SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

Master of Computer Applications

CURRICULUM and SYLLABI

[For students admitted in 2021-2022]

MCA Regulation 2020

Approved by BOS and Academic Council meetings

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for MCA I Semester under Regulations 2020
Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		THEORY					
1	P20MCA101	Problem Solving Techniques Using C*	1	0	2	2	45
2	P20MCA102	Computer Organization and Architecture	3	0	0	3	45
3	P20MCA103	Python Programming	3	0	0	3	45
4	P20MCA104	Data Structures and Algorithms	3	1	0	4	60
5	P20MCA105	Relational Database Management Systems*	2	0	2	3	60
6	P20MCA106	Mathematical Foundations for Computer Applications	3	1	0	4	60
		PRACTICAL					
7	P20MCA107	Python Programming Laboratory	0	0	4	2	60
8	P20MCA108	Data Structures and Algorithms Laboratory	0	0	4	2	60
9	P20MCA109	Soft Skills and Aptitude Career Enhancement Laboratory -1	0	0	2	1	30
*Laboratory Integrated Theory Course					**Total Credits**	**24**	

Approved by

Chairperson, MCA BOS
Dr.T.Padma

Member Secretary, Academic Council
Dr.R.Shivakumar 27/10/4

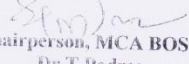Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-
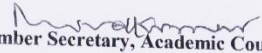HoD, First Semester MCA Students and Staff. COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for MCA II Semester under Regulations 2020
Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P20MCA201	Operating Systems	2	0	0	2	30
2	P20MCA202	Computer Networks	2	0	0	2	30
3	P20MCA203	Internet Programming	3	0	0	3	45
4	P20MCA204	Cloud Computing Technologies	3	0	0	3	45
5	P20MCA205	Data Science*	3	0	2	4	75
6	P20MCA206	Mobile Application Development	3	0	0	3	45
7	P20MCA501	Agile Technologies					
	P20MCA513	MicroServices and DevOps	3	0	0	3	45
		Practical					
8	P20MCA 207	Internet Programming Laboratory	0	0	4	2	60
9	P20MCA208	Cloud Computing Technologies Laboratory	0	0	4	2	60
10	P20MCA209	Soft Skills and Aptitude Career Enhancement Laboratory - II	0	0	2	1	30
		Total Credits				25	

*Laboratory Integrated Theory

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Member Secretary, Academic Council
Dr.R.Shivakumar

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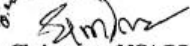HOD MCA, Second Semester MCA Students and Staff, COE

10.12.2021

Regulations-2020

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for MCA III Semester under Regulations 2020
Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P20MCA301	Embedded Systems and Internet of Things	3	0	0	3	45
2	P20MCA302	Cyber Security Essentials	2	0	0	2	30
3	P20MCA303	Artificial Intelligence and Machine Learning	3	0	0	3	45
4	P20MCA510	Elective – Full Stack Web Development*	2	0	2	3	60
5	P20MCA512	Elective – Advanced Web Programming*	2	0	2	3	60
6	P20MCA504	Elective - Social Networks	3	0	0	3	45
	P20MCA506	Elective – Software Testing and Quality Assurance					
		Practical					
7	P20MCA304	Embedded Systems and Internet of Things Laboratory	0	0	4	2	60
8	P20MCA305	Artificial Intelligence and Machine Learning Laboratory	0	0	4	2	60
9	P20MCA306	Mini Project Laboratory	0	0	4	2	60
10	P20MCA307	Soft Skills and Aptitude Career Enhancement Laboratory – III	0	0	2	1	30
* Laboratory Integrated Theory			**Total Credits**			24	

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Member Secretary, Academic Council
Dr.R.Shivakumar 23-8-22

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18.08.2022

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Courses of study for MCA IV Semester under Regulations 2020

Branch: Master of Computer Applications

S.No.	Course Code	Course Title	Lecture	Tutorial	Practical	Credits	Total Contact Hours
Practical							
1	P20MCA401	Project Work	0	0	24	12	360
					Total	12	

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Sona College of Technology, Salem
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Courses of Study for MCA I Semester under Regulations 2020
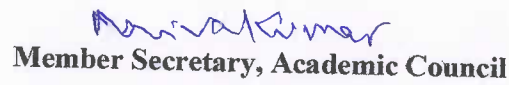### Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		THEORY					
1	P20MCA101	Problem Solving Techniques Using C*	1	0	2	2	45
2	P20MCA102	Computer Organization and Architecture	3	0	0	3	45
3	P20MCA103	Python Programming	3	0	0	3	45
4	P20MCA104	Data Structures and Algorithms	3	1	0	4	60
5	P20MCA105	Relational Database Management Systems*	2	0	2	3	60
6	P20MCA106	Mathematical Foundations for Computer Applications	3	1	0	4	60
		PRACTICAL					
7	P20MCA107	Python Programming Laboratory	0	0	4	2	60
8	P20MCA108	Data Structures and Algorithms Laboratory	0	0	4	2	60
9	P20MCA109	Soft Skills and Aptitude Career Enhancement Laboratory -1	0	0	2	1	30
*Laboratory Integrated Theory Course					**Total Credits**	24	

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Dr.R.Shivakumar 27/10/24

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P20MCA101 – PROBLEM SOLVING TECHNIQUES USING C

L	T	P	C	M
1	0	2	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the various technologies used to solve the problem.

- Learn the fundamentals of algorithm design.

- Understand the basics of C Programming.

- learn the single and multi dimensional arrays, C Functions and Structures.

- learn the pointer and its usages in programming

UNIT I - INTRODUCTION TO COMPUTER PROBLEM SOLVING   **7**

Introduction – The Problem Solving aspect – Top down / Bottom up Design - Exchanging the values – Counting – Summation of a set of numbers – Factorial Computation – Generation of the Fibonacci Series – Reversing the digits of an integer - SINE computation – Base Conversion – Factoring Methods – Array Techniques.

UNIT II - INTRODUCTION TO C LANGUAGE   **7**

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input/Output Operations – Formatted I/O – Decision Making - Branching – IF, Nested IF – Switch – goto - Looping- While, do, for statements.

UNIT III – ARRAYS, FUNCTIONS, STRUCTURES AND UNIONS   **8**

Arrays – dynamic and multi-dimensional arrays - Character arrays and Strings – String handling Functions - User defined Functions – Categories of Functions – Recursion - Structures and Unions – Array of Structures – Structures and Functions.

UNIT IV – POINTERS AND FILE MANAGEMENT   **8**

Pointers – Declaration, Accessing a variable, character strings, pointers to functions and structures - File Management in C – Dynamic Memory allocation – Linked Lists – Preprocessors.

List of Experiments:

1. Write programs to implement input and output statement.

2. Write programs to implement Conditional and Unconditional Statements.

3. Write programs to implement matrix operations using multidimensional array

4. Write programs to display all prime numbers between two intervals using functions

5. Write a program to display the given sentence in reverse order.

6. Write programs to implement Control Statements

7. Write a program to display 'n' numbers in sorting order using pointers.

8. Write a program to implement dynamic memory allocation.
9. Write a program to read the data and determine the following:
    a. Total marks obtained by each subject
    b. Finding Highest Mark each subject and who secured the highest mark.

*Laboratory Integrated Theory Course   **TOTAL = 45 Hours**

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Solve the basic problem and write simple programs using C.
- Build basic programs using Arrays, functions.
- Develop Simple programs using Structures and Union.
- Develop programs using C pointers.
- Develop Programs using File Pointers.

REFERENCES:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education , India. 2007.
2. Seymour Lipschutz, " Essentials Computer Mathematics", Schaums' Outline Series
3. PradipDey, ManasGhosh, "Programming in C", First Edition,OxfordUniversity Press, 2011.
4. Brian W. Kernighan, Dennis Ritchie, "The C Programming Language" (2nd Edition), 1988, Prentice Hall.
5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley(India) Pvt. Ltd., Pearson Education in South Asia, 2011
6. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA101.1	Solve the basic problem and write simple programs using C.	S	S	S	M	S	S	S	M	M	S	W	S	W	S	S
P20MCA101.2	Build basic programs using Arrays, functions.	S	S	S	M	S	S	S	M	M	S	W	S	W	S	S

P20MCA101.3	Develop Simple programs using Structures and Union	S	S	S	M	S	S	S	M	W	S	W	S	W	S	S
P20MCA101.4	Develop programs using C pointers	S	S	S	M	S	S	S	M	W	S	W	S	W	S	S
P20MCA101.5	Develop Programs using File Pointers	S	S	S	M	S	S	S	M	W	S	W	S	W	S	S

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P20MCA102 - COMPUTER ORGANIZATION AND ARCHITECTURE

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:
This course will enable the student to:
- Become familiar with Number system.
- Understand the basic operations of CPU.
- Learn the concepts of processor design
- Become familiar with the memory hierarchy design.
- Understand the concepts of Parallel Processing

UNIT I - INTRODUCTION   **9**

Introduction to Computer Organization, I/O Storage Devices, CPU Processor, Data Representation, Number System, Computer Arithmetic and Boolean Algebra, Generations of Computer, Introduction to Operating Systems, and system Software – Logic gates – Flip Flops – R – S, J & K, and T Flip Flops, Counters, Registers.

UNIT II - BASIC STRUCTURE OF COMPUTER   **9**

Functional Units - Basic Operational Concepts – Bus structures – Performance and Metrics – instruction and instruction sequencing – Hardware Software Interface – Addressing modes – Instruction Sets – RISC and CISC – ALU Design – Fixed point and Floating point operations

UNIT III – PROCESSOR DESIGN   **9**

Processor basics –CPU Organization – Data Path Design – Control Design – Basic concepts – Hardwired control – Micro Programmed control – Pipe control – Hazards super scale operations

UNIT IV – MEMORY HIERARCHY   9

Cache memory organization, Cache addressing modes, direct mapping and associative caches, Elements of cache design, Techniques to reduce cache misses via parrallelism, techniques to reduce cache penalties, technique to reduce cache hit time, Shared memory organization, Interleaved memory organization, bandwidth and fault tolerance, Sequential and weak consistency model - Flash memory.

UNIT V - SIMD ARCHITECTURE   9

Introduction, Parallel Processing, classification of Parallel Processing, Fine-Grained SIMD Architecture, coarse-Grained SIMD Architecture - Basic Features of Current Architectural Trends. DSP Processor, Dual core Technology.

TOTAL = 45 Hours

COURSE OUTCOMES:

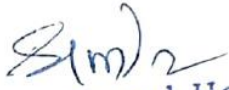**At the end of the course the student should be able to:**

- Simplify and solve the problems in number systems
- Design the combinational and sequential circuits.
- Describe various processing design.
- Differentiate various mapping policies of cache memory
- Discuss the various parallel processors.

REFERENCES

1. M. Morris Mano,"Computer System Architecture", 3rd Edition, Prentice Hall of India, 2014.

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Computer organization and Embedded Systems", 6th Edition, Tata McGraw Hill, 2012.

3. William Stallings, "Computer Organization & Architecture – Designing for Performance" 9th Edition, Prentice Hall of India 2012

4. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", 5th Edition, Morgan Kaufmann, Elsevier, 2014.

5. David Harris and Sarah Harris "Digital Design and Computer Architecture", 2nd Edition Morgan Kaufmann, 2012.

6. Svetlana N. Yanushkevich, Vlad P. Shmerko, "Introduction to Logic Design", CRC Press, 2012.

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA102.1	Simplify and solve the problems in number systems	S	S	S	M	M	S	S	W	M	S	W	S	W	S	S
P20MCA102.2	Design the combinational and sequential circuits	S	S	S	M	M	S	S	W	M	S	W	S	W	S	S
P20MCA102.3	Describe various processing design	S	S	S	M	M	S	S	W	W	S	W	S	W	S	S
P20MCA102.4	Differentiate various mapping	S	S	S	M	M	S	S	W	W	S	W	S	W	S	S

	policies of cache memory															
P20MCA102.5	Discuss the various parallel processors	S	S	S	M	M	S	S	W	W	S	W	S	W	S	S

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	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Explain the basic concepts of Python programming

- Describe the logics of control flow statements

- Discuss the data structure concepts with the help of sequence

- Illustrate file handling functions

- Write python applications using MySQL.

UNIT I - INTRODUCTION   9

OOPS Concepts: Programming Paradigm- Procedure Oriented Programming - Object Oriented Programming - Concepts of OOP - Features of Python- History of Python – The Future of Python – Python Interpreter and Interactive Mode – Writing and Executing First Python Program – Value and Types – Numbers-Boolean – Lists – Strings – Variables and Identifiers – Data Types –Statements – Reserved Words-Tuple Statement – Dictionary-Operators and Expressions – Expression in Python – Operations on Strings – Type Conversion – Comments – Function and Modules

UNIT II - CONTROL FLOW AND FUNCTIONS   9

Introduction to Decision Control Statements – Selection/Conditional Branching Statements – Basic Loop Structures/Iterative Statements - Nested Loops – The break Statement – The continue Statement – The pass Statement – The else Statement Used with Loops– Functions : Defining a Function–Function Call - Variable Scope and Lifetime – Fruitful Functions – Lambda Functions or Anonymous Functions – Function Composition in Python – Documentation Strings – Good Programming Practices - Recursive Functions – Function Redefinition.

UNIT III –SEQUENCE   10

String: Concatenating, Appending, and Multiplying Strings – Strings are Immutable – String Formatting Operator – Built-in-String Methods and Functions – Slice Operation –ord() and chr() Functions – in and not in Operators - Comparing Strings – Iterating String – The String Module-Metacharacters in Regular Expression - Sequence-Lists – Tuple – Dictionaries.

UNIT IV - FILE HANDLING   8

Introduction – File Path – Types of Files – Opening and Closing Files – Reading and Writing Files- File Positions - % Sting Formatting Operator - Command Line Arguments – Renaming and Deleting Files –Directory Methods.

UNIT V - PYTHON MODULES AND PACKAGES   9

Introduction to Errors and Exceptions – Handling Exceptions - Multiple Except Blocks– Multiple Exceptions in a Single Block – Except Block Without Exception – The else cause – Raising Exceptions – Handling Exceptions in Invoked Functions – Built – in and User Defined Exceptions- The try…finally Block – Pre-defined Clean – up Action – Modules – Packages in Python – Standard Library Modules - SQL Introduction – Simple Queries – Create - Insert – update – delete - MySQL Introduction – connecting python and MySQL database.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Write simple applications
- Develop programs using loops
- Create applications using functions
- Develop application using files
- Create application using Python and MySQL

REFERENCES

1. ReemaThareja, "Problem Solving and Programming with Python ", Second Edition, Oxford University Press2019. (Unit I – V).

