Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2023-2024** onwards)

MASTER OF COMPUTER APPLICATIONS

R23 REGULATIONS

DISTRIBUTION OF CREDITS

S.No	Semester 1	Semester 2	Total
I Year	28	28	56
II Year	28	18	46
Total			102

MASTER OF COMPUTER APPLICATIONS

SEMESTER - I

S.No.	Course code	Course Name	Hours per week			Credits
			L	T	P	
1.	23MCCA01T	Mathematical Foundations of Computer Applications	4	0	0	4
2.	23MCCA02T	Operating Systems	4	0	0	4
3.	23MCCA03T	Computer Organization & Architecture	4	0	0	4
4.	23MCCA04T	Data Structures using C	4	0	0	4
5.	23MCCA05T	Database Management Systems	4	0	0	4
6.	23MCCA01P	Operating Systems Laboratory	0	1	2	2
7.	23MCCA02P	Data Structures using C Laboratory	0	1	2	2
8.	23MCCA03P	Database Management Systems Laboratory	0	1	2	2
9	23MCCA01A	Research Methodology and IPR	2	0	0	2
		TOTAL	22	3	8	28

SEMESTER - II

S.No.	Course code	Course Name	Hours per			Credits
			L	T	P	
1.	23MCCA06T	Software Engineering	4	0	0	4
2.	23MCCA07T	Data Science with Python	4	0	0	4
3.	23MCCA08T	Computer Networks	4	0	0	4
4.	23MCCA09T 23MCCA10T 23MCCA11T	Program Elective – I Software Testing Methodologies Mobile Application Development Managerial Economics and Financial Accountancy	4	0	0	3
5.	23MCBA01T 23MCBA02T 23MCCS01T	Open Elective – I Operations Research Digital Marketing Cloud Computing	3	0	0	3
6.	23MCCA04P	Software Engineering Laboratory	0	1	2	2
7.	23MCCA05P	Data Science Laboratory	0	1	2	2
8.	23MCCA06P	Computer Networks Laboratory	0	1	2	2
9.	23MCSK01P	Skill Oriented Course – I JAVA Programming	0	1	2	2
10.	23MCCA01S	Seminar	0	0	4	2
		Total	19	4	10	28



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

SEMESTER – III

S.No.	Course Code	Course Name	Hours per			Credits
			L	T	P	
1.	23MCCA12T	Web Technologies	4	0	0	4
2.	23MCCA13T	Big Data Technologies	4	0	0	4
3.	23MCCA14T	Dev Ops & Agile Programming	4	0	0	4
4.	23MCCA15T	Program Elective – II Software Architecture & Design Patterns	3	0	0	3
	23MCCA16T	Network Security				
	23MCCA17T	Machine Learning				
5.	23MCCA18T	Program Elective – III Data Mining and Business Intelligence	3	0	0	3
	23MCCA19T	Internet of things				
	23MCCA20T	Block chain Technologies				
6.	23MCCA07P	Web Technologies Laboratory	0	1	2	2
7.	23MCCA08P	Big Data Technologies Laboratory	0	1	2	2
8.	23MCCA09P	Dev Ops & Agile Programming Laboratory	0	1	2	2
9.	23MCCA01I	Summer Internship / Industry Oriented Mini Project/ Skill Development Course (Minimum 16 weeks)	-	-	-	2
10.	23MCSK02P	Skill oriented Course – II Exploratory data analysis using R	1	0	2	2
		TOTAL	18	4	8	28

SEMESTER - IV

S.No.	Course Code	Course Name	Hours per			Credits
			L	T	P	
1.	23MCCA21T	Program Elective– IV Deep Learning	3	0	0	3
	23MCCA22T	Natural Language Programming				
	23MCCA23T	Multimedia Systems and Tools				
2.	23MCCA24T	Program Elective– V Cyber Security	3	0	0	3
	23MCCA25T	Enterprise Resource Planning				
	23MCCA26T	NOSQL Databases				
3.	23MCCA01D	Project Work	0	0	20	10
4.	23MCCA01V	Comprehensive Viva Voce	-	-	-	2
		TOTAL	6		20	18



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MASTER OF COMPUTER APPLICATIONS

Course Code	MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS	L	T	P	C
23MCCA01T		4	0	0	4
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> • Introduces the elementary discrete mathematics for computer science and engineering. • Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Demonstrate the ability to understand and construct precise mathematical proofs • Demonstrate the ability to use logic and set theory to formulate precise statements • Acquire the knowledge to analyse and solve counting problems on finite and discrete structures • Demonstrate the ability to describe and manipulate sequences • Demonstrate the ability to apply graph theory in solving computing problems 					
UNIT – I					Lecture Hrs:
The Foundations Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.					
UNIT – II					Lecture Hrs:
Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations: Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.					
UNIT - III					Lecture Hrs:
Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity of Algorithms. Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness					
UNIT – IV					Lecture Hrs:
Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Bayes’ Theorem, Expected Value and Variance. Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion.					
UNIT – V					Lecture Hrs:
Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.					
TEXTBOOKS					
1. Discrete Mathematics and Its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7 th Edition, TMH.					
REFERENCES					
<ol style="list-style-type: none"> 1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH, 2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Theodore P. Baker, 2nd ed., Pearson Education. 3. Discrete Mathematics- Richard Johnsonbaugh, 7th ed., Pearson Education. 4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter. 5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education. 					



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MASTER OF COMPUTER APPLICATIONS

Course Code		L	T	P	C
23MCCA02T	OPERATING SYSTEMS	4	0	0	4
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> Understand basic concepts and functions of operating systems Understand the processes, threads and scheduling algorithms. Provide good insight on various memory management techniques Expose the students with different techniques of handling deadlocks Explore the concept of file-system and its implementation issues Familiarize with the basics of Linux operating system Implement various schemes for achieving system protection and security 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Realize how applications interact with the operating system Analyze the functioning of a kernel in an Operating system. Summarize resource management in operating systems Analyze various scheduling algorithms Examine concurrency mechanism in Operating Systems 					
UNIT - I		Lecture Hrs: 12			
Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.					
UNIT - II		Lecture Hrs: 12			
Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples. Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.					
UNIT - III		Lecture Hrs: 12			
Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples. Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.					
UNIT - IV		Lecture Hrs: 12			
Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention. File Systems: Files, Directories, File system implementation, management and optimization. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.					
UNIT - V		Lecture Hrs: 12			
System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights. System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks,					



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Computer security classification.

Case Studies: Linux, Microsoft Windows.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Inter-process Communication and File systems.)



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

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Course Code	COMPUTER ORGANIZATION & ARCHITECTURE	L	T	P	C
23MCCA03T		4	0	0	4
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> Learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design Understand the structure and behavior of various functional modules of a computer. Discuss the techniques that computers use to communicate with I/O devices Study the concepts of pipelining and the way it can speed up processing. Describe the basic characteristics of multiprocessors 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os Able to explore the hardware requirements for cache memory and virtual memory Ability to design algorithms to exploit pipelining and multiprocessors Ability to use memory and I/O devices effectively Detect pipeline hazards and identify possible solutions to those hazards 					
UNIT – I		Lecture Hrs:			
Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer. Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations INTEL-8086: CPU architecture, Addressing modes - generation of physical address- code segment registers, Zero, one, two, and three address instructions. INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS-Data transfer instructions, input- output instructions, arithmetic, logical, shift, and rotate instructions, Conditional and unconditional transfer.					
UNIT – II		Lecture Hrs:			
Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating- Point Numbers and Operations. Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multi-programmed Control.					
UNIT - III		Lecture Hrs:			
The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.					
UNIT – IV		Lecture Hrs:			
Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.					
UNIT – V		Lecture Hrs:			
Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets. Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.					
TEXT BOOKS:					
1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill Education, 5th Edition, 2013. 2. Microprocessors and Interfacing, Douglas Hall, Tata McGraw-Hill.					



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Course Code	DATA STRUCTURES USING C	L	T	P	C
23MCCA04T		4	0	0	4
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> To illustrate the basic concepts of C programming language. To discuss the concepts of Functions, Arrays, Pointers and Structures. To familiarize with Stack, Queue and Linked lists data structures. To explain the concepts of non-linear data structures like graphs and trees. To learn the different types of searching and sorting techniques. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Use C basic concepts to write simple C programs Explain the different notations of arithmetic express Analyze various operations on linked list Develop the representation of Tress Design the different sorting technique 					
UNIT – I		Lecture Hrs:			
Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Operators and Expressions, Decision Statements - If and Switch Statements, Loop Control Statements -while, for, do-while Statements. Introduction to Functions, Storage classes, Arrays, Structures, Unions, Pointers, Strings and Command line arguments.					
UNIT – II		Lecture Hrs:			
Data Structures, Stacks and Queues- Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operations on a Stack, Implementation of a Stack, Evaluation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.					
UNIT - III		Lecture Hrs:			
Linked Lists–Pointers, Singly Linked List, Dynamically Linked Stacks and Queues, Polynomials Using Singly Linked Lists, Using Circularly Linked Lists, Insertion, Deletion and Searching Operations, Doubly linked lists and its operations, Circular linked lists and its operations.					
UNIT – IV		Lecture Hrs:			
Trees- Tree terminology, representation, Binary tress, representation, Binary tree traversals. Binary Tree Operations, Graphs- Graph terminology, Graph representation, Elementary Graph Operations, Breadth first search (BFS) and Depth first search (DFS), Connected Components, Spanning Trees.					
UNIT – V		Lecture Hrs:			
Searching and Sorting–Sequential, Binary, Exchange (Bubble) Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort. Searching- Linear and Binary Search Methods.					
Text Books:					
<ol style="list-style-type: none"> 1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication. 2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press. 3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education. 4. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016. 5. Richard F. Gilberg&Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, Second Edition, CENGAGE Learning, 2011. 					



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Course Code	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
23MCCA05T		4	0	0	4
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques. Enable students to model ER diagram for any customized application Inducting appropriate strategies for optimization of queries. Provide knowledge on concurrency techniques Demonstrate the organization of Databases 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Design a database for a real world information system Define transactions which preserve the integrity of the database Generate tables for a database Organize the data to prevent redundancy Pose queries to retrieve the information from database 					
UNIT – I		Lecture Hrs:			
Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Database Design, Database Engine, Database and Application Architecture, Database Users and Administrators. Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Algebra					
UNIT – II		Lecture Hrs:			
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: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Index Definition in SQL, Authorization. Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features.					
UNIT – III		Lecture Hrs:			
Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Complex Attributes, Mapping Cardinalities, Primary Key, Removing Redundant Attributes in Entity Sets, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features, Entity- Relationship Design Issues, Alternative Notations for Modelling Data, Other Aspects of Database Design. Relational Database Design: Features of Good Relational Designs, Decomposition Using Functional Dependencies, Normal Forms, Functional-Dependency Theory, Algorithms for Decomposition using Functional Dependencies, Decomposition Using Multivalued Dependencies, More Normal Forms, Atomic Domains and First Normal Form, Database–Design Process, Modelling Temporal Data, Indexing.					
UNIT – IV		Lecture Hrs:			
Query Processing: Overview, Measures of Query cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Query Processing in Memory. Query optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.					
UNIT – V		Lecture Hrs:			
Transaction Management: Transactions: Transaction Concept, A Simple Transactional Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity,					



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Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements. Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Insert Operations. Delete Operations and Predicate Reads, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes, Snapshot Isolation, Weak Levels of Consistency in Practice, Advanced Topics in Concurrency.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Non-Volatile Storage, High Availability Using Remote Backup Systems, Early Lock Release and Logical Undo Operations, ARIES, Recovery in Main- Memory Databases.

TEXT BOOKS:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts", 7/e, TMH 2020



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Course Code		L	T	P	C
23MCCA01P	OPERATING SYSTEMS LABORATORY	0	1	2	2
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> To understand the functionalities of various layers of OSI model To explain the difference between hardware, software; operating systems, programs and files. Identify the purpose of different software applications. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management. Able to implement C programs using Unix system calls 					
List of Experiments:					
<p>Week 1: Simulate the following CPU scheduling algorithms. a) FCFS b) SJF c) Round Robin d) Priority.</p> <p>Week 2: Write a C program to simulate producer-consumer problem using Semaphores</p> <p>Week 3: Write a C program to simulate the concept of Dining-philosophers problem.</p> <p>Week 4: Simulate MVT and MFT.</p> <p>Week 5: Write a C program to simulate the following contiguous memory allocation Techniques a) Worst fit b) Best fit c) First fit.</p> <p>Week 6: Simulate all page replacement algorithms a)FIFO b) LRU c) OPTIMAL</p> <p>Week 7: Simulate all File Organization Techniques a) Single level directory b) Two level directory</p> <p>Week 8: Simulate all file allocation strategies a) Sequential b) Indexed c) Linked.</p> <p>Week 9: Simulate Bankers Algorithm for Dead Lock Avoidance. Week 10: Simulate Bankers Algorithm for Dead Lock Prevention. Week 11: Write a C program to simulate disk scheduling algorithms. a) FCFS b) SCAN c) C-SCAN</p>					



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Course Code		L	T	P	C
23MCCA02P	DATA STRUCTURES USING C LABORATORY	0	1	2	2
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> To get familiar with the basic concepts of C programming. To design programs using arrays, strings, pointers and structures. To illustrate the use of Stacks and Queues To apply different operations on linked lists. To demonstrate the Binary tree traversal techniques. To design searching and sorting techniques 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists. Implement searching and sorting algorithms 					
List of Experiments:					
<p>Write C programs that use both recursive and non-recursive functions</p> <p>i) To find the factorial of a given integer. ii) To find the GCD (greatest common divisor) of two given integers. iii) To solve Towers of Hanoi problem.</p> <p>a) Write a C program to find both the largest and smallest number in a list of integers. b) Write a C program that uses functions to perform the following: i) Addition of Two Matrices ii) Multiplication of Two Matrices</p> <p>a) Write a C program that uses functions to perform the following operations: i) To insert a sub-string in to a given main string from a given position. ii) To delete n Characters from a given position in a given string.</p> <p>a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T. b) Write a C program to count the lines, words and characters in a given text.</p> <p>a) Write a C Program to perform various arithmetic operations on pointer variables. b) Write a C Program to demonstrate the following parameter passing mechanisms: i) call-by-value ii) call-by-reference.</p> <p>Write a C program that uses functions to perform the following operations: i) Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers iv) Multiplication of two complex numbers (Note: represent complex number using a structure.)</p> <p>Write C programs that implement stack (its operations) using</p>					



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i) Arrays

ii) Pointers

Write C programs that implement Queue (its operations) using

i) Arrays

ii) Pointers

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Write a C program that uses functions to perform the following operations on Circular linkedlist.

i) Creation ii) Insertion iii) Deletion iv) Traversal

Write a C program that uses functions to perform the following:

i) Creating a Binary Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search

ii) Binary search

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort

ii) Selection sort

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Insertion sort

ii) Merge sort

iii) Quick sort



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Course Code	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C												
23MCCA03P		0	1	2	2												
Semester		I															
Course Objectives:																	
<ul style="list-style-type: none"> To implement the basic knowledge of SQL queries and relational algebra. To construct database models for different database applications. To apply normalization techniques for refining of databases. To practice various triggers, procedures, and cursors using PL/SQL. To design and implementation of a database for an organization 																	
Course Outcomes (CO):																	
<ul style="list-style-type: none"> Design database for any real-world problem Implement PL/SQL programs Define SQL queries Decide the constraints Investigate for data inconsistency 																	
List of Experiments:																	
<p>1. Create a table called Employee with the following structure.</p> <p>a. Add a column commission with domain to the Employee table.</p> <p>b. Insert any five records into the table.</p> <p>c. Update the column details of job</p> <p>d. Rename the column of Employ table using alter command.</p> <p>e. Delete the employee whose empno is 19.</p>																	
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Name</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>Empno</td> <td>Number</td> </tr> <tr> <td>Ename</td> <td>Varchar2(20)</td> </tr> <tr> <td>Job</td> <td>Varchar2(20)</td> </tr> <tr> <td>Mgr</td> <td>Number</td> </tr> <tr> <td>Sal</td> <td>Number</td> </tr> </tbody> </table>						Name	Type	Empno	Number	Ename	Varchar2(20)	Job	Varchar2(20)	Mgr	Number	Sal	Number
Name	Type																
Empno	Number																
Ename	Varchar2(20)																
Job	Varchar2(20)																
Mgr	Number																
Sal	Number																
<p>1. Create department table with the following structure.</p>																	
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Name</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>Deptno</td> <td>Number</td> </tr> <tr> <td>Deptname</td> <td>Varchar2(20)</td> </tr> <tr> <td>Location</td> <td>Varchar2(20)</td> </tr> </tbody> </table>						Name	Type	Deptno	Number	Deptname	Varchar2(20)	Location	Varchar2(20)				
Name	Type																
Deptno	Number																
Deptname	Varchar2(20)																
Location	Varchar2(20)																



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- a. Add column designation to the department table.
- b. Insert values into the table.
- c. List the records of emp table grouped by dept no.
- d. Update the record where dept no is 9.
- e. Delete any column data from the table

QUERIES USING DDL AND DML

1.
 - a. Create a user and grant all permissions to the user.
 - b. Insert the any three records in the employee table and use rollback. Check the result.
 - c. Add primary key constraint and not null constraint to the employee table.
 - d. Insert null values to the employee table and verify the result.
2.
 - a. Create a user and grant all permissions to the user.
 - b. Insert values in the department table and use commit.
 - c. Add constraints like unique and not null to the department table.
 - d. Insert repeated values and null values into the table.
3.
 - a. Create a user and grant all permissions to the user.
 - b. Insert values into the table and use commit.
 - c. Delete any three records in the department table and use rollback.
 - d. Add constraint primary key and foreign key to the table.
4.
 - a. Create a user and grant all permissions to the user.
 - b. Insert records in the sailor table and use commit.
 - c. Add save point after insertion of records and verify save point.
 - d. Add constraints not null and primary key to the sailor table.
5.
 - a. Create a user and grant all permissions to the user.
 - b. Use revoke command to remove user permissions.
 - c. Change password of the user created.
 - d. Add constraint foreign key and not null.
6.
 - a. Create a user and grant all permissions to the user.
 - b. Update the table reserves and use save point and rollback.
 - c. Add constraint primary key, foreign key and not null to the reserves table
 - d. Delete constraint not null to the table column.