2. Swaroop C N, "A Byte of Python ", ebshelf Inc., 1st Edition, 2013.

3. Wesley J. Chun, "Core Python Programming", Pearson, 2nd Edition, 2006.

4. Allen B.Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly Media, 2ndEdition, 2015.

5. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA103.1	Write simple application programs in Python programming.	S	S	S	S	S	S	S	M	W	S	M	S	M	S	S
P20MCA103.2	Develop programs to implement control statements and functions	S	S	S	S	S	S	S	M	W	S	M	S	M	S	S
P20MCA103.3	Create applications using string functions, sequences and dictionaries	S	S	S	S	S	S	S	M	W	S	M	S	M	S	S
P20MCA103.4	Develop applications to implement file handling functions in Python	S	S	S	S	S	S	S	M	W	S	M	S	M	S	S
P20MCA103.5	Create applications using the two mechanisms that is Python modules and packages to facilitate modular programming	S	S	S	S	S	S	S	M	W	S	M	S	M	S	S

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P20MCA104 - DATA STRUCTURES AND ALGORITHMS

L	**T**	**P**	**C**	**M**
3	1	0	4	100

COURSE OBJECTIVES:

This course will enable the student to:

- Acquire knowledge of Linear Data Structures and its applications
- Understand the concepts of Non-Linear Data Structures
- Apply the algorithm techniques to solve the real-time problems.
- Analyse the algorithms on various algorithm design techniques.
- Understand the concepts of NP and NP-Hard problems.

UNIT I   LINEAR DATA STRUCTURE   12

Arrays, Records, lists – linear list , linked lists, doubly linked lists and circular linked lists – stack– implementation – application - queue – implementation – application , priority queue-Deque - Hashing.

UNIT II   NON – LINEAR DATA STRUCTURE   12

Trees . binary tree representation – binary search tree – operations- AVL trees -B- trees – Red black tree - graph: Representation of graphs- Net work flow problems – graph Traversals

UNIT III   DIVIDE AND CONQUER AND GREEDY METHOD   12

Analyzing and Designing algorithms – Asymptotic notation – Algorithms design techniques-Divide and conquer - Quick Sort – Merge sort. Greedy method – Knapsack problem – algorithm for Huffman codes-– Minimum –cost spanning trees – Single source shortest paths problem

UNIT IV   DYNAMIC PROGRAMMING AND BACKTRACKING   12

Dynamic programming – Matrix chain multiplication - Floyd-Warshall algorithm – Optimal binary search tree – Memory functions. Backtracking – N-Queens problem – Hamiltonian circuit problem

UNIT V   BRANCH AND BOUND   12

Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem. NP-hard and NP-complete problems – Definitions and Properties –Clique decision problem – Node cover problem – Travelling salesman decision problem.

TOTAL = 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Design an efficient algorithms based on storage and execution time.
- Depict the non-linear data structures in the real-time applications.
- Analyse the space and time complexity of the algorithms.
- Apply algorithm design techniques in designing the algorithms.
- Apply the heuristic algorithms to the real-time problems.

REFERENCES

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson,2020.
2. Michael T. Goodrich , Roberto Tamassia , Michael H. Goldwasser, "Data Structu Algorithms in Python", Wiley; First edition, 2013.
3. Anany Levitin, "Introduction to the Design and Analysis of Algorithms" Addison Wes Edition, 2012
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to algorithm 3rd Edition, 2010.
5. VijayalakshmiPai G.A, "Data Structures and Algorithms: Concepts Techniques and Applications", Mc Graw Hill, 2009 .

CO No	Course Outcome (CO)	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	PSOa	PSOb
P20MCA104.1	Design an efficient algorithms based on storage and execution time	S	S	S	S	S	S	S	M	M	S	W	S	M	S	S
P20MCA104.2	Depict the non-linear data structures in the real-time applications	S	S	S	S	S	S	S	M	M	S	W	S	M	S	S
P20MCA104.3	Analyse the space and time complexity of the algorithms	S	S	S	S	S	S	S	M	W	S	W	S	M	S	S
P20MCA104.4	Apply algorithm design techniques in designing the algorithms	S	S	S	S	S	S	S	M	W	S	W	S	M	S	S
P20MCA104.5	Apply the heuristic algorithms to the real-time problems	S	S	S	S	S	S	S	M	W	S	W	S	M	S	S

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Department of MCA   Regulation - 2020   SEMESTER - I

L	**T**	**P**	**C**	**M**
2	**0**	**2**	**3**	**100**

OBJECTIVES:

This course will enable the student to:

- Understand the basis of relational databases and learn how to retrieve and manipulate data from one or more tables.
- Manipulate data with subqueries and aggregate functions.
- Apply views and joins to manage database.
- Demonstrate stored procedures and triggers.
- Work with various databases and create reports.

UNIT I – DESIGNING AND CONSTRUCTING A DATABASE   9

Database design: Database structure, Design process, Pre-design phase of design, Organizing your data, Functional dependency and candidate keys, Entity-relational modeling, Normalization. Creating databases: Creating a database, choosing which database to access, creating a table, Relational data types, Specifying keys, Column constraints, Default values, Design of the movie info database, Indexes. Creating, changing, and removing records: Preparing data, INSERT statement, SELECT and INSERT together, DELETE statement, UPDATE statement, TRUNCATE statement, DROP statement, ALTER statement.

UNIT II - RETRIEVING DATA FROM A DATABASE   9

SELECT statement: Anatomy of a SELECT statement, specifying columns to retrieve, performing calculations on selected data, Using AS to name columns and expressions, Filtering query results using the WHERE clause, dealing with null values, Sorting query results, How the equality of string is determined. Using WHERE Clause: Using logical operators in the WHERE clause, the IN clause, The BETWEEN Clause, Matching parts of strings using LIKE, Useful functions for WHERE clauses. Aggregating query results: Selecting unique values using DISTINCT, Aggregate functions, COUNT() function, SUM() and AVG() function, Dividing aggregates into categories, Filtering query results using HAVING. Combining Tables using Joins: Joins and Normalization, what is a Join, Using Joins, Types of joins, Joining More than two tables, Outer Joins, UNION Joins, SQL -92 Join Syntax. Subqueries: What is a subquery, Types of subqueries, Subqueries that return a list of values, Subqueries that return a single value, writing complex queries, Using subqueries in UPDATE and DELETE statement, Using subqueries with INSERT.

UNIT III – DATABASE MANAGEMENT   9

Using Views: Creating Views, Advantages of Using Views, Creating Column Aliases, Single - Table Views, Views that Use Joins, Creating Views with Subqueries, Using Other Join Operations in views, Nesting Views, Updating Views, tasks you can accomplish with views. The SQL Security Model: Overview of Database Security, Creating Database Users, Database elements, Using GRANT and REVOKE, Security Roles, Views and Database Security. Real-World Issues Handling Specific Types of Data: Numeric Data Types, String Data Types, dealing with Dates, Converting Data Between Types. Database Performance and Integrity: Improving Database Performance, Performance Measurement Tools, Indexes, The Query Optimizer, Data Integrity, Integrity Versus Performance. Transactions and Cursors: Transactions, Using Transactions in Oracle, Using Transact – SQL, Using Cursors in Oracle PL/SQL.

UNIT IV – STORED PROCEDURES 9

Writing Stored Procedures: Writing a Stored Procedure, working with Variables, Defining Blocks of Code, Conditional Statements Using IF, using Loops, Loop over a Cursor, Triggers. More on Transact – SQL Stored Procedures: General Transact-SQL Programming Information, Global Variables, Using RETURN to Leave Stored Procedures, Handling Errors, Using Temporary Objects, WAITFOR, Advanced Trigger-Writing Techniques. Writing Oracle PL/SQL stored procedures: The Declaration Section, The Executable Section, Exception Handling, Writing Stored Procedures, Creating and Using Custom Functions, Bundling Procedures and Functions in Packages, Debugging PL/SQL Queries, Triggers.

UNIT V – SPECIFIC DATABASES 9

Oracle: SQL*PLUS, Creating Reports in SQL*PLUS, Oracle System Views, Sequences, Synonyms, Oracle Data Types, Oracle Resources on the Web Microsoft Access: Microsoft Database Files, ODBC, The Access Interface, Objects in Microsoft Access Resources MySQL: Obtaining MySQL and MySQL, Contrasting MySQL and MySQL, Using MySQL, MySQL Features, MySQL Limitations, MySQL Data Types, MySQL, String Comparisons in MySQL and MySQL.

LIST OF EXPERIMENTS

1. Consider the following Order Table: SALESMAN (Salesman_id, Name, City, Commission, Customer_name, Customer_City, Purchase_amt, Purchase_date)

   Perform the following DDL commands in SQL:
      i.   Creating a database
      ii. Viewing all tables in a database
      iii. Creating tables (with and without constraints)
      iv. Altering tables (with ADD/MODIFY keywords)
      v.   Dropping a table/database
      vi. Truncating a table/database
      vii. Renaming a table/database

2. Consider the following College database:
      STUDENT (Stud_id, Name, Age, Address, Phone_no, Email_ID);
      SEMESTER (Stud_id, Sem_id, Degree, Year_of_Adm)
      SUBJECT (Stud_id, Subject_code, Sub_title,Semester,Credits)
      Perform the following DCL and TCL commands in SQL:
         i.   Commit
         ii. Rollback
         iii. Save Point
         iv. Grant
         v.   Revoke

3. Consider the following Book Table:
      BOOK (Book_id, Title, Author_Name, Publisher_Name, Pub_Year, No_of_Copies)
      Perform the following DML commands in SQL:

         i.   Inserting records
         ii. Updating the existing records
         iii. Deleting the specific records
         iv. Selecting records from the existing table

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4. For a given set of relational database, create tables and perform the following SQL queries:
   SALESMAN (Salesman_id, Name, City, Commission)
   CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)
   ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)
     i. Simple Queries with Select - Where – Between – Like – Distinct clauses.
     ii. Simple Queries with Aggregate functions
     iii. Queries with group by and having clause
     iv. Queries involving - Date Functions, String Functions, Math Functions
     v. Sort records with Order by clause.

5. For a given set of relational database for Movie information, create tables and perform the following SQL queries:
   ACTOR (Act_id, Act_Name, Act_Gender)
   DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
   MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Act_id, Dir_id)
   MOVIE_CAST (Act_id, Actor_name, Mov_id, Role)
   RATING (Mov_id, Rev_Stars).

     i. Subqueries- With ANY, SOME and ALL clauses.
     ii. Join Queries- Inner Join, Outer Join, Left Join, Right Join, Self-Join Subqueries- With IN and NOT IN clause, With EXISTS and NOT EXISTS clause.
     iii. Create a simple view that shows all movie records of a particular director.
     iv. Create a complex view that shows all movie records of a particular film with highest rating and actor name.
     v. Update/Drop the existing views.

1. Create a PL/SQL Cursor to generate student grade calculation.
2. Consider the following Bank table:
   Bank (cid, cname, add, accno, acctype, bankname, dep_amt, bal_amt).
     i. Write a PL/SQL procedure which accept the account number of a customer and retrieve the balance.
     ii. Write a PL/SQL updated trigger on Bank table. The system should keep track of the records that are being updated.

Total = 60 Hours

COURSE OUTCOMES

At the end of the course the student should be able to:

- Illustrate database design.
- Execute various DDL and DML queries.
- Retrieve data using subqueries and combine tables using Joins.
- Executive SQL queries related to data control language to enforce security in a m user database environment.
- Create simple and advanced PL/SQL code blocks for stored procedures, cursors triggers.

REFERENCES:

1. Steve Tale, "SQL: The Ultimate Beginners Guide: Learn SQL Today", Crete Space Independent Publishing Platform, 2016.
2. Special Edition Using SQL, Rafe Colburn, Paperback, 1st edition 1999.
3. Alvin K White, "SQL: QuickSort Guide – The Simplified Beginner's Guide To SQL", Clydebank Technology, EPUB, 2015.
4. "Learning SQL", By Alan Beaulieu, O'Reilly Media, 2014.
5. Ben Forta, "Sams Teach Yourself in 10 Minutes", SAMS, 4th edition, 2012
6. Special Edition Using SQL, Rafe Colburn, Paperback, 1st edition, 1999.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA105.1	Illustrate database design	S	M	S	S	M	M	M	M	W	M	S	S	M	S	M
P20MCA105.2	Execute various DDL and DML queries	S	S	S	S	S	M	M	M	W	S	S	S	M	S	M
P20MCA105.3	Retrieve data using subqueries and combine tables using Joins	S	M	S	S	S	M	M	M	M	M	S	S	M	S	M
P20MCA105.4	Executive SQL queries related to data control language to enforce securit in a multi-user database environment.	S	M	S	S	M	M	M	M	W	M	S	S	M	S	M
P20MCA105.5	Create simple and advance PL/SQL code blocks for stored procedures, cursors and triggers.	S	M	S	S	S	S	M	M	M	M	S	S	M	S	M

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P20MCA106 – MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

	L	T	P	C	M
	3	1	0	4	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the basis of Propositional Logic and Theory of Inference
- Understand and apply the Grammars of the formal languages.
- Construct the Finite and Nonfinite Automata theory.
- Understand the concepts of graph and its algorithms.
- Understand and Illustrate the methods of handling quantitative and qualitative data

UNIT I – PROPOSITIONAL LOGIC
12

Propositions – Logical connectives – Negation – Disjunction – Conjunction – Conditional – bi conditional – Tautologies and contradictions - Equivalence and Implications – Duality law – Dual statements – Exclusive OR – NOR – NAND – Normal forms – Theory of Inference and deduction. Predicate calculus: Predicates and quantifiers, Mathematical induction.

UNIT II – FORMAL LANGUAGES
12

Languages and grammars - Phrase structure grammar - Classification of grammars -Pumping lemma for regular languages - Context free languages.