QUERIES USING AGGREGATE FUNCTIONS

1.
 - a. By using the group by clause, display the names who belongs to dept no 10 along with average salary.
 - b. Display lowest paid employee details under each department.
 - c. Display number of employees working in each department and their department number.
 - d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert dept name to dept table and insert dept name for each row, do the required thing specified above.
 - e. List all employees which start with either B or C.
 - f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2.
 - a. Calculate the average salary for each different job.
 - b. Show the average salary of each job excluding manager.
 - c. Show the average salary for all departments employing more than three people.
 - d. Display employees who earn more than the lowest salary in department 30
 - e. Show that value returned by sign (n)function.



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- f. How many days between day of birth to current date
3. a. Show that two substring as single string.
- b. List all employee names, salary and 15% rise in salary.
- c. Display lowest paid emp details under each manager
- d. Display the average monthly salary bill for each deptno.
- e. Show the average salary for all departments employing more than two people.
- f. By using the group by clause, display the eid who belongs to dept no 05 along with average salary.
4. a. Count the number of employees in department20
- b. Find the minimum salary earned by clerk.
- c. Find minimum, maximum, average salary of all employees.
- d. List the minimum and maximum salaries for each job type.
- e. List the employee names in descending order.
- f. List the employee id, names in ascending order by empid.
5. a. Find the sids ,names of sailors who have reserved all boats called "INTERLAKE
Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
- b. Find the sname , bid and reservation date for each reservation.
- c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
- d. List in alphabetic order all sailors who have reserved red boat.
- e. Find the age of youngest sailor for each rating level.
- 6 a. List the Vendors who have delivered products within 6 months.
- b. Display the Vendor details who have supplied both Assembled and Subparts.
- c. Display the Sub parts by grouping the Vendor type (Local or Non Local).

PROGRAMS ON PL/SQL

1. a. Write a PL/SQL program to swaptwonumbers.
- b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display thegrade.
- b. Write a PL/SQL program to find the sum of digits in a given umber.
3. a. Write a PL/SQL program to display the number in reverse order.
- b. Writea PL/SQLprogramtocheckwhetherthegivennumberisprimeornot.
4. a. Write a PL/SQL program to find the factorial of a givennumber.
- b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius andarea.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the worldHello).
- b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainderin words.

PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number and hence find NCR.
4. Write a PL/SQL block o pint prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birth date.
6. Create function to the reverse of given number



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PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.
3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not

CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degree they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.



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Course Code		L	T	P	C
23MCCA01A	RESEARCH METHODOLOGY AND IPR	2	0	0	2
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> • Identify an appropriate research problem in their interesting domain. • Understand ethical issues understand the Preparation of a research project thesis report. • Understand the Preparation of a research project thesis report • Understand the law of patent and copyrights. • Understand the Adequate knowledge on IPR 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Analyze research related information • Follow research ethics • Understand that today’s world is controlled by Computer, Information Technology, but tomorrow w world will be ruled by ideas, concept, and creativity. • Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. • Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits. 					
UNIT - I		Lecture Hrs:			
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations					
UNIT - II		Lecture Hrs:			
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.					
UNIT - III		Lecture Hrs:			
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.					
UNIT - IV		Lecture Hrs:			
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.					
UNIT - V		Lecture Hrs:			
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.					
Text Books:					
<ol style="list-style-type: none"> 1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students” 2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction” 					



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Course Code	SOFTWARE ENGINEERING	L	T	P	C
23MCCA06T		4	0	0	4
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To learn the basic concepts of software engineering and life cycle models To explore the issues in software requirements specification and enable to write SRS documents for software development problems To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing To reveal the basic concepts in software project management 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Ability to apply software engineering principles and techniques. Ability to develop, maintain and evaluate large-scale software systems. To produce efficient, reliable, robust and cost-effective software solutions. Ability to work as an effective member or leader of software engineering teams. Ability to understand and meet ethical standards and legal responsibilities. 					
UNIT – I		Lecture Hrs:			
Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.					
UNIT – II		Lecture Hrs:			
The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques. Axiomatic specification, algebraic specification.					
UNIT - III		Lecture Hrs:			
Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based Vs. Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.					
UNIT – IV		Lecture Hrs:			
Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.					
UNIT – V		Lecture Hrs:			
Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.					
Text Books:					
<ol style="list-style-type: none"> 1. RajibMall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018. 2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill. 					



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Course Code	DATA SCIENCE WITH PYTHON	L	T	P	C
23MCCA07T			4	0	0
Semester		II			
Course Objectives:					
<p>Ideally for a student to understand Data Science, he/she should have exposure to the following. This will give a basic feel about Data Science. In the following, the topics highlighted in light blue is minimum needed and those highlighted in yellow will help to get a feel about the subject.</p> <p>Overall it covers the following:</p> <ul style="list-style-type: none"> • Basics of probability • Basics of statistics • Pattern Recognition • Machine Learning • Introduction on Deep Neural Networks. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Obtain, clean/process, and transform data • Analyze and interpret data using an ethically responsible approach • Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues • Apply computing theory, languages, and algorithms, as well as mathematical and statistical models, and the principles of optimization to appropriately formulate and use data analyses • Formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges • Perform well in a group 					
UNIT – I					Lecture Hrs:
Descriptive Statistics: Measures of central tendency—mean, median, mode, harmonic mean and geometric mean; Measures of dispersion – mean deviation from mean, standard deviation and variance. Central moments. Linear and rank correlation. Covariance and correlation; Statistics and sampling distributions; Hypothesis testing of means, proportions, variances and correlations Definition of random variable and probability, (problems depending on counting –taught in MFCS), discrete probability distributions: Bernoulli, Binomial, Poisson; Continuous probability distributions: Gaussian, Exponential, Chisquare. Definition of Bayesian probability.					
UNIT - II					Lecture Hrs:
Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps etc.					
UNIT - III					Lecture Hrs:
Patterns, features, patter representation, curse of dimensionality, dimensionality reduction. Supervised and Unsupervised learning. Classification—linear and non-linear. Bayesian, Perceptron, Nearest neighbour classifier, Support vector machine, use of kernels, Logistic regression, Naïve-bayes, decision trees and random forests; boosting and bagging. Clustering---partitional and hierarchical; k-means clustering. Regression. Least squares. Evaluation metrics: RMSE, MAE and Coefficient of Determination (R- square) Cost functions, training and testing a classifier. Cross-validation. Class-imbalance – ways of handling, Exploratory data analysis (EDA), evaluation metrics— Precision, Recall, RoC, AUC; Confusion matrix, Classification accuracy					
UNIT - IV					Lecture Hrs:



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Multilayer perceptron. Back propagation. Loss functions. Epochs and Batch sizes. Hyper parameter tuning. Applications to classification, regression and unsupervised learning. Overview (introduction to the terms) of RNN, CNN and LSTM.

UNIT - V

Applications to text, images, videos: recommender systems, image classification, Social network graphs

Textbooks:

- Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from the Frontline. O'Reilly, 2013.
- Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.
- Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009.
- Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.



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Course Code		L	T	P	C
23MCCA08T	COMPUTER NETWORKS	4	0	0	4
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> Introduce the basic concepts of Computer Networks. Introduce the layered approach for design of computer networks Expose the network protocols used in Internet environment Explain the format of headers of IP, TCP and UDP Familiarize with the applications of Internet Elucidate the design issues for a computer network 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Identify the software and hardware components of a Computer network (L1) Design software for a Computer network (L6) Develop new routing, and congestion control algorithms (L3) Critique the existing routing protocols (L5) Explain the functionality of each layer of a computer network (L2) Employ the appropriate transport protocol based on the application requirements (L3) 					
UNIT – I		Lecture Hrs: 12			
What is the Internet, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet					
UNIT – II		Lecture Hrs:12			
Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet’s Directory Service, Peer-to-Peer Applications					
UNIT – III		Lecture Hrs:12			
Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control					
UNIT – IV		Lecture Hrs:12			
Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing					
UNIT – V		Lecture Hrs:12			
Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Centre Networking, Retrospective: A Day in the Life of a Web Page Request					
Text Books:					
1. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6th edition, Pearson, 2019.					



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Course Code 23MCCA09T	SOFTWARE TESTING METHODOLOGIES	L	T	P	C
		4	0	0	3
Semester		I			
Course Objectives:					
<ul style="list-style-type: none"> • To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies. • To develop skills in software test automation and management using latest tools. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Have an ability to apply software testing knowledge and engineering methods. • Have an ability to design and conduct a software test process for a software testing project. • Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation. • Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods. • Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects 					
UNIT - I		Lecture Hrs:			
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of Bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and Achievable paths, path sensitizing, path instrumentation, application of path testing.					
UNIT - II		Lecture Hrs:			
Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domainntesting, domains and interfaces testing, domain and interface testing, domains and testability					
UNIT - III		Lecture Hrs:			
Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.					
UNIT - IV		Lecture Hrs:			
State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.					
UNIT - V		Lecture Hrs:			
Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).					
Text Books:					
<ol style="list-style-type: none"> 1. Software Testing techniques - BarisBeizer, Dreamtech, second edition. 2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech. 					



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Course Code	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
23MCCA10T		4	0	0	4
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To demonstrate their understanding of the fundamentals of Android operating systems To improves their skills of using Android software development tools To demonstrate their ability to develop software with reasonable complexity on mobile platform To demonstrate their ability to deploy software to mobile devices To demonstrate their ability to debug programs running on mobile devices 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Student understands the working of Android OS Practically. Student will be able to develop Android user interfaces Student will be able to develop, deploy and maintain the Android Applications. 					
UNIT – I		Lecture Hrs:			
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes.					
UNIT – II		Lecture Hrs:			
Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities					
UNIT – III		Lecture Hrs:			
Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts					
UNIT – IV		Lecture Hrs:			
Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference					
UNIT – V		Lecture Hrs:			
Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)					
Text Books:					
<ol style="list-style-type: none"> 1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox)2012 2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013 					



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Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	L	T	P	C
23MCCA11T		4	0	0	4
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Prepare balance sheets of budget. Get the skill to manage finances of a firm/company 					
UNIT - I		Lecture Hrs:			
Introduction & Demand Analysis Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.					
UNIT - II		Lecture Hrs:			
Production Function- Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) – Managerial Significance.					
UNIT - III		Lecture Hrs:			
Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing. Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing. Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.					
UNIT - IV		Lecture Hrs:			
Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership. Joint Stock Company. Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.					
UNIT - V		Lecture Hrs:			
Introduction to Financial Accounting: Double-Entry Book Keeping, Journal. Ledger. Trial Balance- Final Accounts (Trading Account. Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio). Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio).					
Text Books:					
<ol style="list-style-type: none"> 1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2009. 2. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2009. 					



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Course Code	OPERATIONS RESEARCH	L	T	P	C
23MCBA01T		3	0	0	3
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To impart knowledge in concepts and tools of Operations Research To understand mathematical models used in Operations Research To apply these techniques constructively to make effective business decisions 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Solve Linear Programming Problems Solve Transportation and Assignment Problems Understand the usage of game theory and Simulation for Solving Business Problems 					
UNIT - I		Lecture Hrs:			
Linear programming problems - Mathematical formulation, graphical method of solution, simplex method					
UNIT - II		Lecture Hrs:			
Duality in linear programming problems, dual simplex method, sensitivity analysis, transportation and assignment problems, Traveling salesman Problem.					
UNIT - III		Lecture Hrs:			
Game theory Introduction, two-person zero-sum games, some basic terms, the maxmin principle, games without saddle points-Mixed Strategies, graphic solution of $2 \times n$ and $m \times 2$ games, dominance property. CPM & PERT- project scheduling, critical path calculations, Crashing.					
UNIT - IV		Lecture Hrs:			
Queuing theory -basic structure of queuing systems, roles of the Poisson and exponential distributions, classification of queues basic results of M/M/1: FIFO systems, Extension to multi-server queues.					
UNIT - V		Lecture Hrs:			
Simulation: simulation concepts, simulation of a queuing system using event list, pseudorandom numbers, multiplication congruential algorithm, inverse transformation method, basic ideas of Monte-Carlo simulation.					
Text Books:					
<ul style="list-style-type: none"> Taha.H.A ,operation Research : An Introduction, McMilan publishing Co., 1982. 7th ed. Ravindran A, Philips D.T &Solbery.J.J, Operations Research: Principles and practice, John Wiley & Sons, New York, 1987. Frank S. Budnick, Dennis Mcleavey and Richard Mojena, Principles of Operations Research for Management. All India Traveler Book seller, Delhi. Gillet.B.E., Introduction to Operations Research - A Computer oriented algorithmic approach, McGraw Hill, 1987. Joseph.G.Ecker& Michael Kupper Schimd, Introduction to operations Research, John Wiley & Sons, 1988. Hillier.F.S&Liberman.G.J, operation Research, Second Edition, Holden Day Inc, 1974. KantiSwarup, Gupta.P.K. & Man Mohan, operations Research, S.Chand& Sons. 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	DIGITAL MARKETING	L	T	P	C
23MCBA02T		3	0	0	3
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> The primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment. It also focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> To examine and explore the role and importance of digital marketing in today's rapidly changing business environment. To focus on how digital marketing can be utilized by organizations and how its effectiveness can be measured. To know the key elements of a digital marketing strategy To study how the effectiveness of a digital marketing campaign can be measured To demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs. 					
UNIT - I		Lecture Hrs:			
Online Market space- Digital Marketing Strategy- Components -Opportunities for building Brand-Website - Planning and Creation- Content Marketing.					
UNIT - II		Lecture Hrs:			
Search Engine optimisation - Keyword Strategy- SEO Strategy - SEO success factors - On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works- SEM components- PPC advertising -Display Advertisement					
UNIT - III		Lecture Hrs:			
E- Mail Marketing - Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximising email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and targeting.					
UNIT - IV		Lecture Hrs:			
Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns. Engagement Marketing-Building Customer relationships - Creating Loyalty drivers - Influencer Marketing.					
UNIT - V		Lecture Hrs:			
.Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.					
Text Books:					
1. Fundamentals of Digital Marketing by Puneet Singh Bhatia;Publisher: Pearson Education; First edition (July 2017)					
2. Digital Marketing by Vandana Ahuja ;Publisher: Oxford University Press (April 2015)					



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MASTER OF COMPUTER APPLICATIONS

Course Code	CLOUD COMPUTING	L	T	P	C
23MCCS01T		3	0	0	3
	Semester	II			
Course Objectives:					
<ul style="list-style-type: none"> To understand the need of Cloud Computing. To develop cloud applications. To demonstrate design the architecture for new cloud application. To teach how to re-architect the existing application for the cloud. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Outline the procedure for Cloud deployment (L4) Investigate different cloud service models and deployment models (L4) Compare different cloud services. (L4) Design applications for an organization which use cloud environment. (L6) Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data. (L2) 					
UNIT – I		Lecture Hrs:			
<p>Introduction to cloud computing: Introduction, Characteristics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications</p> <p>Cloud concepts and Technologies: Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.</p> <p>Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application services, Content delivery services, Analytics Services, Deployment and Management Services, Identity & and Access Management services, Open Source Private Cloud software</p>					
UNIT – II		Lecture Hrs:			
<p>Hadoop & MapReduce: Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster setup.</p> <p>Cloud Application Design: Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.</p> <p>Python Basics: Introduction, Installing Python, Python data Types & Data Structures, Control flow, Function, Modules, Packages, File handling, Date/Time Operations, Classes.</p>					
UNIT – III		Lecture Hrs:			
<p>Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for MapReduce, Python packages of Interest, Python web Application Framework, Designing a RESTful web API.</p> <p>Cloud Application Development in Python: Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App.</p>					
UNIT – IV		Lecture Hrs:			
<p>Big Data Analytics: Introduction, Clustering Big Data, Classification of Big data, Recommendation of Systems.</p> <p>Multimedia Cloud: Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Transcoding App.</p> <p>Cloud Application Benchmarking and Tuning: Introduction, Workload Characteristics, Application Performance Metrics, Design Considerations for a Benchmarking Methodology, Benchmarking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop benchmarking case Study.</p>					
UNIT – V		Lecture Hrs:			
<p>Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity & Access Management, Data Security, Key Management, Auditing.</p> <p>Cloud for Industry, Healthcare & Education: Cloud Computing for Healthcare, Cloud computing for</p>					



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Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

Migrating into a Cloud: Introduction, Broad Approaches to migrating into the cloud, the seven –step model of migration into a cloud.

Organizational readiness and Change Management in The Cloud Age :Introduction, Basic concepts of Organizational Readiness, Drivers for changes : A frame work to comprehend the competitive environment , common change management models, change management maturity models, Organizational readiness self – assessment.

Text Books:

1. Cloud computing A hands-on Approach|| By ArshdeepBahga, Vijay Madiseti, Universities Press, 2016
2. Cloud Computing Principles and Paradigms: By Raj kumarBuyya, James Broberg, Andrzej Goscinski, wiley, 2016



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	SOFTWARE ENGINEERING LABORATORY	L	T	P	C
23MCCA04P			0	1	2
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> • To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Ability to translate end-user requirements into system and software requirements • Ability to generate a high-level design of the system from the software requirements • Will have experience and/or awareness of testing problems and will be able to develop a simple testing report 					
List of Experiments:					
<ol style="list-style-type: none"> 1) Development of problem statement. 2) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents. 3) Preparation of Software Configuration Management and Risk Management related documents. 4) Study and usage of any Design phase CASE tool 5) Performing the Design by using any Design phase CASE tools. 6) Develop test cases for unit testing and integration testing 7) Develop test cases for various white box and black box testing techniques. 					