UNIT III – FINITE STATE AUTOMATA
12

Finite state automata - Deterministic finite state automata (DFA) – Non-deterministic finite state automata (NFA) - Conversion of NFA to DFA, Optimizing DFA, FA with output: Moore machine, Mealy machine, conversions.

UNIT IV –STATISTICS
12

Statistical Investigation – Sampling - Methods of Sampling- Sampling Survey- Data – Collection of Data – Classification and tabulation of Data – Diagrammatic and graphical presentation of data- Construction of frequency distribution – Nominal , Ordinal and Ratio.

UNIT V – PROBABILITY
12

Probability – Types of Probability – Axiomatic approach to Probability – Theorems of Probability- Bayes Theorem- Random Variable – Distribution Function – Joint, Marginal and Conditional Distribution function.

TOTAL = 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Illustrate the problems on propositional logic
- Design the grammars of the programming languages
- Construct the finite automata of the regular expression
- Apply and acquire knowledge on graph algorithms in the real time applications.
- Acquire the basic statistics knowledge of Graph theory and functionalities.

REFERENCES

1. J.P. Trembley and R. Manohar "Discrete Mathematical structures with Applications to Computer science" McGraw Hill Pvt. Ltd, New Delhi.

2. KantiSwarup, P.K. Gupta and Man Mohan, "Operation Research", Sultan Chand & Sons, Sixteenth Edition, 2012.

3. Taha H.A., "Operations Research: An Introduction", Pearson Education, 7th Edition, 2004.

4. B L Agarwal, Basic Statistics, New Age International, 6th Edition, 2013

5. B.L. Agarwal, Programmed Statistics, New Age International, 2017

6. T. Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", Tata McGraw Hill Pvt. Ltd., New Delhi, 5th Reprint (2008) (Unit-V: Pages 448-490).

7. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.

CO No	Course Outcome (CO)	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	PSOa	PSOb
P20MCA106.1	Illustrate the problems on propositional logic	S	S	S	S	S	S	S	M	S	S	M	S	M	S	S
P20MCA106.2	Design the grammars of the programming languages	S	S	S	S	S	S	S	M	S	S	M	S	M	S	S
P20MCA106.3	Construct the finite automata of the regular expression	S	S	S	S	S	S	S	M	S	S	M	S	M	S	S

| P20MCA106.4 | Apply and acquire knowledge on graph algorithms in the real time applications | S | S | S | S | S | S | S | M | S | S | M | S | M | S | S |
| P20MCA106.5 | Acquire the basic statistics knowledge of Graph theory and functionalities | S | S | S | S | S | S | S | M | S | S | M | S | M | S | S |

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P20MCA107 – PYTHON PROGRAMMING LABORATORY

L	T	P	C	M
0	0	4	2	100

COURSE OBJECTIVES:

This course will enable the student to:

1. Learn to develop python applications for real world problems.
2. Gain a working knowledge of python programming and learn how to apply data structure concepts in python.
3. Acquire a working knowledge of creating applications using python modules
4. Learn to write programs using file handling functions.
5. Configure and develop python applications using MySQL.

LIST OF EXPERIMENTS

1. Develop programs to learn operators using python.

2. Develop programs to learn string operations and string formatting in python.

3. Develop programs to understand the control structures of python.

4. Develop programs to learn concept of functions scoping and recursion.

5. Develop programs to learn different types of structures (list, dictionary, and tuples) in python.

6. Develop programs for data structure algorithms using python – searching and sorting.

7. Develop programs to implement built-in-string methods and functions.

8. Develop programs to read and write a text file.

9. Develop programs using Python Module.

10. Develop python application using MySQL Database.

TOTAL = 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Develop python applications for real world problems.
- Create applications using files
- Develop applications using MySQL

CO No	Course Outcome(CO) On completion of the course the student should be able to:	P O a	P O b	P O c	P O d	P O e	P O f	P O g	P O h	P O i	P O j	P O k	P O l	P O m	PS O a	PS O b
P20MCA107 .1	Develop python applications for real world problems	S	M	S	S	M	M	M	M	W	M	S	S	M	S	M
P20MCA107 .2	Create applications using files	S	M	S	S	S	M	M	M	M	M	S	S	M	S	M
P20MCA107 .3	Develop applications using MySQL	S	M	S	S	S	M	M	M	M	M	S	S	M	S	M

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P20MCA108 – DATA STRUCTURES AND ALGORITHMS LABORATORY

L	T	P	C	M
0	0	4	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Demonstrate the experiments on Linear and Non Linear Data Structures.

- Understand the implementation of various algorithmic techniques

- Gain knowledge on designing the algorithm for the real time problem

- Understand the significance of the algorithms in the real time problems.

- Understand the implementation of approximate algorithm

LIST OF EXPERIMENTS

1. Write a program to perform the operations of Stack and Queue.

2. Write a program to implement the polynomial expression addition and multiplication using Linked List.

3. Write a program to perform Graph Traversals

4. Apply divide and conquer method to sorting the given numbers using Quick sort and Merge Sort.

5. Apply Greedy Method to find the Minimum Spanning Tree.

6. Write a program to implement the single source shortest path problem using Greedy Method.

7. Apply the Dynamic Programming to apply Floyd's and Warshal Algorithm.

8. Write a program to implement 8 Queens' Problem using Backtracking Algorithm.

9. Apply Branch and Bound to find solution for 0 / 1 Knapsack Problem.

10. Apply NP Complete to find solution for Travelling Salesman Problem.

TOTAL = 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Demonstrate the experiments on Linear and Non-Linear data structures.
- Design an algorithm for the real time problem
- Demonstrate the application using the algorithm techniques.

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA108.1	Demonstrate the experiments on Linear and Non Linear data structures	S	S	S	S	S	S	S	M	M	S	W	S	M	S	S
P20MCA108.2	Design an algorithm for the real time problem	S	S	S	S	S	S	S	M	M	S	W	S	M	S	S
P20MCA108.3	Demonstrate the application using the algorithm techniques	S	S	S	S	S	S	S	M	W	S	W	S	M	S	S

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Semester-I	**P20MCA109 - Soft Skills and Aptitude Career Enhancement Lab -I**	**L**	**T**	**P**	**C**	**Marks**
		0	**0**	**2**	**1**	**100**

COURSE OUTCOMES:

At the end of the course the student will be able to:

1. Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches
2. Solve fundamental problems in specific areas of Quantitative aptitude & Logical Reasoning
3. Demonstrate higher level of verbal aptitude skills in English with regard to specific topics
4. Read and interpret timetables, graphs, etc. and also introduce themselves in a formal situation

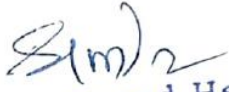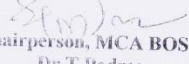|	
1. Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. SWOT Analysis b. Goal Setting c. Attitude Building d. Innovation and Creativity e. Problem Solving and Decision Making f. Dealing with Criticism
2. Quantitative Aptitude and Logical Reasoning	**Solving simple problems with reference to the following topics:** a. Vedic Maths b. Number properties c. Ratio & Proportion d. Mixtures & Solutions e. Problems on ages f. Averages g. Clocks h. Calendars i. Direction Sense j. Coding and Decoding k. Blood Relation l. Data Arrangement
3.Focus on language	**Demonstrating plain English language skills with reference to the following topics:** a. Synonyms b. Antonyms c. Tenses d. Prefixes and suffixes e. Collocations f. Phrasal verb g. Verbal analogy h. Sentence filler words i. Jumbled sentences j. Reconstructions of sentences (PQRS) k. Sentence fillers two words
4. Reading	Reading comprehension, understanding notices, messages, timetables, etc. reading passages for specific information transfer
5. Writing	Report writing and proposal writing
6. Speaking	Self-introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town and introduction to articulation skills

TOTAL = 30 Hours

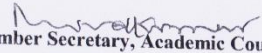| CO / PO, PSO Mapping												
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
Programme												
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13
CO – 1	W	W	M	W	W	S	S	S	W	W	M	W	S
CO – 2	W	W	W	W	W	S	S	M	W	W	W	S	M
CO – 3	W	W	W	W	W	S	S	S	W	S	M	W	S
CO – 4	W	W	W	W	W	S	S	S	W	M	M	W	M

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Sona College of Technology, Salem
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Courses of Study for MCA II Semester under Regulations 2020
Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P20MCA201	Operating Systems	2	0	0	2	30
2	P20MCA202	Computer Networks	2	0	0	2	30
3	P20MCA203	Internet Programming	3	0	0	3	45
4	P20MCA204	Cloud Computing Technologies	3	0	0	3	45
5	P20MCA205	Data Science*	3	0	2	4	75
6	P20MCA206	Mobile Application Development	3	0	0	3	45
7	P20MCA501	Agile Technologies	3	0	0	3	45
	P20MCA513	MicroServices and DevOps	3	0	0	3	45
		Practical					
8	P20MCA 207	Internet Programming Laboratory	0	0	4	2	60
9	P20MCA208	Cloud Computing Technologies Laboratory	0	0	4	2	60
10	P20MCA209	Soft Skills and Aptitude Career Enhancement Laboratory - II	0	0	2	1	30
					Total Credits	25	

*Laboratory Integrated Theory

Approved by

Chairperson, MCA BOS
Dr.T.Padma

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-

HOD MCA, Second Semester MCA Students and Staff, COE

10.12.2021

Regulations-2020

P20MCA201 - OPERATING SYSTEMS

	L	T	P	C	M
	2	0	0	2	100

COURSE OBJECTIVES:

This course will enable the student to:
- Describe the basic organization of computer systems.
- Understand inter process communication using shared memory and message passing.
- Gain knowledge about CPU scheduling and the basis for multi programmed operating systems.
- Provide a detailed description of various ways of organizing memory hardware.
- Know the performance and characteristics of mass-storage devices.

UNIT I - INTRODUCTION & SYSTEM STRUCTURES 5

What Operating Systems Do - Computer System Organization- Computer System Architecture: Operating System Services- System Calls - Types of System Calls - System Programs – Operating System Structure - System Boot.

UNIT II – PROCESS MANAGEMENT 5

Process Concept- Process Scheduling- Operations on Processes- Inter process Communication- Multicore Programming- Multithreading Models- Implicit Threading- Threading Issues- The Critical Section Problem- Semaphores- Classic Problems of Synchronization.

UNIT III – CPU SCHEDULING & DEADLOCKS 5

CPU Scheduling: Basic Concepts - Scheduling Criteria- Scheduling Algorithms - Thread Scheduling- Multiple Processor Scheduling - Real-Time CPU Scheduling. Deadlocks: System Model- Deadlock Characterization- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection - Recovery from Deadlock.

UNIT IV – MEMORY MANAGEMENT 5

Main Memory: Background- Swapping- Contiguous Memory Allocation Segmentation- Paging. Virtual memory : Background- Demand Paging- Copy-on Write- Page Replacement- Allocation of Frames- Thrashing.

UNIT V – STORAGE MANAGEMENT 5

Mass-Storage Structure: Overview of Mass Storage Structure- Disk Structure- Disk Attachment- Disk Scheduling- Disk Management- Swap-Space Management- RAID Structure. File System Interface: File Concept- Access Methods- Directory and Disk Structure- File System Mounting- File Sharing- Protection. File System Implementation: File System Structure- File System Implementation- Directory Implementation- Allocation Methods – Free Space Management- Efficiency and Performance- Recovery.

TOTAL = 30 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Explain the fundamental concepts of operating system services and system calls
- Analyze the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
- Describe the concepts of deadlock in operating systems and how they can be managed / avoided.
- Implement memory management techniques.
- Apply the algorithms in secondary storage and file management techniques

REFERENCES

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
2. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts & Design", Fifth edition, Addison-Wesley, 2012.
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, 7thEdition, 2011.
4. Andrew S. Tanenbaum& Maarten van Steen, "Distributed Systems: Principles and Paradigms", Prentice-Hall, Second Edition, 2006.
5. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill, 1st Edition, 2001.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	P O A	P O B	P O C	P O D	P O E	P O F	P O G	P O H	P O I	P O J	P O K
P20MCA201.1	Describe the basic organization of computer systems.	3	3	3	3	3	3	2	2	2	2	3
P20MCA201.2	Understand inter process communication using shared memory and message passing.	3	3	3	3	3	2	2	2	2	2	3
P20MCA201.3	Gain knowledge about CPU scheduling and the basis for multi programmed operating systems.	3	3	3	3	3	3	2	2	2	3	3
P20MCA201.4	Provide a detailed description of various ways of organizing memory hardware.	3	3	3	2	3	3	2	3	2	3	3
P20MCA201.5	Know the performance and characteristics of mass-storage devices.	3	3	3	3	3	3	2	3	2	3	3

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P20MCA202 – COMPUTER NETWORKS

L	T	P	C	M
2	0	0	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the protocol layering and physical level communication.
- Analyze the performance of a network.
- Understand the various components required to build different networks.
- Learn the functions of network layer and the various routing protocols.
- Familiarize the functions and protocols of the Transport layer.

UNIT I - INTRODUCTION AND PHYSICAL LAYER   **5**

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II – DATA-LINK LAYER & MEDIA ACCESS   **5**

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III - NETWORK LAYER   5

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV – TRANSPORT LAYER   **5**

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V – APPLICATION LAYER   **5**

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP

    TOTAL = 30 Hours
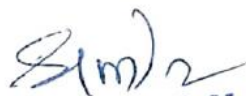
COURSE OUTCOMES:

At the end of the course the student should be able to:

- Understand the basic layers and its functions in computer networks.
- Evaluate the performance of a network.
- Understand the basics of how data flows from one node to another.
- Analyze and design routing algorithms.
- Design protocols for various functions in the network.
- Understand the working of various application layer protocols

REFERENCES

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
3. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
4. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
5. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
6. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA202.1	Understand the protocol layering and physical level communication.	3	2	2	2	1	1	1	1	2	1	1	2	1	3	3
P20MCA202.2	Analyze the performance of a network.	3	3	3	2	1	1	1	1	2	1	1	1	1	3	3
P20MCA202.3	Understand the various components required to build different networks.	3	3	3	1	2	1	1	2	2	2	1	1	1	3	3
P20MCA202.4	Learn the functions of network layer and the various routing protocols.	3	3	3	1	2	2	2	2	2	2	3	2	1	3	3
P20MCA202.5	Familiarize the functions and protocols of the Transport layer.	3	3	3	2	3	2	2	2	2	2	3	2	1	3	3

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P20MCA203 - INTERNET PROGRAMMING

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:
- Understand the various technologies used over internet.
- Learn java-specific web services architecture.
- Discuss on Client and Server side scripting
- learn the Spring framework and build applications using Spring..
- learn and implement the concept of Java Persistence API

UNIT I - WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0   9

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

UNIT II – CLIENT SIDE PROGRAMMING   9

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL. AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods

UNIT III - SERVER SIDE PROGRAMMING   9

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

UNIT IV – SPRING   9

Spring Configuration and Spring Boot, Spring MVC: Dispatcher Servlet and Configuration - Interceptors - Controllers - Views - Input Validation - File Upload, Building RESTful Web Services, Spring Security Architecture, Spring Cache.