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MASTER OF COMPUTER APPLICATIONS

Course Code	DATA SCIENCE LABORATORY	L	T	P	C
23MCCA05P		0	1	2	2
	Semester	II			
Course Objectives:					
<ul style="list-style-type: none"> To train the students in solving computational problems To elucidate solving mathematical problems using Python programming language To understand the fundamentals of Python programming concepts and its applications. Practical understanding of building different types of models and their evaluation 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Read, write, execute simple Python programs Decompose a Python program into functions Manipulate with 1-d,2-d and multidimensional data using Python Read and write data from/to files in Python programs 					
List of Experiments:					
<ol style="list-style-type: none"> 1. Write a program to demonstrate a) Different numeric data types and b) To perform different Arithmetic Operations on numbers in Python. 2. Write a program to create, append, and remove lists in Python. 3. Write a program to demonstrate working with tuples in Python. 4. Write a program to demonstrate working with dictionaries in Python. 5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy. 6. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data. 7. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file. 8. Write a program to demonstrate Regression analysis with residual plots on a given data set. 9. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. 10. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. 11. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions using Java/Python ML library classes. 12. Write a program to implement k-Means clustering algorithm to cluster the set of data stored in CSV file. Compare the results of various “k” values for the quality of clustering. 13. Write a program to build Artificial Neural Network and test the same using appropriate data sets. 					



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MASTER OF COMPUTER APPLICATIONS

Course Code	COMPUTER NETWORKS LABORATORY	L	T	P	C
23MCCA06P		0	0	4	2
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To understand the working principle of various communication protocols. To understand the network simulator environment and visualize a network topology and observe its performance To analyze the traffic flow and the contents of protocol frames 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> To understand the working principle of various communication protocols. To understand the network simulator environment and visualize a network topology and observe its performance To analyze the traffic flow and the contents of protocol frames 					
List of Experiments:					
<ol style="list-style-type: none"> 1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing. 2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP 3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism. 4. Implement Dijkstra's algorithm to compute the shortest path through a network 5. Take an example subnet of hosts and obtain a broadcast tree for the subnet. 6. Implement distance vector routing algorithm for obtaining routing tables at each node. 7. Implement data encryption and data decryption 8. Write a program for congestion control using Leaky bucket algorithm. 9. Write a program for frame sorting technique used in buffers. 10. Wireshark <ol style="list-style-type: none"> i. Packet Capture Using Wire shark ii. Starting Wire shark iii. Viewing Captured Traffic iv. Analysis and Statistics & Filters. 11. How to run Nmap scan 12. Operating System Detection using Nmap 13. Do the following using NS2 Simulator <ol style="list-style-type: none"> i. NS2 Simulator-Introduction ii. Simulate to Find the Number of Packets Dropped iii. Simulate to Find the Number of Packets Dropped by TCP/UDP iv. Simulate to Find the Number of Packets Dropped due to Congestion v. Simulate to Compare Data Rate& Throughput. vi. Simulate to Plot Congestion for Different Source/Destination vii. Simulate to Determine the Performance with respect to Transmission of Packets 					



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MASTER OF COMPUTER APPLICATIONS

Course Code		L	T	P	C
23MCSK01P	JAVA PROGRAMMING	0	1	2	2
Semester		II			
Course Objectives:					
<ul style="list-style-type: none"> To introduce the object-oriented programming concepts. To understand object-oriented programming concepts, and apply them in solving problems. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes To introduce the implementation of packages and interfaces To introduce the concepts of exception handling and multithreading. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Able to solve real world problems using OOP techniques. Able to understand the use of abstract classes. Able to solve problems using java collection framework and I/o classes. Able to develop multithreaded applications with synchronization. 					
UNIT - I	Object-Oriented Thinking	Lecture Hrs:			
<p>A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.</p> <p>Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of</p>					
UNIT - II		Lecture Hrs:			
<p>Packages- Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.</p> <p>Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.</p>					
UNIT - III		Lecture Hrs:			
<p>Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception subclasses.</p> <p>Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication</p>					
UNIT - IV		Lecture Hrs:			
<p>The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable, Properties, Stack, Vector.</p> <p>More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner</p>					
UNIT - V		Lecture Hrs:			



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GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling - The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **The Swing Buttons**- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

References:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.



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MASTER OF COMPUTER APPLICATIONS

Course Code	WEB TECHNOLOGIES	L	T	P	C
23MCCA12T		4	0	0	4
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> To introduce PHP language for server-side scripting To introduce XML and processing of XML Data with Java To introduce Server-side programming with Java Servlets and JSP To introduce Client-side scripting with Javascript and AJAX. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Gain knowledge of client-side scripting, validation of forms and AJAX programming Understand server-side scripting with PHP language Understand what is XML and how to parse and use XML Data with Java To introduce Server-side programming with Java Servlets and JSP 					
UNIT - I		Lecture Hrs:			
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories					
UNIT - II		Lecture Hrs:			
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.					
UNIT - III		Lecture Hrs:			
Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling HttpRequest & Responses, Using Cookies and Sessions, connecting to a database using JDBC.					
UNIT - IV		Lecture Hrs:			
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.					
UNIT - V		Lecture Hrs:			
Client-side Scripting: Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions. event handlers (on click, on submit etc.), Document Object Model, Form validation.					
Text Books:					
<ol style="list-style-type: none"> 1. Web Technologies, Uttam K Roy, Oxford University Press 2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hil 					



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MASTER OF COMPUTER APPLICATIONS

Course Code	BIG DATA TECHNOLOGIES	L	T	P	C
23MCCA13T		4	0	0	4
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> To understand the specialized aspects of big data including big data application, and big data analytics. To study different types Case studies on the current research and applications of the Hadoop and big data in industry. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Discuss the challenges and their solutions in Big Data Understand and work on Hadoop Framework and eco systems. Explain and Analyze the Big Data using Map-reduce programming in Both Hadoop and Spark framework. Demonstrate spark programming with different programming languages. Demonstrate the graph algorithms and live streaming data in Spark 					
UNIT – I		Lecture Hrs: 12			
What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics					
UNIT – II		Lecture Hrs: 12			
Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing mapreduce, Calculations.					
UNIT – III		Lecture Hrs:			
Data format, analysing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures					
UNIT – IV		Lecture Hrs:			
MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats.					
UNIT – V		Lecture Hrs:			
Hbase, data model and implementations, Hbase clients, Hbase examples, praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration, Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.					
Text Books:					
<ol style="list-style-type: none"> 1. Big Data Analytics, Introduction to Hadoop, Spark, and Machine-Learning, Raj kamal, PreetiSaxena, McGraw Hill, 2018. 2. Big Data, Big Analytics: Emerging Business intelligence and Analytic trends for Today's Business, Michael Minelli, Michelle Chambers, and AmbigaDhiraj, John Wiley & Sons, 2013 					



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MASTER OF COMPUTER APPLICATIONS

Course Code		L	T	P	C
23MCCA14T	DEVOPS & AGILE PROGRAMMING	4	0	0	4
	Semester	III			
Course Objectives:					
<ul style="list-style-type: none"> To give strong knowledge of Agile practices To give strong foundation of applications of DevOps To give strong foundation of development and its operations To give strong foundation of the source code management 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Understand the traditional software development. Learn the rise of agile methodologies. Define and design purpose of DevOps Understand applied DevOps. Learn real world applications of DevOps. Understand its practical examples. 					
UNIT - I		Lecture Hrs:			
Why Agile? How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value. Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.					
UNIT - II		Lecture Hrs:			
Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation. Planning-Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.					
UNIT - III		Lecture Hrs:			
Developing-Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.					
UNIT - IV		Lecture Hrs:			
DEFINITION & PURPOSE OF DEVOPS: Introduction to DevOps - DevOps and Agile, Minimum Viable Product - Application Deployment - Continuous Integration - Continuous Delivery					
UNIT - V		Lecture Hrs:			
CAMS (CULTURE, AUTOMATION, MEASUREMENT AND SHARING): CAMS – Culture - CAMS – Automation - CAMS – Measurement - CAMS – Sharing - Test-Driven Development - Configuration Management - Infrastructure Automation - Root Cause Analysis – Blamelessness - Organizational Learning.					
Text Books:					
<ol style="list-style-type: none"> 1. James Shore and Shane Warden, “ The Art of Agile Development”, O’REILLY, 2007. 2. Robert C. Martin, “Agile Software Development, Principles, Patterns, and Practices” , PHI, 2002. 3. The DevOps Handbook - by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis 4. What is DevOps? - by Mike Loukides 5. The DevOps Handbook - by John Willis, Patrick Debois, Jez Humble, Gene Kim. 6. DevOps: A Software Architect’s Perspective - by Len Bass, Ingo Weber, Liming Zhu. 					