UNIT V – JAVA PERSISTENCE API AND HIBERNATE   9

Entity: Basic, Embeddable and Collection Types - Identifiers - Entity Relationship - Inheritance, Persistence Context and Entity Manager, JPQL, Criteria API, Spring Data JPA - Specification and Projection.

TOTAL = 45 Hours

COURSE OUTCOMES:

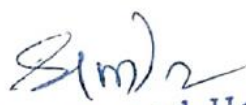**At the end of the course the student should be able to:**

- Construct a basic website using HTML and Cascading Style Sheets.
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
- Develop server side programs using Servlets and JSP.
- Implement Web Application using Spring
- Implement a Java application using Java Persistence API.

REFERENCES:

1. Deitel and Deitel and Nieto,"Internet and World Wide Web - How to Program", Prentice Hall, 5th Edition, 2011.

2. Stephen Wynkoop and John Burke,"Running a Perfect Website",QUE,2nd Edition,1999.

3. Chris Bates, "Web Programming – Building Intranet Applications", 3rd Edition, Wiley Publications, 2009.

4. Jeffrey C and Jackson,"Web Technologies A Computer Science Perspective", Pearson Education, 2011.

5. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.

6. UttamK.Roy, ‑"Web Technologies", Oxford University Press, 2011.

CO No	Course Outcomes - On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA203.1	Construct a basic website using HTML and cascading style sheets.	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA203.2	Build dynamic web page with validation using java script objects and by applying	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3

	different event handling mechanism.															
P20MCA203.3	Develop server side programs using servlet and JSP.	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA203.4	Implement web applications using spring	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA203.5	Implement a java application using Java persistence API	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand Cloud computing its services.
- Understand the virtualization techniques in cloud.
- Explain the concept of cloud database and analyze the various security concerns of cloud.
- Discuss on the storage and testing in cloud
- Discuss on the Real time applications and Best practices of cloud.

UNIT I - OVERVIEW OF CLOUD COMPUTING   9

Introduction to Cloud Computing –Cloud service models – Cloud computing sub service models – Cloud deployment models – Alternative deployment models – Cloud architecture –Characteristics of cloud computing.

UNIT II – VIRTUALIZATION AND LOAD BALANCING IN CLOUD   9

Virtualization Techniques – Virtualization Technology – Overview of x86 virtualization - Types of Virtualization – CPU – Memory – Device and I/O – OS level – Network Server–Client- Application – Open source Containers in Cloud Kubernetes- Load balancing.

UNIT III – DATABASE AND SECURITY   9

Cloud databases and File systems –Cloud database , Cloud File system , Cloud Programming model – Cloud Disaster Recovery - Security concerns of cloud computing – Cloud information security objectives - Cloud security and existing security solutions –Cloud Security Architecture, VM Security challenges , Vulnerability Assessment tools for cloud , Open source security solution products in cloud .

UNIT IV – CLOUD STORAGE AND CLOUD TESTING   9

Cloud Middleware – Concept and Need of Cloud Middleware. Cloud optimized storage: scalability – Replications options – Data archiving methods – Physical storage facilities: Data center operations – Data monitoring strategies - Cloud testing – Secure cloud software testing.

UNIT V – REAL TIME APPLICATIONS AND BEST PRACTICES OF CLOUD 9
COMPUTING

Role of Cloud in Big data and IoT – Cloud Providers and their products – Amazon , Microsoft, VMware - Working with Google app engine and Hosting the application- Consideration before adopting cloud – Development and environments for service development – Best practices– Economics of choosing a cloud platform for an organization – Cloud computing Consumer case studies.
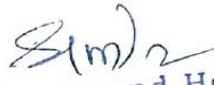
TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:
- Apply the service models and deployment models of cloud computing in real time.
- Analyze the details of virtualization and load balancing.
- Appraise the databases and security mechanism of cloud.
- Appraise the storage and testing mechanisms of Cloud Computing.
- Analyze the best practices of implementing cloud and the integration of latest technologies with cloud computing.

REFERENCES

1. Rishabh Sharma ,"Cloud Computing – Fundamentals , Industry approach and trends" ,Wiley Pub, 1st Edition 2015.(Unit 1,2,3,4,5).
2. Shailendra Singh,"Cloud Computing", Oxford university press, 2018(Unit 1,2,3)
3. Dr.S.AnandaMurugan,T.Priya,M.C.Arvind Babu,"Cloud Computing", University Science Press,2017.(Unit 4)
4. Barrie Sosinsky , " Cloud Computing Bible " , Wiley pub , 2011.
5. Buyya, Selvi ,Vecchiola" Mastering Cloud Computing – Foundations and application programming ",TMH Pub, 1st Edition, 2013
6. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications, Cambridge University Press (14 October 2010) [ISBN: 978-0521137355]
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8. Liz Kao, Jon Paz, "Salesforce.com for dummies " , Wiley , 6th Edition , 2016.
9. Dan Appleman,"Advanced Apex Programming", 2nd Edition ,2013 , Desaware Publishing.
10. Jim Smith and Ravi Nai ,:Virtual Machines: Versatile Platforms for Systems and Processes (The Morgan Kaufmann Series in Computer Architecture and Design)",2005, Morgan Kaufman publisher.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA204 .1	Apply the service models and deployment models of cloud computing in real time.	2	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA204 .2	Analyze the details of virtualization and load balancing.	3	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA204 .3	Appraise the databases and security mechanism of cloud.	3	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA202 .4	Appraise the storage and testing mechanisms of Cloud Computing.	3	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA204 .5	Analyze the best practices of implementing cloud and the integration of latest technologies with cloud computing.	3	3	3	3	3	3	3	2	1	3	2	3	3	3	3

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	L	T	P	C	M
	3	0	2	4	100

COURSE OBJECTIVES:
This course will enable the student to:
- Understand the basic concepts of Data Science and Big Data
- Understand the statistical concepts using R Language.
- Discuss various data models used data analysis.
- Discuss the concepts of data analysis using Hadoop
- Describe the Linear Transformations and Matrices

UNIT I –INTRODUCTION TO DATA SCIENCE AND BIG DATA   9

Introduction to Data Science – Data Science Process – Exploratory Data analysis –Big data: Definition, Risks of Big Data, Structure of Big Data – Web Data: The Original Big Data- Evolution of Analytic Scalability – Analytic Processes and Tools – Analysis versus Reporting – Core Analytics versus Advanced Analytics – Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions - Re- Sampling – statistical inference – Introduction to Data Visualization.

UNIT II DATA ANALYSIS USING R   9

Univariate Analysis: Frequency. Mean. Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis –Bivariate Analysis: Correlation – Regression – Multivariate Analysis – Graphical representation of Univariate, Bivariate and Multivariate Analysis – Graphical representation of Univaruate, Bivariate and Multivariate Analysis in R: Bar Plot, Histogram, Box Plot, Line Plot, Scatter Plot, Lattice Plot, Regression Line, Two-way cross Tabulation.

9

UNIT III – DATA MODELING

Bayesian Modeling – Support Vector and Kemel Methods – Neuro – Fuzzy Modeling – Principal Component Analysis – Introduction to NoSQL: CAP Theorem, MongoDB: RDBMS Vs MongoDB, Mongo DB Database Model, Data Types and Sharding – Data Modeling in HBase: Defining Schema – CRUD Operations

UNIT IV DATA ANALYTICAL FRAMEWORKS   9

Introduction to Hadoop: Hadoop Overview – RDBMS Versus Hadoop – HDFS (Hadoop Distributed File System): Components and Block Replication –Introduction to MapReduce – Running Algorithms Using MapReduce – Introduction to HBase: HBase Architecture, HLog and HFile, Data Replication – Introduction

UNIT V Linear Transformation & matrices: 9

Introduction to linear transformations - General linear transformations - Kernel & Range - Matrices of general linear transformations - Eigen Values & Eigen Vectors: Introduction to Eigen values - Diagonalizing of a matrix - Orthogonal diagonalization - Application of differential equation.

TOTAL = 75 Hours

List of Programs

1. Download, install and explore the features of R/Python for data analytics.

2. Use the Diabetes data set from UCI and Pima Indians Diabetes data set for per forming the following:

   a. Univariate Analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.

   b. Bivariate Analysis: Linear and logistic regression modeling.

   c. Multiple Regression Analysis

   d. Also Compare the results of the above analysis for the two data sets.

3. Apply Bayesian and SVM techniques on Iris and Diabetes data set.

4. Apply and explore various plotting functions on UCI data sets.

Implement the following using Hadoop, Map Reduce, HDFS, Hive:

5. Perform setting up and installing Hadoop in its two operating modes: pseudo-distributed and fully distributed.

6. Implement the following file management tasks in Hadoop: adding files and directories, Retrieving files and Deleting files

   (i) Performing a MapReduce Job for word search count (look for specific keywords in a file)

   (ii) Implement step word elimination problem: Input a large textual file containing one sentence per file and a small file containing a set of stop words (one stop word per line) and save the results in an output textual file containing the same sentences of the large input the without the words appearing in the small file.

7. Implement a MapReduce program that processes a weather data set to:

   a. Find average, max and min temperature for each year in National Climate Data Centre data set.

   b. Filter the readings of a set based on Value of the measurement. The program must save the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.

8. Mini projects on the following:

   a. Simulate a simple recommender system with Amazon product dataset, Social tweet data set etc. on Hadoop.

b. Perform a very large text classification run on Hadoop.

COURSE OUTCOMES:

At the end of the course the student should be able to:
- Apply the modern analytical tools on Big data.
- Experiment with statistical concepts using R language
- Experiment various data models using R Language
- Perform a Data Analysis Using Hadoop Framework
- Illustrate all the strategies on Linear Transformations and Matrices.

REFERENCES

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & Sons, First Edition, 2013.

2. Umesh R Hodeghatta, Umesh Nayak, "Business Analytics Using in R – A Practical Approach", Apress, First Edition, 2017.

3. Howard Anton & Chris Rorres, "Elementary Linear Algebra", Wiley, Eleventh Edition 2013.

4. J. Leskowac, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets",Cambridge University Press, Second Edition, 2014.

5. Nishant Gerg, "Hbase Essentials", Packt, First Edition, 2014.

6. Rachel Schutt, Cathy O'Nell, "Doing Data Science",O'Reilly, First Edition, 2013.

7. Foster Provost, Tom Fawcet, "Data Science for Business",O'Reilly, First Edition, 2013.

8. Bert Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley, First Edition, 2014.

CO No	Course Outcome (CO)	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	PSOa	PSOb
P20MCA205.1	Apply the modern analytical tools on Big data	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA205.2	Experiment with statistical concepts using R language	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA205.3	Experiment various data models using R Language	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

| P20MCA205.4 | Perform a Data Analysis Using Hadoop Framework | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 1 | 3 | 2 | 3 | 3 |
| P20MCA205.5 | Illustrate all the strategies on Linear Transformations and Matrices | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 1 | 3 | 2 | 3 | 3 |

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P20MCA206 - MOBILE APPLICATION DEVELOPMENT

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Relate the need of mobile applications and point out the importance of it.
- Discuss on the basic concepts of android.
- Identify the components beyond user interface and use them in an application.
- Describe the advanced application development in android.
- Discuss the basic concepts of iOS application development.

UNIT I - INTRODUCTION TO MOBILE APPLICATIONS   7

Introduction to mobile applications - Mobility landscape - Mobile platforms - Mobile apps development – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications – Market and business drivers for mobile application.

UNIT II –ANDROID INTRODUCTION   9

Android Introduction - Android features - Android Architecture – Mobile UI resources (Layout, Fragment, UI elements, Drawable, Menu) - Activity – states and life cycle - Interaction amongst activities – Notifications.

UNIT III –ANDROID APP DEVELOPMENT   10

Threads – Async tasks - Services – states and lifen b   cycle – Shared preferences - Broadcast receivers - Telephony and SMS APIs - Animation

UNIT IV –ANDROID ADVANCED CONCEPTS   10

Multimedia-Audio/Video Playback and Record – Location Awareness – Native Hardware access using Accelerometer and Gyroscope– Mobile Databases using SQlite - Content Providers - Introduction to material designing

UNIT V – iOS INTRODUCTION AND APP DEVLOPMENT   9

Basics of Swift for iOS App development - iOS Introduction - features –Architecture - iOS Actions and Outlets – Story Board – Views - Simple iOS Application - iCloud introduction - iPhone market place.

TOTAL = 45 Hours

COURSE OUTCOMES:

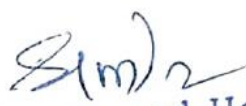**At the end of the course the student should be able to:**

- Analyze the significance of mobile application development and its market value.
- Develop real time mobile applications and discuss the architecture, platform and tools required for mobile application.
- Design and develop an application with the given component.
- Develop an application beyond user interface with intricate tools like mobile databases, sensors, animation, multimedia etc.
- Analyze the Architecture, iCloud and the concepts of iOS.

REFERENCES

1. "Composing Mobile Apps: Learn, Explore, Apply using Android ", Anubhav Pradhan, Anil V. Deshpande, Wiley Publications, 2014.
2. "IOS 12 Programming for Beginners", Craig Clayton ,Packt publishing 3rd Edition.
3. Android Application Development All in one for Dummies, Barry Burd, Wiley Publications (Edition 1)
4. Teach Yourself Android Application Development in 24 Hours, Lauren Darcey & Shane Conder, SAMS Publication, 2010.
5. "Microsoft Mobile development Handbook", Andy Wigley, Microsoft Publications, 2001.
6. "iOS Apps for Masterminds ",J.D.Gauchat,Registration number 1126232, 4th edition, 2018.
7. "Learning Swift: Building Apps for macOS, iOS, and Beyond ",Jonathon Manning ,Paris Buttfield-Addison ,Tim Nugent ,O'reilly , 3rd Edition.

CO No	Course Outcomes - Mobile Application and Development	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA2 06.1	Analyze the significance of mobile application development and its market value	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3

P20MCA2 06.2	Develop real time mobile applications and discuss the architecture , platform tools required for mobile applications	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA2 06.3	Design and develop and application with the given component.	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA2 06.4	Develop an application beyond user interface with intricate toolslike mobile databases,sensors, animation , multimedia etc	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA2 06.5	Analyze the architecture , iCloud and the concepts of iOS.	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3

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L	T	P	C	M
0	0	4	2	100

COURSE OBJECTIVES:

This course will enable the student to:
- To be familiar with Web page design using HTML/XML and style sheets
- To learn to create dynamic web pages using server side scripting.
- To learn to write Client Server applications.
- To develop a web application using Spring.
  To implement a Persistence layer using Hibernate and Spring Data JPA
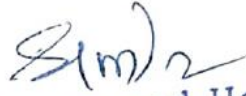
LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
2. To embed a map in a web page
3. To fix the hot spots in that map
4. Show all the related information when the hot spots are clicked.
5. Create a web page with the following.
6. Cascading style sheets.
7. Embedded style sheets.
8. Inline style sheets. Use our college information for the web pages.
9. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
10. Write programs in Java using Servlets:
11. To invoke servlets from HTML forms
12. Session tracking using hidden form fields and Session tracking for a hit count
13. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
14. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) 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.
15. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
16. Create and save an XML document at 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
17. Create a Spring MVC application. The application should handle form validation, file upload, session tracking.
18. Design a complex system using JPA and Hibernate. The system should have multiple entities and relationships between the entities. The database schema should be generated through Hibernate. Provide RESTful endpoints for CRUD operations for the defined entities. Also, support pagination and searching using JPA's JPQL and Criteria API.

TOTAL = 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:
- Upon Completion of the course, the students will be able to:
- Construct web pages using HTML/XML and Style sheets
- Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
- Develop dynamic web pages using server side scripting
- Develop applications in Spring
- Develop applications in JPA and hibernate

CO No	Course Outcomes - Internet Programming Lab	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA207.1	Construct web pages using HTML/XML and style sheets	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA207.2	Build dynamic web pages with validation using javascript objects and by applying different event handling mechanisms.	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA207.3	Develop dynamic web pages using server side scripting	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA207.4	Develo applications in Spring	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3
P20MCA207.5	Develop applications in JPA and hibernate	3	3	3	3	3	2	3	3	2	3	3	3	3	3	3

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P20MCA208 - CLOUD COMPUTING TECHNOLOGIES LABORATORY

L	T	P	C	M
0	0	4	2	100

Course Objectives:
- Relate the application of cloud computing with real time.
- Develop SaaS application in cloud CRM.
- Develop sample programs in any of the on demand cloud CRM in the market
- Create applications in cloud CRM in a very short time without any developmental cost.
- Understand cloud containers.

List of Programs:
Develop applications in Cloud:
Cloud CRM:

1. Formula and Validation – Basic and Advanced level.
2. Workflow Process
3. Automation Process
4. Apex triggers
5. Data management
6. Visual Force pages
7. SaaS Application
8. Einstein dashboard – Reports
9. AI for business

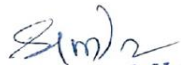**Open source Cloud Containers:**
10. Containers - Kubernetes

Course Outcomes:

At the end of the course the student should be able to:
- Create real time applications that uses formulas, validation, and workflow and automation process in Cloud CRM.
- Create applications that describes Visual Force pages, Apex triggers, Data Management tools in Cloud CRM.
- Appraise open source cloud containers and learn its implementation

TOTAL = 60 Hours

CO No	Course Outcome(CO) On completion of the course the student should be able to :	P O a	P O b	P O c	P O d	P O e	P O f	P O g	P O h	P O i	P O j	P O k	P O l	P O m	P S O a	P S O b
P20MCA208.1	Create real time applications that uses formulas, validation, and workflow and automation process in Cloud CRM.	1	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA208.2	Create applications that describes Visual Force pages, Apex triggers, Data Management tools in Cloud CRM.	1	3	3	3	3	3	3	2	1	3	2	3	3	3	3
P20MCA208.3	Appraise open source cloud containers and learn its implementation	1	3	3	3	3	3	3	2	1	3	2	3	3	3	3

P20MCA209 - Soft Skills and Aptitude Career Enhancement Laboratory -II   L   T   P C Marks

0   0   2   1   100

COURSE OUTCOMES:

At the end of the course the student will be able to:

1. Demonstrate capabilities in supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches

2. Solve problems of advanced levels than those in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests

3. Demonstrate greater than level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests.

4. Make effectively oral presentation and take part in group discussions and write formal letters, memos, paragraphs and notices

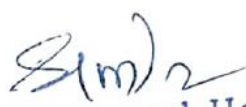|	
1. Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a) Presentation Skills b) Team work c) Leadership Skills d) Listening Skills e) Critical Thinking (Observation, Analysis, Interpretation, Reflection, Evaluation, Inference, Explanation, Problem Solving and Decision Making)
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a) Percentage b) Profit, loss & Discount c) Time & Work , Pipes & Cisterns d) Partnership e) Time Speed and Distance f) Interest Calculations g) Logarithm h) Data Sufficiency i) Ranking & Ordering j) Data Interpretation k) Company specific aptitude questions-1
Focus on language	**Demonstrating verbal ability skills in English with reference to the following topics:** a. **S**ubject verb agreement b. Modal verbs c. Reading comprehension d. Spotting errors e. Choosing the correct / incorrect sentences f. Describing the picture g. Critical Reasoning h. Theme Detection i. Cloze test

Speaking	Mini presentation and group discussion
Writing	Paragraph writing, e-mail, letter to editors and memos
Reading	Reading advertisements and graphs, reading passages for specific information transfer

TOTAL = 30 Hours

CO / PO, PSO Mapping													
MCA													
COs, POs PSOs Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO13**
CO – 1	1	1	2	1	1	3	3	3	1	1	2	1	3
CO – 2	1	1	1	1	1	3	3	2	1	2	2	3	2
CO – 3	1	1	1	1	1	3	3	3	1	3	2	1	2
CO – 4	1	1	1	1	1	3	3	3	1	2	2	1	2

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ELECTIVE - I

L	**T**	**P**	**C**	**M**
3	**0**	**0**	**3**	**100**

COURSE OBJECTIVES:

This course will enable the student to:

- To understand the basic concepts of Agile Software Process.
- To gain knowledge in the area of various Agile Processes.
- To develop Agile Software Process
- To know the benefits and pitfalls of working in an Agile Team.
- Assess product quality risks within an Agile project

UNIT I – INTRODUCTION 9

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT II - AGILE PROCESSES 9

Lean Production – SCRUM, Crystal, Feature Driven Development – Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III – AGILITY and KNOWLEDGE MANAGEMENT 9

Agile Information Systems – Agile Decision Making – Earl's Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge sharing - Role of Story – Cards – Story-Card Maturity Model (SMM).

UNIT IV – AGILITY and Requirements Engineering 9

Impact of Agile Processes in Re-Current Agile Practices – Variance – Overview of Re using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V – AGILITY and Quality Assurance 9

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development – Agile Scrum – Scrum Master – Scaling Projects using Scrum.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:
- Demonstrate a systematic understanding of current agile techniques and practices used in industry.
- Apply industry standard agile techniques in develop software in a team.
- Use group and individual retrospectives to critically evaluate and propose improvements in developing software in a professional context.
- Develop techniques and tools for improving team collaboration and software quality.
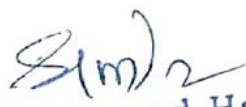- Managing the Agile Approaches up to the enterprise level.

REFERENCES

1. David J Anderson and Eli Schragenhelm, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Illustrated Edition, Prentice Hall PTR, 2004.
2. Orit Hazza and Yaepi Dubinsky," Agile Software Engineering: Undergraduate Topics in Computer Science, Springer Verlag, First Edition, 2009.
3. Craig Larman,"Agile and Iterative Development: A Manager's Guide", Pearson Education, Second Edition, 2007.
4. Kavin C.Desouza,"Agile Information Systems: Conceptualization, Construction and Management", Elsevier, Butterworth-Heinemann, First Edition, 2007.
5. Ken Schwaber, "Agile Project Management with Scrum", Illustrated, Revised Edition, Microsoft Press, 2004.
6. Konnor Cluster, "Agile Project Management: Learn How to Manage a Project with Agile Methods, Scrum, Kanban and Extreme Programming", Independently Published, First Edition, 2019.

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA501.1	Demonstrate a systematic understanding of current agile techniques and practices used in industry	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA501.2	Apply industry standard agile techniques in develop software in a	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

	team														
P20MCA501.3	Use group and individual retrospectives to critically evaluate and propose improvements in developing software in a professional context	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA501.4	Develop techniques and tools for improving team collaboration and software quality	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA501.5	Managing the Agile Approaches up to the enterprise level	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

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P20MCA513– MICROSERVICES AND DEVOPS

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Explain an overview of Microservices and Containers.
- Understand the key concepts and principles of DevOps
- List the most common DevOps tools
- Identify the business benefits of DevOps and continuous delivery.
- Recall the specific DevOps methodologies and frameworks.

UNIT I – INTRODUCTION TO MICROSERVICES   9

Definition of Microservices – Characteristics - Microservices and Containers – Interacting with Other Services – Monitoring and Securing the Services – Containerized Services – Deploying on Cloud.

UNIT II - MICROSERVICES ARCHITECTURE   9

Monolithic architecture- Microservice architectural style- Benefits - Drawbacks of Microservice architectural style - decomposing monolithic applications into Microservices.

UNIT III - BASICS OF DEVOPS   9

History of DevOps- DevOps and software development life cycle- water fall model – agile model – DevOps life cycle – DevOps tools: distributed version control tool –Git- automation testing tools – Selenium - reports generation – TestNG - User Acceptance Testing – Jenkins.

UNIT IV - MICROSERVICES IN DEVOPS ENVIRONMENT   9

Evolution of Microservices and DevOps – Benefits of combining DevOps and Microservices working of DevOps and Microservices in Cloud environment - DevOps Pipeline representation for a NodeJS based Microservices.

UNIT V - VELOCITY AND CONTINUOUS DELIVERY   9

Velocity - Delivery Pipeline- test stack - Small/Unit Test – medium /integration testing – system testing- Job of Development and DevOps - Job of Test and DevOps – Job of Op and Devops-Infrastructure and the job of Ops.

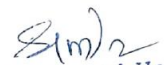**TOTAL = 45 Hours**

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Understand the Microservices and containers.
- Explain the architecture of Microservices.
- Describe DevOps and the common tools used in DevOps.
- Apply Microservices in DevOps.
- Develop, integrate and deploy projects using DevOps.

REFERENCES

1. **Namit Tanasseri, RahulRai, "Microservices with Azure", 1st Edition, Packt Publishing, UK, 2017.**

2. **Eberhard Wolff, "Microservices: Flexible Software Architecture", 1st Edition, Pearson Education, 2017**

3. James A Scott, "A Practical Guide to Microservices and Containers", Map R Data Technologies e–book. https://mapr.com/ebook/microservices-andcontainers/assets/microservices-and-containers.pdf.

4. Joyner Joseph, Devops for Beginners, First Edition, Mihails Konoplovs publisher, 2015.

5. Gene Kim, Kevin Behr, George Spafford, The Phoenix Project, A Novel about IT, DevOps, 5th Edition, IT Revolution Press, 2018.

6. Michael Hüttermann, DevOps for Developers, 1st Edition, APress, e-book, 2012.

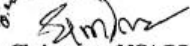| CO No	Course Outcome(CO) On completion of the course the student should be able to :	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	PSOa	PSOb
P20MCA513.1	Understand the Microservices and containers.	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1
P20MCA513.2	Explain the architecture of Microservices.	1	3	3	1	1	2	2	1	1	3	3	3	1	3	1
P20MCA513.3	Describe DevOps and the common tools used in DevOps.	3	3	3	1	3	3	3	3	1	1	1	1	1	3	3
P20MCA513.4	Apply Microservices in DevOps.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
P20MCA513.5	Develop, integrate and deploy projects using DevOps.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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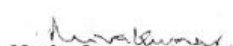Sona College of Technology
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Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for MCA III Semester under Regulations 2020
Branch: Master of Computer Applications

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P20MCA301	Embedded Systems and Internet of Things	3	0	0	3	45
2	P20MCA302	Cyber Security Essentials	2	0	0	2	30
3	P20MCA303	Artificial Intelligence and Machine Learning	3	0	0	3	45
4	P20MCA510	Elective – Full Stack Web Development*	2	0	2	3	60
5	P20MCA512	Elective – Advanced Web Programming*	2	0	2	3	60
6	P20MCA504	Elective - Social Networks	3	0	0	3	45
	P20MCA506	Elective – Software Testing and Quality Assurance					
		Practical					
7	P20MCA304	Embedded Systems and Internet of Things Laboratory	0	0	4	2	60
8	P20MCA305	Artificial Intelligence and Machine Learning Laboratory	0	0	4	2	60
9	P20MCA306	Mini Project Laboratory	0	0	4	2	60
10	P20MCA307	Soft Skills and Aptitude Career Enhancement Laboratory – III	0	0	2	1	30
* Laboratory Integrated Theory				**Total Credits**		24	

Approved by

Chairperson, MCA BOS
Dr.T.Padma

Member Secretary, Academic Council
Dr.R.Shivakumar 23-8-22

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-
HOD MCA, Third Semester MCA Students and Staff, COE

18.08.2022

Regulations-2020

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Provide an overview of principles of Embedded System
- Understand the basics of IoT, communication models and emerging technologies.
- Exhibit domain and system management for IoT applications.
- Use cloud services for IoT applications.
- Learn real world application scenarios of IoT along with its societal and economic impact using case studies.

UNIT I - INTRODUCTION TO EMBEDDED SYSTEM   9

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems, General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major application areas, Purpose of Embedded Systems, Characteristics and Quality attributes of Embedded Systems. The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System components-Embedded System development environment – IDE- Embedded product development life-cycle.