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Course Code	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS	L	T	P	C
23MCCA15T		3	0	0	3
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> Learn How to add functionality to designs while minimizing complexity. What code qualities are required to maintain to keep code flexible? To Understand the common design patterns. To explore the appropriate patterns for design problems 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Design and implement codes with higher performance and lower complexity Experience core design principles and be able to assess the quality of a design with respect to these principles. Capable of applying these principles in the design of object oriented systems. Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary. Be able to select and apply suitable patterns in specific contexts 					
UNIT – I		Lecture Hrs:			
Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.					
UNIT – II		Lecture Hrs:			
Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM Moving from One System to Many Software Product Lines, Building systems from off the shelf components, Software architecture in future					
UNIT – III		Lecture Hrs:			
Patterns Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage. Creational and Structural Patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.					
UNIT – IV		Lecture Hrs:			
Behavioral Patterns Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.					
UNIT – V		Lecture Hrs:			
Case Studies A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development. A Case Study (Designing a Document Editor): Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.					
TEXT BOOKS:					
1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003. 2. Design Patterns, Erich Gamma, Pearson Education, 1995.					
REFERENCE BOOKS:					
1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003. 2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001 3.					



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3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F. Buschmann & others, John Wiley & Sons.



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Course Code		L	T	P	C
23MCCA16T	NETWORK SECURITY	3	0	0	3
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> Network security using various cryptographic algorithms. Underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide email and websecurity. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Understand the most common type of cryptographic algorithm Understand the Public-Key Infrastructure Understand security protocols for protecting data on networks Be able to digitally sign emails and files Understand vulnerability assessments and the weakness of using passwords for authentication Be able to perform simple vulnerability assessments and password audits 					
UNIT - I		Lecture Hrs:			
Attacks, Services and Mechanisms, Security Attacks, Security Services, Integrity check, digital Signature, authentication, has algorithms.					
UNIT - II		Lecture Hrs:			
Block Encryption, DES rounds, S-Boxes IDEA: Overview, comparison with DES, Key expansion, IDEA rounds, Uses of Secret key Cryptography; ECB, CBC, OFB, CFB, Multiple encryptions DES					
UNIT - III		Lecture Hrs:			
Length of hash, uses, algorithms (MD2, MD4, MD5, SHS) MD2: Algorithm (Padding, checksum, passes.) MD4 and 5: algorithm (padding, stages, digest computation.) SHS: Overview, padding, stages. Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: PKCS, Diffie-Hellman, El-Gamal signatures, DSS, Zero-knowledge signatures.					
UNIT - IV		Lecture Hrs:			
Password Based, Address Based, Cryptographic Authentication. Passwords in distributed systems, on-line vs offline guessing, storing. Cryptographic Authentication: passwords as keys, protocols, KDC's Certification Revocation, Interdomain, groups, delegation. Authentication of People: Verification techniques, passwords, length of passwords, password distribution, smart cards, biometrics.					
UNIT - V		Lecture Hrs:			
What is security policy, high and low level policy, user issues? Protocol problems, assumptions, Shared secret protocols, public key protocols, mutual authentication, reflection attacks, use of timestamps, nonce and sequence numbers, session keys, one-and two-way public key based authentication.					
Text Books:					
<ol style="list-style-type: none"> 1. AtulKahate, Cryptography and Network Security, McGraw Hill. 2. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice HallPTR., 2002. 3. Stallings W.Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR.,2003 4. Stallings, W. Network security Essentials: Applications and standards, Prentice Hall, 2000. 5. Cryptography and Network Security; McGraw Hill; Behrouz A Forouzan. 6. Information Security Intelligence Cryptographic Principles and App. CalabresThomson. 7. Securing A Wireless Network Chris Hurley SPD. 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	MACHINE LEARNING	L	T	P	C
23MCCA17T		3	0	0	3
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> This course explains machine learning techniques such as decision tree learning, Bayesian learning etc. To understand computational learning theory. To study the pattern comparison techniques. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Understand the concepts of computational intelligence like machine learning Ability to get the skill to apply machine learning techniques to address the real time problems in different areas Understand the Neural Networks and its usage in machine learning application. 					
UNIT - I					Lecture Hrs:
<p>Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.</p> <p>Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning</p>					
UNIT - II					Lecture Hrs:
<p>Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.</p> <p>Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.</p> <p>Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.</p>					
UNIT - III					Lecture Hrs:
<p>Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm. Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.</p> <p>Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning</p>					
UNIT - IV					Lecture Hrs:
<p>Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms. Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.</p> <p>Reinforcement Learning – Introduction, the learning task, Q-learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.</p>					



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UNIT - V	
Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge. Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators. Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis	
Text Books:	
1.Machine Learning – Tom M. Mitchell, - MGH	