UNIT II –DESIGN OF IoT   9

Introduction-Definition and characteristics of IoT-Physical design of IoT-Things in IoT and IoT protocols-Logical design of IoT-IoT functional blocks-IoT communication model and IoT communication APIs-IoT enabling technologies-Wireless Sensor Networks-Role of Cloud Computing and Big Data Analytics, IIOT, Industry 4.0-Communication protocols-IoT levels.

UNIT III - DOMAIN, M2M AND SYSTEM MANAGEMENT   9

Introduction – Home Automation-Cities-Industry-Health & Lifestyle-M2M-SDN and NFV for IoT-Software Defined Networking-Network Function Virtualization-IoT system management-Need for IoT system management – Simple Network Management protocol. Protocols: IEEE 802.15.4 – The IEEE 802 Committee Family protocols-The physical layer-The Media Access Control Layer-Uses of 802.15-BACNet Protocol-Modbus-KNX-Zigbee Architecture-Network Layer-APS layer-Security.

UNIT IV – DEVELOPING INTERNET OF THINGS   9

IoT Platforms Design Methodology-IoT System for Weather Monitoring-IoT System for Agriculture. Introduction to Cloud Storage Models & Communication APIs-WAMP-AutoBahn for IoT –Xively Cloud for IoT-Python Web Application Framework-Django Architecture – Development with Django Toolkit-Arduino –Rasberry Pi.

UNIT V – CLOUD SERVICES FOR IOT   9

Designing a RESTFUL Web API-Amazon Web Services for IoT – EC2-Autoscaling-S3-RDS-Dynamo DB-Kinesis-SkyNet IoT Messaging Platform. Case Studies – Environement-IoT systems for weather reporting Bot-Air Pollution Monitoring system-Forest Fire Detection-IoT system for Energy-Smart grid – Renewable Energy Systems.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Acquire knowledge and understand fundamental embedded system design paradigms and architecture.
- Illustrate the design, communication model and enabling technologies for IoT.
- Analyze the system management and domain for various applications of IoT.
- Classify the various protocols that are used for developing IoT applications.
- Identify the cloud services for various applications of IoT.

REFERENCES

1. Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill, January 2020 (Unit 1).
2. Arshdeep Bahga and Vijay Madisetti, "Internet of Things, A Hands-on Approach", Universities Press, 2015 (Units 2 ,3 & 5).
3. Mayur Ramgir, "Internet of Things-Architecture, Implementation and Security", Pearson, August 2019.
4. Olivier Hersent, David Boswarthick, Omar Elloumi,"The Internet of Things-Key applications and Protocols", Wiley, 2012. (Unit 4)
5. Adrian McEwen, "Designing the Internet of Things", Wiley, 2014.
6. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, October 2015.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA301.1	Acquire knowledge and understand fundamental embedded system design paradigms and architecture.	3	2	3	3	2	2	2	2	1	2	3	3	2	3	2
P20MCA301.2	Illustrate the design, communication model and enabling	3	3	3	3	3	2	2	2	1	3	3	3	2	3	2

	technologies for IoT.															
P20MCA301.3	Analyze the system management and domain for various applications of IoT.	3	2	3	3	3	2	2	2	2	2	3	3	2	3	2
P20MCA301.4	Classify the various protocols that are used for developing IoT applications.	3	2	3	3	2	2	2	2	1	2	3	3	2	3	2
P20MCA301.5	Identify the cloud services for various applications of IoT.	3	2	3	3	3	3	2	2	2	2	3	3	2	3	2

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P20MCA302 - CYBER SECURITY ESSENTIALS

	L	T	P	C	M
	2	0	0	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the various types of cybercrimes.
- Formulate the security problems in wireless devices and networks.
- Identify the different types of cybercrimes and its associated cyber laws.
- Gain knowledge about computer forensics and challenges in computer forensics.
- Discuss the social impacts of cybercrime and privacy protection in an organization.

UNIT I - INTRODUCTION TO CYBERCRIME   **9**

Introduction: Cybercrime - Cybercrime and Information Security - Cyber Criminals-Classification of Cybercrimes-Cyber Offenses: Attacks-Social Engineering- Cyberstalking-Cyber Cafe and Cybercrimes-Botnets.

UNIT II – CYBERCRIME : MOBILE AND WIRELESS DEVICES   **9**

Cybercrime : Mobile and Wireless Devices: Proliferation of Mobile and Wireless Devices-Credit Card Frauds in Mobile and Wireless Computing Era -Security Challenges Posed by Mobile Devices -Registry Settings for Mobile Devices -Authentication Service Security : Cryptographic Security for Mobile Devices - LDAP Security for Hand- Held Mobile Computing Devices -Attacks On Mobile Phones - Tools and Methods used in Cybercrime: Proxy Servers and Anonymizers – Phishing - Password Cracking - Key Loggers and Spywares - Buffer Overflow -Attacks on Wireless Networks.

UNIT III – CYBER SECURITY : LEAGAL PERSPECTIVE   **9**

Introduction – Cyber Security Evolution – Cyber Security Objectives - Cyberlaws: The Indian Context - Indian IT Act - Digital Signature and the Indian IT Act - Amendments to the Indian IT Act - Cybercrime and the Punishment –Cyberlaw - Technology and Students: Indian Scenario.

UNIT IV – COMPUTER FORENSICS   **9**

Introduction - Historical Background of Cyber Forensics - Digital Forensics Science - Need for Computer Forensics -Cyber Forensics and Digital Evidence - Forensics Analysis of E-Mail - Digital Forensics Life Cycle -Chain of Custody Concept - Network Forensics - Computer Forensic Investigation - Computer Forensic and Steganography -Challenges in Computer Forensics - Forensics Auditing – Anti-forensics.

UNIT V –SOCIAL IMPLICATIONS   **9**

Introduction - Cost of Cybercrime and IPR Issues -Web Threats for Organizations - Security and Privacy Implications from Cloud Computing - Social Media Marketing -Social

Computing and Associated Challenges -Protecting People's Privacy in the Organization - Organizational Guide Lines for Internet Usage -Safe Computing Guidelines and Computer Usage Policy - Incident Handling -Forensics Best Practices for Organizations - Media and Asset Protection -Importance of endpoint Security in Organizations.

TOTAL = 30 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Acquire the knowledge about cybercrime and attacks in cybercrime.
- Explore the tools and methods used to protect wireless devices and networks from various attacks.
- Analyse various Indian acts imposed in cybercrime.
- Apply and know the importance of computer forensics in the digital world.
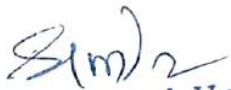- Exhibit the media and asset protection of an organization.

TEXT BOOKS

1. Nina Godbole, Sunit Belapure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", 2019, Wiley Publications (Unit I – V).

REFERENCE BOOKS

2. Jennifer L. Bayuk,Jason Healey, Paul Rohmeyer, Marcus H. Sachs, Jeffrey Schmidt, Joseph Weiss, "Cyber Security Policy Guidebook", 2017, Wiley Pulications. (Unit -1)
3. Mayank Bhushan, Rajkumar Singh Rathore, Aatif jamshed "Fundamental of Cyber Security Principles, Theory and Practices", BPB Publications.
4. Thomas J. Mowbray, "Cyber Security Managing Systems, Conducting Testing and Investigating Intrusions", 2019, Wiley Publications.
5. **Khadsare S, " Cyber Security HandBook ", 2017, Mrs. Deepthy Chaudry publications.**

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA302.1	Acquire the knowledge about cybercrime and attacks in cybercrime.	3	2	2	2	1	1	1	1	2	1	1	2	1	3	3
P20MCA302.2	Explore the tools and methods used to protect wireless devices and networks from various attacks.	3	3	3	2	1	1	1	1	2	1	1	1	1	3	3
P202CA302.3	Analyse various Indian acts imposed in cybercrime.	3	3	3	1	2	1	1	2	2	2	1	1	1	3	3
P20MCA302.4	Apply and know the importance of computer forensics in the digital world.	3	3	3	1	2	2	2	2	2	2	3	2	1	3	3
P20MCA302.5	Exhibit the media and asset protection of an organization.	3	3	3	2	3	2	2	2	2	2	3	2	1	3	3

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P20MCA303 – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

L	T	P	C	M
3	0	0	3	100

COURSE OBJECTIVES:

 This course will enable the student to:

- Explain the principles of Artificial intelligence like problem solving, inference, perception.

- Understand the methods for knowledge representation, and learning.

- List the characteristics of Intelligent agents

- Design and implement the machine learning techniques for real world problems

- Gain experience in doing research using Artificial intelligence and Machine learning techniques.

UNIT I –INTRODUCTION TO ARTIFICIAL INTELLIGENCE   9

Foundation of AI-History of AI-State of Art.-Intelligent Agents: Agents and Environments - Concepts of Rationality-Nature of Environments-Structure of Agents. Problem Solving: Problem Solving by Search: Problem Solving Agents-Searching for Solutions-Uniform Search Strategies-Heuristic Search Strategies- local Search Algorithms and Optimization Problems.

UNIT II - KNOWLEDGE AND REASONING   9

Logical Agents: Knowledge Based Agents-Logic-Propositional Logic-Propositional Theorem Proving-Model Checking-Agent based on Propositional Logic. First-Order Logic: Syntax and Semantics- Using First-Order Logic-Knowledge Engineering. Inference in First-Order Logic: Prepositional Vs. First-Order Inference-Unification and Lifting-Forward Chaining-Backward Chaining –Resolution. Fuzzy Sets to Fuzzy Logic System in AI: Fuzzy sets – operations – Logic – rules – fuzzy inference system – fuzzification and defuzzification.

UNIT III - BAYESIAN LEARNING   9

Basic Probability Notation- Inference – Independence - Bayes Rule. Bayesian Learning: Maximum Likelihood and Least Squared error hypothesis-Maximum Likelihood hypotheses for predicting probabilities- Minimum description Length principle -Bayes optimal classifier - Naïve Bayes classifier - Bayesian Belief networks -EM algorithm.

UNIT IV - MACHINE LEARNING PARAMETRIC MODELS   9

Supervised Learning – Regression and classification – Evaluating and choosing best Hypothesis - Perceptron – Artificial Neural Networks – Fuzzy neurons and Fuzzy Neural networks - Multi – class Classification - Backpropagation – Non-linearity with activation functions (Tanh, Sigmoid, Relu, PRelu) - Dropout as regularization.

k- Nearest Neighbors- Learning Decision Trees – Inducing – attribute tests - Generalization and Overfitting – application - Ensemble learning - Boosting - Adaboost algorithm. Support Vector Machines – Large Margin Intuition – Loss Function - Hinge Loss – SVM Kernels – Case Study.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Apply AI techniques in problem solving context.

- Implement Knowledge and Reasoning in the real world problems.

- Design a model with the required Learning features in AI applications.

- Analyze the working model and features of Decision tree.

- Apply k-nearest algorithm for the appropriate research oriented problems.

REFERENCES

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Third Edition Pearson Education Limited, 2015 (Unit 1-5).

2. CalumChace, "Surviving AI: The Promise and Peril of Artificial Intelligence", Three CS publication, Second Edition, 2015.

3. Christopher M Bishop, "Pattern Recognition and Machine Learning", Spring 2011 Edition.

4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference and Prediction", Springer 2nd Edition.

5. EthemAlpaydin, "Introduction to Machine Learning", Second Edition, MIT Press, 2010.

6. Tom M. Mitchell, "Machine Learning", India Edition, 1 st Edition, McGraw-Hill Education Private Limited, 2013.

7. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2012 .

8. Nikola K. Kasabov, Foundation of Neural Networks, Fuzzy Systems, and Knowledge Engineering, The MIT Press, 1998.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA303.1	Apply AI techniques in problem solving context.	3	3	3	3	3	1	3	1	1	3	1	3	2	3	3
P20MCA303.2	Implement Knowledge and Reasoning in the real world problems.	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
P20MCA303.3	Design a model with the required Learning features in AI applications.	3	3	3	3	3	3	3	2	1	3	3	3	3	3	3
P20MCA303.4	Analyze the working model and features of Deci3ion tree.	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3
P20MCA303.5	Apply k-nearest algorithm for the appropriate research oriented problems.	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3

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	L	T	P	C	M
	0	0	4	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand Arduino UNO and Raspberry Pi architecture.
- Setup the IDE and write embedded code.
- Learn real world application scenarios of IoT with societal and economic impact.
- Apply design concept to IoT solutions.
- Develop comprehensive approach towards building small low cost embedded IoT system.

The following experiments should be practiced in Arduino Platform

1   (a) Write a script to turn the Arduino LED on and off every second.

       (b) Write a script that allows the user to turn the Arduino LED on and off with a time dealy.

2   Write a script to control Arduino LED. When the user enters the value 1, the LED has to turn on and similarly, when the user enters the value 0, the LED has to turn off. Also when the user enters "Quit", the application has to end.

3   Write a script using Arduino UNO to turn on LED and buzzer alarm.

4   Write a script to read a photosensor connected to an Arduino and turn on and off an LED based on light intensity level. So, when your room is dark, your LED must turn on.

5   Write a script to control the stepper motor (brushless DC motor) using Arduino UNO.

6   Write a script for distance measurement using Ultrasonic sensor and Arduino UNO.

The following experiments should be practiced in Raspberry Pi Platform

1   Write a script to blink on alternative LEDs on and off every second using Raspberry Pi.

2   Write a script with Raspberry Pi to make the LEDs blink on and off like a heartbeat: 2 quick flashes in succession and then a longer delay.

3   Write a script using Raspberry Pi to make the LEDs blink when a button is pressed.

4   Write a script using Raspberry Pi so that whenever you press the button a variable is incremented by one and is printed on the screen. This should work as a simple button counter. Start at 0, and each time you press the button it counts up on the screen.

5   Write a script to turn LED On and Off when the value "1/0" is received from smartphone using Bluetooth.

6   Write a script to detect the vertical (Y-axis) and horizontal (X-axis) movement of Analog Joystick.

7   Write a script to talk to a TMP102 Temperature sensor and display the temperature data into the terminal screen. Note: The temperature sensor can measure the temperature for: light/humidity/wind speed/air pressure/people entering your room etc.,)

TOTAL: 60 hours

COURSE OUTCOMES:
At the end of the course the student should be able to:

- Design and develop an environment friendly IoT enabled devices.
- Provide embedded system solutions for societal needs.
- Work individually and in a group to develop embedded systems.
- Apply skills to conduct interfacing of Arduino board with components, actuators and sensors.
- Configure and work with Raspberry Pi controller circuits.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA304.1	Design and develop an environment friendly IoT enabled devices.	3	2	3	3	2	2	2	2	1	2	3	3	2	3	2
P20MCA304.2	Provide embedded system solutions for societal needs.	3	3	3	3	3	2	2	2	1	3	3	3	2	3	2
P20MCA304.3	Work individually and in a group to develop embedded systems.	3	2	3	3	3	2	2	2	2	2	3	3	2	3	2

P20MCA304.4	Apply skills to conduct interfacing of Arduino board with components, actuators and sensors.	3	2	3	3	2	2	2	2	1	2	3	3	2	3	2
P20MCA304.5	Configure and work with Raspberry Pi controller circuits.	3	2	3	3	3	3	2	2	2	2	3	3	2	3	2

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P20MCA305 – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY

L	T	P	C	M
0	0	4	2	100

COURSE OBJECTIVES:

This course will enable the student to:

- Familiarize with the machine learning algorithms and implement in practical situations.
- Demonstrate AI algorithms and techniques.
- Learn to use different algorithms for real time data sets.

List of Experiments

1. Write a program to illustrate problem solving as a search and also apply local search algorithms.

2. Write a program to demonstrate logical agents.

3. Evaluate forward chainer and rule base on at least four different databases. Try to create at least one database that demonstrates an interesting feature of the domain, or an interesting feature of forward chaining in general.

4. Demonstrate agent based on propositional logic.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set. Compute the accuracy of the classifier, considering few test data sets.

6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

7. Apply EM algorithm to cluster a set of data stored in a .CSV file.

8. Write a program to implement k-Nearest Neighbor algorithm to classify the data set.

9. Apply the technique of pruning for a noisy data from any sample data set and derive the decision tree. Analyze the results by comparing the structure of pruned and unpruned tree.

10. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets

11. Implement Support Vector Classification for linear kernel.

12. Implement Logistic Regression to classify the problems such as spam detection. Diabetes predictions so on.
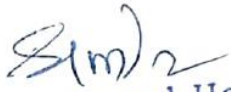
TOTAL: 60 hours

COURSE OUTCOMES:

- Increase the problem-solving skills using AI techniques.
- Apply knowledge, reasoning and Learning algorithms in real-world context applications that increase the performance of system.
- Organize the data set using classification techniques.
- Analyze and predict the data sets using ML techniques.
- Create an application to test the data with appropriate algorithms in Neural Network system.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA305.1	Increase the problem solving skills using AI techniques.	3	3	3	3	3	2	3	1	1	3	1	3	2	3	3
P20MCA305.2	Apply knowledge, reasoning and Learning algorithms in real-world context applications that increase the performance of system.	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
P20MCA305.3	Organize the data set using classification techniques.	3	3	3	3	3	1	3	2	1	3	3	3	1	3	1
P20MCA305.4	Analyze and predict the data sets using ML techniques.	3	3	3	3	3	1	3	3	1	3	3	3	3	3	1

| P20MCA305.5 | Create an application to test the data with appropriate algorithms in Neural Network system. | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

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P20MCA306 - MINI PROJECT LABORATORY

	L	T	P	C	M
	0	0	4	2	100

Course Objective:

- Understand the software engineering principles in developing software solutions to the society-needs problems and deploy as a Microservice.
- Apply advancement in techniques and tools to support the frequent releases of software product
- Build the strong network of stakeholders to get better experiences in Industrial/IT knowledge.

SCOPE OF THE COURSE:

Every student is required to carry out in-house Mini Project work under the supervision of a faculty member of the department. The students can do a project in a group of size between 4 and 5. The guide shall monitor progress of the student continuously. A candidate is required to present the progress of the Mini Project work once in a month during the semester at an appropriate time decided by the Department. There will a final presentation of the Mini Project work at the end of the semester. It is recommended that Mini Project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution.

The purpose of the project is to apply Microservices and DevOps concepts in the required fields, help the student to develop ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories, this project will helps the student make ease and provides enough experience to carry out the larger project in the fifth and sixth semester.

AIM:

Students should identify society-needs problems that analyze/plan the requirements, schedule, cost estimation & methodologies/technologies to be proposed, design and implement into IT outlook software solution. The domain of the problem may be identified from the emerging area of an application and deploy into Microservices like as follows:

- Feedback application
- Registration and login form
- Contact Form
- Payment Form
- Catalogue Form

- Review/Comments
- Profile creation/setting
- Booking services
- Order & Cart Form
- GPS Location tracking
- Sensors reading using Arduino/Raspberry Pi
- Consuming any third party web services.

The evaluation of the project would be based on the need of the hour and request from stakeholders, usefulness of the problem statement, formulation of the problem, stakeholders need and the usage statistics of the solution and the technical merit of the solution.

The project design, development and testing phases can be as shown below:

PHASES:

1. **Requirements Engineering Phase:**
   - Problem identification.
   - Feasibility study of domain.
   - Requirement elicitation and analysis.

   The above mentioned topic should document the Software Requirements Specification (SRS) for the identified development, operations and micro services along with the following.

     o Timeline chart/Project schedule
     o Estimation with chart

2. **Team Formation Phase:**
   - Teams formation, roles identified, activities framed

3. **Design Phase:**
   - Architectural design.
     - Case studies in sample application for each type of architecture, popular enterprise applications, cloud computing platforms comparison, DevOPs solution fundamentals, applications of SOA and MSA (Microservice, Architecture), OOAD and SOAD comparison, Identifying simple services based on SOA and MSA.
     - UML Diagram (Use case, Conceptual classes, process flow diagram, sequence & activity diagram, etc.,)
     - System architecture
   - Front-End Design.

o   UI design
   - Component Design.
        o   API Design
   - Back-end design.
        o   E-R model
        o   Database Design

4. **Implementation Phase:**
   - Development, operations and micro services proposal scheme
   - Front-end and Back-end Coding in a suitable language using necessary platforms and tools.

5. **Testing And Validation Phase:**
        o   Develop test cases
        o   Component Testing
        o   System Testing
        o   Acceptance Testing
        o   Testing reports

6. **Deployment & Feedback Phase:**
   - Web services and micro services
        o   Implementing XML, DOM and SAX
        o   Creation of web services in Java/.NET/Python environment, RESTful web services.
   - Implementation of Microservices architecture with python.
   - Creation of container services.
   - Cloud deployment.
   - Case Study of middleware services for IoT, mobile services
   - Reviews & Feedback Collection

Project Development Should be based on Agile methodology,
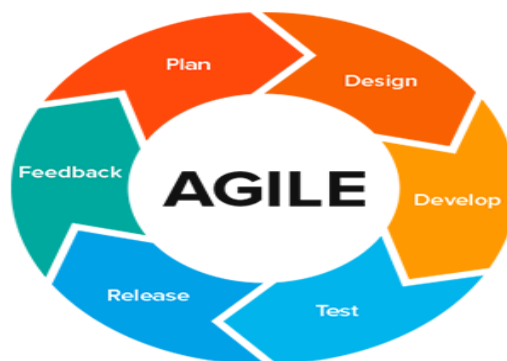
MINI PROJECT PROPOSAL (SYNOPSIS) STRUCTURE

Mini Project proposal should be prepared in consultation with the guide. It should clearly state the objectives and environment of the proposed Mini Project to be undertaken. Ensure to include the following items while submitting your Mini Project synopsis. Mini Project synopsis may contain 15-25 pages and sequence of contents strictly should be in the following order:

1. Cover and Title page

2. Synopsis Approval Performa duly filled and signed by the student

3. Index

4. Acknowledgement

5. Introduction and objective of the Mini Project

6. System Study (Literature Survey, Proposed Methodology)

7. Feasibility Study

8. System Requirements

9. System Design

10. Development & Feedback

11. Deployment & Conclusion

12. Scope of future application

13. References

COMMUNICATION OF SYNOPSIS APPROVAL

A list of approved synopsis will be put on the notice board of the Institute as per the dates mentioned in the activity schedule. In case of non-approval, the suggestions for reformulating the Mini Project will be communicated to the student. Students can resubmit the modified synopsis to Project In-Charge of the Department of Master of Computer Applications as per the specified time given in activity schedule.

MINI PROJECT REPORT STRUCTURE

The Mini Project should be prepared in consultation with the guide and may contain 100-150 pages (including coding). Mini Project Report should strictly follow the points given below:

Details

1. Cover and Title page

2. Synopsis Approval Certificate   13. UI Design/Development

3. Index   14. Coding

4. Acknowledgement   15. Validation & Verification

5. Certificate of Originality   16. Testing (Testing techniques, Testing

6. Introduction, Aims / Objectives

7. System Study

    Problem Identification

    Literature Study

    The scope of problem

8. Feasibility Study

    8.1. Technical Feasibility

    8.2. Economic Feasibility

    8.3. Operational Feasibility

9. Proposed Methodology

10. S/W Engineering Paradigm applied

11.System Specification

12. System Design (DFD 0 Level, 1- Level and 2 Level/ER Diagram, and Data structure, Table structure, etc.)

strategies, Use Cases)

17. Implementation and Maintenance

18. System Security & Performance measurements

20. Reports, Pert Chart/Gantt Chart, Summary/Conclusion

21. Future scope of the Mini Project

22. Bibliography/References/Glossary

23. Document Approval

SYNOPSIS SUBMISSION OF A MINI PROJECT REPORT

Only one Copy of the Mini Project report in bound form is to be submitted to the Project In-Charge of the Department of Master of Computer Applications. Another copy of the Mini Project Report must be retained by the student which should be produced before the examiner at the time of the Viva-voice.

MINI PROJECT EVALUATION

As per the norms Mini Project Report shall be evaluated by the examiner at the end of the semester. However there will be continuous monitoring of the Mini Project progress report during the semester and distribution of marks shall be as follows:

- 5 reviews – 40 (8 marks for each review)

- Documentation - 20

- Viva 1 – 10

- Project evaluation – 30

LIST OF BROAD AREAS OF APPLICATIONS AND RELATED TOOLS

- **Technology:** Visual studio 2008, .NET framework, J2EE, Spring, AngularJS.

- **Front-End Development:** UI Design Tools, PHP, React js, etc.,

- **Back-End Development:** NoSQL, SQL Server, Oracle 10g, MySQL, MongoDB, Django, Sybase

- **Languages:** C, C++, C#, Java, VC++, Python

- **Internet Technologies:** HTML, DHTML, XML, CSS, JavaScript, DOM, JQuery, AJAX, node.js, ASP, JSP, Java Servlet, Perl & CGI script, VBscript, Swing, XSL, Java Beans, UML, EDA, Broadvision, ATG, NET Dynamics, Silver Stream, Cold Fusion, etc.,

- **Web Server:** IIS, APACHE, TOMCAT, GlassFish, etc.,

- **Networking Technologies:** ATM, Frame Relay, TCP/IP, SNMP, GSM, VOIP, PPP, IP-PSTN, SONET/SDH

- **Wireless Technologies:** 2G, 3G, 4G, Bluetooth, Wi-fi, ISDN, Edge, etc.,

- **Real-time OS/ Embedded Skills:** QNX, LINUX, OSEK, DSP, VRTX, RTXC, Nucleus, etc.,

- **Operating System:** Windows XP/VISTA/7, Windows Server 2008, MS-DOS, LINUX SUN, VRTX, SOLARIS, HP/UX, PSOS, IRIX, Ubuntu, Mac OS, Fedora, Debian, etc.,

- **Project Management Tools:** JIRA, Kanban, GitHub, Smartsheet, Zoho Sprint, pivotal Tracker, etc.,

Course Outcome:

The students are able to

- Become an expert as a software engineer to execute the project with expected product.

- Obtain good exposures to lead the teams and maintain good relationship between IT industries and customers.

- Become a specialist to deploy and manage the Microservices.

TOTAL: 60 hours

CO No	Course Outcome(CO) On completion of the course the student should be able to :	P O a	P O b	P O c	P O d	P O e	P O f	P O g	P O h	P O i	P O j	P O k	P O l	P O m	P S O a	P S O b
P20MCA306.1	Become an expert as a software engineer to execute the project with expected product.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
P20MCA306.2	Obtain good exposures to lead the teams and maintain good relationship between IT industries and customers.	1	1	2	3	3	3	3	3	3	3	3	1	3	3	3
P20MCA306.3	Become a specialist to deploy and manage the Microservices.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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P20MCA307 - Soft Skills and Aptitude Career Enhancement Laboratory - III

L	T	P	C	Marks
0	0	2	1	100

COURSE OUTCOMES:

At the end of the course the student will be able to:

1. Demonstrate capabilities in supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches

2. Solve problems of advanced levels than those in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests

1. Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career Planning b. Resume Writing c.Interview Skills d.Group Discussion Techniques e. Mock GD's f. Mock Interview.
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** a. Permutation and Combination b. Probability c. Crypto Arithmetic d. Functions & Polynomials e. Geometry & Mensuration f. Syllogism g. Cubes & Dice h. Visual Reasoning i. Inequalities j. Analogies k. Number Series l. Company Specific Questions - 2
3. Verbal Ability	**Demonstrating English language skills with reference to the following topics:** a. Select the best alternative for the underlined part of the sentence b. Writing a quote for the given picture c. Writing story on a given picture d. Critical Reasoning e. Theme detection
4. Speaking	Interviews and presentation
5. Writing	Essay writing and story writing
6. Reading	Reading comprehension
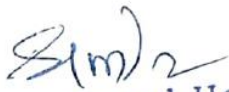
TOTAL: 30 hours

CO / PO, P3O Mapping (3/2/1 indicate3 3trength of correlation) 3-Strong, 2-Medium, 1-Weak													
Programme													
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13
CO – 1	1	1	2	1	1	3	3	3	1	1	2	1	3
CO – 2	1	1	1	1	1	3	3	2	1	2	2	3	2
CO – 3	1	1	1	1	1	3	3	3	1	3	2	1	2
CO – 4	1	1	1	1	1	3	3	3	1	2	2	1	2

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P20MCA510 - FULL STACK WEB DEVELOPMENT

	L	T	P	C	M
	2	0	2	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the architecture of Web Application Architecture.
- Learn the basic concepts of Node JS and creating the applications in Node js.
- Be familiar with the file systems concepts of in Node.js..
- Gain a working knowledge of React and learn how to create an application.
- Acquire in-depth knowledge in Mongo DB.