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	DATA MINING AND BUSINESS INTELLIGENCE	L	T	P	C
23MCCA18T		4	0	0	3
Semester		III			
Course Objectives:					
The student will define the importance of business intelligence by: <ul style="list-style-type: none"> • Describing key business intelligence terms. • Determining the relevance of data to business • Aligning business intelligence to organizational strategy. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Demonstrate an understanding of the importance of data mining and the principles of business intelligence • Organize and Prepare the data needed for data mining using pre preprocessing techniques • Perform exploratory analysis of the data to be used for mining. • Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets. • Define and apply metrics to measure the performance of various data mining algorithms. • Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support. 					
UNIT - I	Overview and concepts Data Warehousing and Business Intelligence	Lecture Hrs:			
Why reporting and Analysing data, Raw data to valuable information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data 1marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing					
UNIT - II	The Architecture of BI and DW	Lecture Hrs:			
BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations					
UNIT - III	Introduction to data mining (DM)	Lecture Hrs:			
Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process					
UNIT - IV	Data Pre-processing	Lecture Hrs:			
Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.					
UNIT - V	Concept Description and Association Rule Mining	Lecture Hrs:			
What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining					
Text Books:					
<ol style="list-style-type: none"> 1. J. Han, M. Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann 2. M. Kantardzic, “Data mining: Concepts, models, methods and algorithms, John Wiley & Sons Inc. 3. PaulrajPonnian, “Data Warehousing Fundamentals”, John Willey. 4. M. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education. 5. G. Shmueli, N.R. Patel, P.C. Bruce, “Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner”, Wiley India 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	INTERNET OF THINGS	L	T	P	C
23MCCA19T		3	0	0	3
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> Introduce the fundamental concepts of IoT and physical computing Expose the student to a variety of embedded boards and IoT Platforms Create a basic understanding of the communication protocols in IoT communications. Familiarize the student with application program interfaces for IoT. Enable students to create simple IoT applications. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Choose the sensors and actuators for an IoT application Select protocols for a specific IoT application Utilize the cloud platform and APIs for IoT applications Experiment with embedded boards for creating IoT prototypes Design a solution for a given IoT application Establish a startup 					
UNIT – I		Lecture Hrs: 9			
<p>Overview of IoT: The Internet of Things: An Overview, The Flavor of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things? Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.</p> <p>Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.</p>					
UNIT – II		Lecture Hrs: 9			
<p>Embedded Devices: Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things</p>					
UNIT – III		Lecture Hrs: 9			
<p>Communication in the IoT: Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols Prototyping Online Components: Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol</p>					
UNIT – IV		Lecture Hrs: 9			
<p>Business Models: A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups. Manufacturing: What are you producing, Designing kits, Designing printed circuit boards.</p>					
UNIT – V		Lecture Hrs: 9			
<p>Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software. Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.</p>					
Text Books:					
Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	BLOCK CHAIN TECHNOLOGIES	L	T	P	C
23MCCA20T		3	0	0	3
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> This course is intended to study the basics of Block chain technology. During this course learner will explore various aspects of Block chain technology like application in various domains. By implementing learner will have idea about private and public Block chain, and smart contract 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Understand and explore the working of Block chain technology (Understanding) Analyze the working of Smart Contracts (Analyze) Understand and analyze the working of Hyper ledger (Analyze). Apply the learning of solidity and de-centralized apps on Ethereum (Apply). 					
UNIT - I		Lecture Hrs:			
Introduction of Cryptography and Block chain: What is Block chain, Block chain Technology Mechanisms & Networks, Block chain Origins, Objective of Block chain, Block chain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Block chain					
UNIT - II		Lecture Hrs:			
Bit Coin and Crypto currency: What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Block chain Technology On Crypto currency.					
UNIT - III		Lecture Hrs:			
Introduction to Ethereum: What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts.					
UNIT - IV		Lecture Hrs:			
Introduction to Hyper ledger: What is Hyper ledger? Distributed Ledger Technology & its Challenges, Hyper ledger & Distributed Ledger Technology, Hyper ledger Fabric, Hyper ledger Composer.					
UNIT - V		Lecture Hrs:			
Block chain Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Block chain, Alt Coins					
Text Books:					
<ol style="list-style-type: none"> 1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven 2. Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive 3. Introduction, Princeton University Press (July 19, 2016). 4. Antonopoulos, Mastering Bitcoin. 5. Antonopoulos and G. Wood, Mastering Ethereum. 6. D. Drescher, Blockchain Basics. Apress, 2017. 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	WEB TECHNOLOGIES LABORATORY	L	T	P	C
23MCCA07P			0	0	4
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> Understand the web technologies to create adaptive web pages for web application. Use CSS to implement a variety of presentation effects to the web application Know the concept and implementation of cookies as well as related privacy concerns Develop a sophisticated web application that employs the MVC architecture. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Integrate frontend and backend web technologies in distributed systems. Facilitate interface between frontend and backend of a web application. Debug, test and deploy web applications in different web servers. Migrate the web applications to the other platforms like .Net 					
List of Experiments:					
<ol style="list-style-type: none"> 1. Write a PHP script to print prime numbers between 1-50. 2. PHP script to <ol style="list-style-type: none"> a. Find the length of a string. b. Count no of words in a string. c. Reverse a string. d. Search for a specific string. 3. Write a PHP script to merge two arrays and sort them as numbers, in descending order. 4. Write a PHP script that reads data from one file and write into another file. 5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages. <ol style="list-style-type: none"> a) Home page b) Registration and user Login c) User Profile Page d) Books catalog e) Shopping Cart f) Payment By credit card g) Order Conformation 6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript. 7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document. 8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart. 9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	BIG DATA TECHNOLOGIES LABORATORY	L	T	P	C
23MCCA08P			0	1	2
Semester		III			
Course Objectives:					
<ul style="list-style-type: none"> Apply quantitative modeling and data analysis techniques to the solution of real-world business problems, communicate findings, and effectively present results using data visualization techniques. Apply principles of Data Science to the analysis of business problems. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Understand and implement the basics of data structures like Linked list, stack, queue, set and map in Java. Demonstrate the knowledge of big data analytics and implement different file management task in Hadoop. Understand Map Reduce Paradigm and develop data applications using variety of systems. Analyze and perform different operations on data using Pig Latin scripts. Illustrate and apply different operations on relations and databases using Hive. 					
List of Experiments:					
<p>Week 1: Hadoop Installation on a) Single Node and SPARK Installation, Launch a cloud instance for AWS instance on Centos 7</p> <p>Week 2: Design a distributed application using MapReduce which processes a log file of a system. List out the users who have logged for maximum period on the system. Use simple log file from the Internet and process it using a pseudo distribution mode on Hadoop platform.</p> <p>Week 3: Design and develop a distributed application to find the coolest/hottest year from the available weather data. Use weather data from the Internet and process it using MapReduce.</p> <p>Week 4: Write an application using HBase and HiveQL for flight information system which will include 1) Creating, Dropping, and altering Database tables, 2) Creating an external Hive table to connect to the HBase for Customer Information Table, 3) Load table with data, insert new values and field in the table, Join tables with Hive, 4) Create index on Flight information Table, and 5) Find the average departure delay per day in 2008.</p> <p>Week 5: Display the hierarchical structure of your data by generating Trees, graphs and network visualization. Install and Run Pig then write Pig Latin scripts to sort, group, join, project and filter the data. Install and Run Hive then use Hive to Create, alter and drop databases, tables, views, functions and Indexes.</p> <p>Week 6: Input file contains a series of tweets made by few people. Do a word count on the text object value Hint: Json Parsing in python – this sample snippet can be used within Map to read the JSON</p> <p>Week 7: Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location. And Reading Excel,XML data sheets in R. Using with and without R objects on console, mathematical functions on console create R objects for calculator application and save in a specified location in disk. Write an R script to find basic descriptive statistics using summary, str, quartile unction on mtcars& cars datasets and to find subset of dataset by using subset (), aggregate () functions on dataset.</p> <p>Week 8: Implementing data visualization using R : Find the data distributions using box and scatter plot, Find the outliers using plot and Plot the histogram, bar chart and pie chart on sample data.</p>					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	DEVOPS & AGILE PROGRAMMING LABORATORY	L	T	P	C
23MCCA09P		0	1	2	2
Semester		III			
Course Objectives:					
<p>To understand the concept of DevOps with associated technologies and</p> <ul style="list-style-type: none"> Methodologies. To be familiarized with Jenkins, which is used to build & test software Applications & Continuous integration in Devops environment. To understand different Version Control tools like GIT, CVS or Mercurial To understand Docker to build, ship and run containerized images To use Docker to deploy and manage Software applications running on Container. To be familiarized with concept of Software Configuration Management & provisioning using tools like Puppet, Chef, Ansible or Saltstack. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> Understand and Implement the Integration and Continuous deployment. Can implement anatomy of continuous delivery pipeline. Understands and implement static code analysis. 					
List of Experiments:					
Agile Laboratory Programs:					
<ol style="list-style-type: none"> 1. Understand the background and driving forces for taking an Agile Approach to Software Development. 2. Understand the business value of adopting agile approach. 3. Understand agile development practices 4. Drive Development with Unit Test using Test Driven development. 5. Apply Design principle and Refactoring to achieve agility 6. To study automated build tool. 7. To study version control tool. 8. To study Continuous Integration tool. 9. Perform Testing activities within an agile project. 					
Dev Ops Laboratory Programs:					
<ol style="list-style-type: none"> 1. Build & Test Applications with Continuous Integration - To Install and Configure Jenkins to test, and deploy Java or Web Applications using NetBeans or eclipse. 2. Version Control - To Perform Version Control on websites/Software's using different Version control tools like RCS/ CVS/GIT/Mercurial (Any two) 3. Virtualization & Containerization - To Install and Configure Docker for creating Containers of different Operating System Images 4. Virtualization & Containerization - To Build, deploy and manage web orJava application on Docker 5. Software Configuration Management -To install and configure Software Configuration Management using Chef/Puppet/Ansible or Salt stack. 6. Provisioning - To Perform Software Configuration Management and provisioning using Chef/Puppet/Ansible or Saltstack. 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

Course Code	Exploratory Data Analytics with R	L	T	P	C
23MCSK02P			1	0	2
Semester		III			
Course Objectives:					
<p>The students will be able to learn:</p> <ul style="list-style-type: none"> • How to manipulate data within R and to create simple graphs and charts used in introductory statistics. • The given data using different distribution functions in R. • The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis. • The relevance and importance of the theory in solving practical problems in the real world. 					
Course Outcomes (CO):					
<p>After completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Install and use R for simple programming tasks. • Extend the functionality of R by using add-on packages • Extract data from files and other sources and perform various data manipulation tasks on them. • Explore statistical functions in R. • Use R Graphics and Tables to visualize results of various statistical operations on data. • Apply the knowledge of R gained to data Analytics for real-life applications. 					
List of Experiments:					
<p>1: INTRODUCTION TO COMPUTING</p> <ol style="list-style-type: none"> a. Installation of R b. The basics of R syntax, workspace c. Matrices and lists d. Subsetting e. System-defined functions; the help system f. Errors and warnings; coherence of the workspace <p>2: GETTING USED TO R: DESCRIBING DATA</p> <ol style="list-style-type: none"> a. Viewing and manipulating Data b. Plotting data c. Reading the data from console, file (.csv) local disk and web d. Working with larger datasets <p>3: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS</p> <ol style="list-style-type: none"> a. Tables, charts and plots. b. Univariate data, measures of central tendency, frequency distributions, variation, and Shape. c. Multivariate data, relationships between a categorical and a continuous variable, d. Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations. e. Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables. <p>4: PROBABILITY DISTRIBUTIONS</p> <ol style="list-style-type: none"> a. Sampling from distributions – Binomial distribution, normal distribution b. tTest, zTest, Chi Square test c. Density functions d. Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

- 5: EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.
- 6: TESTING HYPOTHESES a. Null hypothesis significance testing b. Testing the mean of one sample c. Testing two means
- 7: PREDICTING CONTINUOUS VARIABLES a. Linear models b. Simple linear regression c. Multiple regression d. Bias-variance trade-off – cross-validation
- 8: CORRELATION
- How to calculate the correlation between two variables.
 - How to make scatter plots.
 - Use the scatter plot to investigate the relationship between two variables
- 9: TESTS OF HYPOTHESES
- Perform tests of hypotheses about the mean when the variance is known.
 - Compute the p-value.
 - Explore the connection between the critical region, the test statistic, and the p-value
- 10: ESTIMATING A LINEAR RELATIONSHIP Demonstration on a Statistical Model for a Linear Relationship
- Least Squares Estimates
 - The R Function lm
 - Scrutinizing the Residuals
- 11: APPLY-TYPE FUNCTIONS
- Defining user defined classes and operations, Models and methods in R
 - Customizing the user's environment
 - Conditional statements
 - Loops and iterations
- 12: STATISTICAL FUNCTIONS IN R
- Write Demonstrate Statistical functions in R
 - Statistical inference, contingency tables, chi-square goodness of fit, regression, generalized linear models, advanced modeling methods.