Unit – I Introduction   **9**

Web Application Architecture - Understanding Basic web development framework - Components of Web Applications Architectures – Web Services – Java Script Primer – Understanding Node.js, capabilities of Node.js - Uses – Setting up Node.js.

Unit – II Basics of Node.js   **9**

Working with Node.js Packages – Creating applications – Data to Console – Events, Listeners, Timers and callbacks in Node.js – Handling Data I/O in Node.js.

Unit – III Advance Node.js   **9**

File Systems in Node.js – HTTP Services – Socket Services in Node.js – Scaling Applications - Additional Modules

Unit – IV Working with React.js   **9**

Features of React – Advantages – Limitations – Setting up the environment – creating a React Application – Command – Creating React Components.

Unit – V Building Database using Mongo DB   **9**

Understanding NoSQL and Mongo DB – Building the MongoDB Environment – Use Accounts – Access Control – Adding MongoDB Driver to Node.js – Connection – Objects Used in MongoDB – Accessing and Manipulating Databases, Collections – Manipulating MongoDB Documents from Node.js, Connecting to MongoDB Database using Mongoose.

List of Experiments

1. Install Node JS and execute simple programs.
2. Create / Design a function to invoke its properties.
3. Design an application to handle the Data I / O in Node JS.
4. Create a module that display the current Time / Date.
5. Build an HTTP Server with Node.JS using HTTP APIs.
6. Design an application by reading to and writing from the File systems of Node.js.
7. Create a React Application that reads data from one to another component.
8. Create a Counter Component using React.
9. Develop an application using Node JS, React with MongoDB.
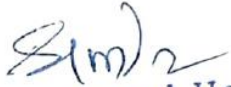
TOTAL= 60 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

* Explain the architecture of Web Application Architecture.
* Demonstrate applications using Node.js.
* Design the web application using the several services of Node.js.
* Explain the basics of React and design the applications.
* Develop complete web services using Node.js, React and Mongo DB.

REFERENCES

1. Frank Zammetti, Modern Full-Stack Development Using TypeScript, React, Node.js, Webpack, and Docker, Apress, 2020. (Unit I to V)
2. Brad Dayley, Node.js, MongoDB and AngularJS Web Development: The Definitive Guide to Building JavaScript-Based Web Applications from Server to Frontend, Addison-Wesley Professional, 2014.
3. David Herron, Node.js Web Development: Create real-time server-side applications with this practical, step-by-step guide, Packt Publishing; 3rd Revised edition,2016.
4. Dinesh Rajput, Designing Applications with Spring Boot 2.2 and React JS, BPB Publications, 2019.
5. David Choi, Full-Stack React, TypeScript, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL, Packt Publishing, 2020.

CO No	Course Outcome (CO)	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	PSOa	PSOb
P20MCA510.1	Explain the architecture of Web Application Architecture.	3	3	3	3	3	3	3	2	2	3	1	3	2	3	3
P20MCA510.2	Demonstrate applications using Node.js.	3	3	3	3	3	3	3	2	2	3	1	3	2	3	3
P20MCA510.3	Design the web application using the several services of Node.js.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA510.4	Explain the basics of React and design the applications.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA510.5	Develop complete web services using Node.js, React and Mongo DB.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

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	L	**T**	**P**	**C**	**M**
	2	0	2	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Design interactive user interfaces for real time web applications.
- Apply the knowledge of client side scripting in the given scenarios
- Apply the knowledge of server-side scripting in the given scenarios.
- Implement the concepts of advanced server side scripting in the real time scenarios
- Connect the front end with databases and deploy the application in cloud server or in a local server.

UNIT I - UI DEVELOPMENT   8

Introduction to BootstrapBS4 : Containers – Topography - UI elements – Grid – JS Components - JS alert – JS Button – JS Modal – JS Tab – JS Toasts – JS Tooltip

UNIT II – CLIENT-SIDE SCRIPTING   10

JQuery : Introduction-Basics - Syntax – Selectors - Events – JQuery HTML -Get – set – add – remove – CSS classes - Dimensions– JQuery traversing -Ancestors – Descendants – Sibling – Filtering - JQuery AJAX- Load- Get/Post.

UNIT III – BASICS OF PHP SERVER-SIDE SCRIPTING   9

PHP Basics – Installation – Syntax – Comments – Variables – Datatypes – Strings – Constants – Loops – If ..else – Arrays – RegEx- OOPS – Classes and objects – Constructors – De- constructor- Access modifiers – Inheritance – Constants – Abstract classes – Interfaces – Static methods – Properties – Iterables.

UNIT IV – ADVANCED CONCEPTS OF PHP SERVER SIDE   10

PHP FORMS – PHP AJAX – Database – XML – Live Search – Poll– PHP File Handling – PHP JSON – PHP sessions – Filters – Call-back functions – RESTAPI development using POSTMAN tool.

UNIT V – DATABASE AND DEPLOYMENT   8

Creating a database in MariaDB – Creating a table in MariaDB- PHP functions in MariaDB - Connecting MariaDB with PHP – Checking the connection – Executing the request – Deployment in cloud server– Amazon - Deployment in Local Server – XAMPP.

TOTAL = 60 Hours

List of Programs:

1. Design a responsive web page that uses the features of Bootstrap.(Unit I)

2. Create the following simple applications in JQuery (Unit II)

   - Create a Zebra Stripes table effect

   - Scroll to the top of the page

   - Restrict "number"-only input for textboxes including decimal points

   - Animate an element, by changing its height and width

   - Toggle between fading in and fading out different boxes

3. Create the following simple applications in PHP (Unit III)

   1. Sorting arrays in descending numerical order

   2. PHP form validation

   3. PHP super globals – $_GLOBAL, $_REQUEST, $_POST, $_GET,$_SERVER

   4. Regular expressions to do a case – insensitive count of the number of occurrences of a particular string

   5. Connect, login, and close an FTP connection

   6. Send a simple email

4. Design a simple application that uses the Geolocation API to return the coordinates of where the browser is located.(Unit IV)

5. Create a simple user registration and login web application using the features of Bootstrap, JQuery, PHP, WEB API and MariaDB. (Unit V)

6. Development of a dashboard application using Bootstrap, HTML5 and PHP REST API (Unit V)
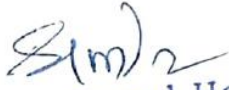
Course Outcomes:

- Design top- notch unique user interface design that enhances the visual representation of an application.

- Develop efficient client-side script that respond immediately to user's actions and do not require trip to the server.

- Create resourceful dynamic web pages using scripts on web server

- Apply server-side scripts in real time applications that retrieve and generate content

- Develop a web application that connects front end with back end and deploy it in the cloud or local server.

References:

1. Jorg Krause, "Introducing Bootstrap 4: Create Powerful Web Applications Using Bootstrap 4.5", Apress, Second edition, 2020(unit I)

2. Adrian W. West, Steve Prettyman ," Practical PHP 7, MySQL 8, and MariaDB Website Databases: A Simplified Approach to Developing Database-Driven Websites", Apress, Second Edition, 2018(unit III,IV,V)

3. Jacob Lett, "Bootstrap Reference Guide: Bootstrap 4 and 3 Cheat Sheets Collection",Bootstrap Creative, 2018(unit I)

4. Benjamin Jakobus, Jason Marah , "Mastering Bootstrap 4" Packt Publish(unit I)ing Limited, 2016

5. Mary Delamater,Zak Ruvalcaba,"Murach's Javascript and JQuery",Mike Murachs and Associates, Fourth Edition , 2020(unit II)

6. Jennifer Kyrnin , Bootstrap in 24 Hours, Sams Publishing,First edition , 2015(unit I)

7. Russell J.T. Dyer, Learning MySQL and MariaDB, O'Reilly Media, First Edition, 2015. (unit v).

CO No	Course Outcome (CO)	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA512.1	Design top-notch unique user interface design that enhances the visual representation of an application.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA512.2	Develop efficient client-side script that respond immediately to user's actions and do not require trip to the server.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA512.3	Create resourceful dynamic web pages using scripts on web	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

	server.														
P20MCA512.4	Apply server-side scripts in real time applications that retrieve and generate content.	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3
P20MCA512.5	Develop a web application that connects front end with back end and deploy it in the cloud or local server	3	3	3	3	3	3	3	2	1	3	1	3	2	3	3

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P20MCA504 - SOCIAL NETWORKS

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities.
- Learn visualization of social networks.
- Represent trust models

UNIT I - INTRODUCTION TO SEMANTIC WEB 9

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II – MODELING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III – EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks – Multi Relational characterization of dynamic social network communities.

UNIT IV – PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES 9

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V – VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and

Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks.
- Signify trust network analysis.

REFERENCES

1. John Scott, "Social Network Analysis", Sage publications Ltd, March 2017 (Units 1,2)
2. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007 (Units 3,4,5).
3. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
4. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
5. Stephen P Borgatti, "Analyzing Social Networks", 2nd Edition, Sage publications Ltd, May 2018.
6. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.

   Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO D	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA504.1	Develop semantic web related applications.	3	3	3	3	3	3	3	2	2	2	3	2	3	3	3
P20MCA504.2	Learn knowledge representation using ontology.	3	3	3	3	3	2	2	2	2	2	3	2	2	3	3
P20MCA504.3	Predict human behaviour in social web and related communities.	3	3	3	3	3	3	2	2	2	2	3	2	2	3	3

| P20MCA504.4 | Visualize social networks. | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| P20MCA504.5 | Apply the visualization techniques. | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 1 | 3 | 3 |

Professor and Head
Dept. of Master of Computer Applications
Sona College of Technology
SALEM-636 005.

P20MCA506 - SOFTWARE TESTING AND QUALITY ASSURANCE

	L	T	P	C	M
	3	0	0	3	100

COURSE OBJECTIVES:

This course will enable the student to:

- Summarize the software testing life cycle process
- Understanding various types of software tests and quality control standards.
- Describe the quality assurance concepts and its role in software development.
- Estimate the scope of software Metrics in testing.
- Manipulate about the principles underlying any standards in quality Management.

UNIT I - TESTING PRINCIPLES   9

Need of testing, Basic concepts – errors, faults, defects, failures, unit testing, integration testing system, system testing, regression testing, alpha, beta and acceptance testing, functional testing, performance testing, recovery testing, white box testing, black box testing, verification and validation.

UNIT II – TEST MANAGEMENT   9

Testing Life Cycle – Roles and activities, Test Planning – forming a test team, develop test plan review, Test Cases design strategies - Blackbox approach: random testing, equivalence class partitioning and boundary value analysis. Whitebox approach: test adequacy criteria, coverage and control flow graphs, paths, loop testing, mutation testing. Test execution: build test data, life cycle of defect, defect tracking, defect detection stages, defect types, defect severity, defect analysis and prevention.

UNIT III – SOFTWARE METRICS   9

Scope of software metrics, Classifying software measures, Measuring process – product attributes- scales-What to measure – product quality metrics – defect density, customer problems, customer satisfaction, function point, Metrics for software maintenance, In-process quality metrics.

UNIT IV – QUALITY ASSURANCE   9

Quality concepts – quality, quality control, quality assurance, cost of quality Software ,quality assurance – SQA activities, software reviews, inspections, audits, Software reviews, inspections, audits, Software reliability Quality Attributes: correctness, reliability, usability, integrity, portability, maintainability, interoperability.

Basic concept of – ISO 9000 standards – quality Management system- CMMI for software Engineering – CMMI framework- levels of software process- various level process area – Importance of CMMI – software Testing Tools- Need for Tools, Classification of Tools – Benefits of Tools-Risk with Tools-Win Runner-Load Runner-Test Director.

TOTAL = 45 Hours

COURSE OUTCOMES:

At the end of the course the student should be able to:

- Identifies the relevance with software engineering testing process.
- Apply the knowledge in a variety of testing techniques, methods and tools.
- Compute the practice of verification and validation techniques.
- Solve proficiency in managing a software project to customer requirements.
- Relates the ISO 9000 and the capability maturity model on software testing.
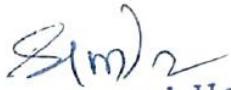
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- William E Perry, "Effective Methods for Software Testing", Second Edition, Wiley Publication, 2015 (Unit I – V).
- Dr. K.V.K.K Prasad, "Software Testing" , Dream Tech press publication,2007
- Stephen H. Kan "Metrics and Models in Software Quality Engineering" Pearson Education., 2009.
- Pressman, "Software Engineering ", seventh Edition, TATA McGraw Hill, 2014.
- Iien Burnstein, "Practical Software Testing", Springer Publication, 2003.
- Norman E. Fenton "Software Metrics A Rigorous and Practical Approach", Second Edition, Thomson Publication, 2010.

CO No	Course Outcome(CO) On completion of the course the student should be able to :	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PO m	PSO a	PSO b
P20MCA506.1	Identifies the relevance with software engineering testing process.	3	2	2	2	3	2	3	3	3	3	3	2	3	3	3
P20MCA506.2	Apply the knowledge in a variety of testing techniques,	3	2	2	2	3	2	3	3	3	3	3	2	3	3	3

	methods and tools.															
P20MCA506.3	Compute the practice of verification and validation techniques.	3	2	2	2	3	2	3	3	3	3	3	2	3	3	3
P20MCA506.4	Solve proficiency in managing a software project to customer requirements.	3	2	2	2	3	2	3	3	3	3	3	2	3	3	3
P20MCA506.5	Relates the ISO 9000 and the capability maturity model on software testing.	3	2	2	2	3	2	3	3	3	3	3	2	3	3	3

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Courses of study for MCA IV Semester under Regulations 2020

Branch: Master of Computer Applications

S.No.	Course Code	Course Title	Lecture	Tutorial	Practical	Credits	Total Contact Hours
		Practical					
1	P20MCA401	Project Work	0	0	24	12	360
					Total	12	

Approved by

Chairperson, MCA BOS

Dr.T.Padma

Member Secretary, Academic Council

Dr.R.Shivakumar

Chairperson, Academic Council & Principal

Dr.S.R.R.Senthil Kumar

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06.01.2023

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