References:

- SandipRakshit, “Statistics with R Programming”, McGraw Hill Education, 2018.
- Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “AN Introduction to Statistical Learning: with Applications in R”, Springer Texts in Statistics, 2017.
- Joseph Schmuller, “Statistical Analysis with R for Dummies”, Wiley, 2017.
- K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, “Statistical Programming in R”, Oxford Higher Education, 2017.



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MASTER OF COMPUTER APPLICATIONS

Course Code	DEEP LEARNING	L	T	P	C
23MCCA18T		3	0	0	3
Semester		IV			
Course Objectives:					
<ul style="list-style-type: none"> To present the mathematical, statistical and computational challenges of building neural networks. To teach the concepts of deep learning. To introduce dimensionality reduction techniques. To enable the students to know deep learning techniques to support real-time applications. To explain the case studies of deep learning techniques. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Identify Convolutional Neural Networks models to solve Supervised Learning Problems Design Autoencoders to solve Unsupervised Learning problems Apply Long Shot Term Memory (LSTM) Networks for time series analysis classification problems. Apply Classical Supervised Tasks for Image Denoising, Segmentation and Object detection problems. 					
UNIT - I		Lecture Hrs:			
Introduction: Introduction to machine learning- Linear models (SVMs and Perceptron, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates.					
UNIT - II		Lecture Hrs:			
Deep Networks: History of Deep Learning- A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks					
UNIT - III		Lecture Hrs:			
Dimensionality Reduction: Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures - AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyper parameter optimization.					
UNIT - IV		Lecture Hrs:			
Optimization and Generalization: Optimization in deep learning- Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.					
UNIT - V		Lecture Hrs:			
Case Study and Applications: Image net- Detection-Audio Wave Net-Natural Language Processing Word2Vec - Joint Detection Bioinformatics- Face Recognition- Scene Understanding- Gathering Image Captions.					
Text Books:					
<ol style="list-style-type: none"> 1. "Deep Learning", Ian Goodfellow, Yoshua Bengio , Aaron Courville, MIT Press 2016. 2. "Neural Networks and Deep Learning A Text Book", Charu C Aggarwal, Springer International 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code	NATURAL LANGUAGE PROGRAMMING	L	T	P	C
23MCCA19T		3	0	0	3
Semester		IV			
Course Objectives:					
<ul style="list-style-type: none"> • Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics. 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> • Show sensitivity to linguistic phenomena and an ability to model them with formal grammars. • Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems • Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods. • Able to design, implement, and analyze NLP algorithms • Able to design different language modeling Techniques. 					
UNIT - I		Lecture Hrs:			
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches					
UNIT - II					
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues					
UNIT - III					
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.					
UNIT - IV					
Predicate-Argument Structure, Meaning Representation Systems, Software					
UNIT - V					
Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling					
Text Books:					
<ol style="list-style-type: none"> 1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008. 2. Anne Kao and Stephen R. Poteet (Eds), “Natural Language Processing and Text Mining”, Springer-Verlag London Limited 2007. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, 2nd Edition, Prentice Hall, 2008. 2. James Allen, “Natural Language Understanding”, 2nd edition, Benjamin/Cummings publishing company, 1995. 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code		L	T	P	C
23MCCA20T	MULTIMEDIA SYSTEMS & TOOLS	3	0	0	3
Semester		IV			
Course Objectives:					
<ul style="list-style-type: none"> Formulate a working definition of interactive multimedia Demonstrate competence in using the authoring program Hyper Studio Outline the use of animation, digitized sound, video control, and scanned images Illustrate the use of Netscape to access the Course Home Page and Tips and Tricks; 					
Course Outcomes (CO): Student will be able to					
<ul style="list-style-type: none"> Create a well-designed, interactive Web site with respect to current standards and practices Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language Determine the appropriate use of interactive versus standalone Web applications Create time-based and interactive multimedia components Identify issues and obstacles encountered by Web authors in deploying Web-based Applications 					
UNIT – I		Lecture Hrs:			
Unit-I: Multimedia Overview, Definition Applications and Design, Authoring (HyperStudio), Introduction to HyperStudio, The Metaphor, The Basics (Cards, Buttons, Text), HyperStudio, Resources. Multimedia Authoring- Multimedia Authoring Metaphors, Multimedia Production, Multimedia Presentation, Automatic Authoring, Some Useful Editing and Authoring Tools, Adobe Premiere, Macromedia Director, Macromedia Flash, Dreamweaver.					
UNIT – II		Lecture Hrs:			
Unit-II: Instructional Design, Objectives, Content (print, graphics, sounds, etc.), Interaction, Assessment, Closure, Screen Design: Metaphors and Themes, Colors and Backgrounds, Text (size, color, placement), Navigation, Consistency.					
UNIT – III		Lecture Hrs:			
Unit-III: Transitions and Links, Use of Sound, HyperStudio Sounds, Recording Your Own, Internet Resources, Graphics, Integrating Web documents, HyperStudio Tips and Tricks, Animation, Launching other applications and documents					
UNIT – IV		Lecture Hrs:			
Unit-IV: Multimedia Portfolios, Designing a template, Adding elements, Choosing materials, Advanced Button Features, Hyperlinks, Drag-n-Drop, Advanced NBA's, Using Actions with other Objects.					
UNIT – V		Lecture Hrs:			
Incorporating Digital Media, QuickTime Movies, Laserdisc and CD-ROM control, scanning.					
Text Books:					
<ol style="list-style-type: none"> 1. Marcia Kuperberg, A Guide to Computer Animation: for TV, games, multimedia and web, Focal Press (Taylor and Francis Group), 2002. 2. Z. N. Li and M. S. Drew, "Fundamentals of Multimedia", Pearson Prentice Hall 					



VEMU INSTITUTE OF TECHNOLOGY- P. KOTHAKOTA (Autonomous)

MASTER OF COMPUTER APPLICATIONS

Course Code		L	T	P	C
23MCCA21T	CYBER SECURITY	3	0	0	3
	Semester	IV			
Course Objectives:					
<ul style="list-style-type: none"> To understand various types of cyber-attacks and cyber-crimes To learn threats and risks within context of the cyber security To have an overview of the cyber laws & concepts of cyber forensics To study the defensive techniques against these attacks 					
Course Outcomes:					
<ul style="list-style-type: none"> Analyze and evaluate the cyber security needs of an organization. Understand Cyber Security Regulations and Roles of International Law. Design and develop a security architecture for an organization. Understand fundamental concepts of data privacy attacks 					
UNIT - I		Lecture Hrs:			
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber					
UNIT - II		Lecture Hrs:			
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics					
UNIT - III		Lecture Hrs:			
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.					
UNIT - IV		Lecture Hrs:			
Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations					
UNIT - V		Lecture Hrs:			
Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains-medical, financial, etc					
Text Books:					
<ol style="list-style-type: none"> 1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley 2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press. 2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group. 					



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MASTER OF COMPUTER APPLICATIONS

Course Code 23MCCA22T	ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3
		Semester		IV	
Course Objectives:					
<ul style="list-style-type: none"> The aim of this course is to have a comprehensive perspective of inclusive learning, ability to learn and implement the fundamentals of Entrepreneurship. 					
Course Outcomes:					
<ul style="list-style-type: none"> Learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up. 					
UNIT - I					
Entrepreneurial Perspectives Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs - Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods - Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development					
UNIT - II					
New Venture Creation Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives.					
UNIT - III					
Management of MSMEs and Sick Enterprises Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units					
UNIT - IV					
Managing Marketing and Growth of Enterprises Essential Marketing Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.					
UNIT - V					
Strategic perspectives in Entrepreneurship Strategic Growth in Entrepreneurship, The Valuation Challenge in Entrepreneurship, The Final Harvest of New Ventures, Technology, Business Incubation, India way – Entrepreneurship; Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India.					
Text Books:					
<ol style="list-style-type: none"> Entrepreneurship Development and Small Business Enterprises, Poornima M.Charantimath, 2nd edition, Pearson, 2014. Entrepreneurship, a South – Asian Perspective, D.F.Kuratko and T.V.Rao, 3rd edition, Cengage, 2012. Entrepreneurship, Arya Kumar, 4th edition, Pearson 2015. 					



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(Autonomous)**

MASTER OF COMPUTER APPLICATIONS

Course Code	NOSQL DATABASES	L	T	P	C
23MCCA23T			3	0	0
Semester		IV			
Course Objectives:					
<ul style="list-style-type: none"> Distinguish the different types of NoSQL databases. Understand the impact of the cluster on database design. State the CAP theorem and explain its main points 					
Course Outcomes:					
<ul style="list-style-type: none"> Define, compare and use the four types of NoSQL Databases (Document-oriented, Key/Value Pairs, Column-oriented and Graph). Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases. Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases. 					
UNIT – I					
Define, compare and use the four types of NoSQL Databases (Document-oriented, Key/Value Pairs, Column-oriented and Graph). Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases. Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.					
UNIT – II					
Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases					
UNIT – III					
Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication. NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.					
UNIT – IV					
Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use.					
UNIT – V					
NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets.					
Text Books:					
1.NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence Sadalage, P. Fowler Pearson Education					