



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T
Curriculum & Syllabus
2020 Regulations

I SEMESTER						
S.NO	Sub.Code	Title of the Subject	T/L/ETL	T/SLr	P/R	C
1.	MMA200012	Mathematical Foundations for Computer Science	3	1	0	4
2.	MCA20ETL1	Programming fundamentals with C++ (ETL)	2	0	1	3
3.	MCA20G001	Data Structures And Algorithms	3	1	0	4
4.	MCA20G002	Software Engineering	3	1	0	4
5.	MCA20G003	Database Technologies	3	1	0	4
6.	MCA20GL01	Database Laboratory	0	0	2	2
7.	MCA20GL02	Data Structures Laboratory	0	0	2	2
TOTAL						23

II SEMESTER						
S.NO	Sub.Code	Title of the Subject	T/L/E TL	T/SL r	P/R	C
1.	MCA20ETL2	Object Oriented Analysis And Design (ETL)	2	0	1	3
2.	MCA20G004	Advanced Java Programming	3	1	0	4
3.	MCA20GEXX	Elective - I	3	1	0	4
4.	MCA20G005	Internet Technologies	3	1	0	4
5.	MCA20G006	Enterprise Resource Planning	3	1	0	4
6.	MCA20GL03	Advanced Java Programming Laboratory	0	0	2	2
7.	MCA20GL04	Internet Programming Laboratory	0	0	2	2
TOTAL						23



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III SEMESTER						
S.NO	Sub.Code	Title of the Subject	T/L/ETL	T/SLr	P/R	C
1.	MCA20ETL3	Data Analytics and R Programming (ETL)	2	0	1	3
2.	MCA20G007	Entrepreneurship Development	3	0	0	3
3.	MCA20GEXX	Elective - II	3	1	0	4
4.	MCA20G008	C# and .Net Framework	3	1	0	4
5.	MCA20G009	Python Programming	3	1	0	4
6.	MCA20GL05	C# and .Net Programming Laboratory	0	0	2	2
7.	MCA20GL06	Python Programming Laboratory	0	0	2	2
8.	MCA20GL07	Implant Training / Internship	0	0	2	2
TOTAL						24

IV SEMESTER						
S.NO	Sub.Code	Title of the Subject	T/L/ETL	T/SLr	P/R	C
1.	MCA20GEXX	(Elective-III)	3	1	0	4
2.	MCA20GEXX	(Elective-IV)	3	1	0	4
3.	MCA20GP01	Project Work	0	0	15	15
TOTAL						23

Summary of Credits

1st Semester	-	23
2nd Semester	-	23
3rd Semester	-	24
4th Semester	-	23
Total	-	93



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LIST OF ELECTIVES

Electives						
S.No	Sub.Code	Title of the Subject	L	T	P	C
1	MCA20GE01	Data Communication and Networks	3	1	0	4
2.	MCA20GE02	Internet of Things and Wireless Sensor Networks	3	1	0	4
3	MCA20GE03	Grid and Cloud Computing	3	1	0	4
4	MCA20GE04	Data Analysis and Business Intelligence	3	1	0	4
5	MCA20GE05	Image Processing	3	1	0	4
6	MCA20GE06	Soft Computing	3	1	0	4
7	MCA20GE07	Semantic Web	3	1	0	4
8	MCA20GE08	Service Oriented Architecture and Web Services	3	1	0	4
9	MCA20GE09	Progressive Web Application Development	3	1	0	4
10	MCA20GE10	Data Visualization	3	1	0	4
11	MCA20GE11	Embedded Systems	3	1	0	4
12	MCA20GE12	Big Data Analytics	3	1	0	4
13	MCA20GE13	Software Project Management	3	1	0	4
14	MCA20GE14	Game Programming	3	1	0	4
15	MCA20GE15	Distributed Systems	3	1	0	4
16	MCA20GE16	Knowledge Management	3	1	0	4
17	MCA20GE17	M-Commerce	3	1	0	4
18	MCA20GE18	Healthcare Information Systems	3	1	0	4
19	MCA20GE19	Computer Graphics & Multimedia Systems	3	1	0	4
20	MCA20GE20	Data Mining And Warehousing	3	1	0	4



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MMA200012	Subject Name MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:NIL						T	3	1/0	0/0	4	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
➤ Students should develop mathematical thinking and problem-solving skills.												
➤ Students should also be exposed to a wide variety of mathematical concepts that are used in the Computer Science discipline, which may include concepts drawn from the areas of Graph Theory, Trees and Groups												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Ability to apply knowledge of computing and mathematics appropriate to the discipline.											
CO2	Ability to analyze a problem and identify and define the computing requirements to solution.											
CO3	Ability to design- implement and evaluate a computer-based system- process- component or program to meet desired needs.											
CO4	Ability to learn about graphs which is applicable in many fields.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	L	H	L	L	L	L	L	L	L	L
CO2	M	H	M	H	L	M	L	L	L	L	L	L
CO3	M	H	H	M	L	M	L	M	M	L	M	L
CO4	M	H	M	H	L	M	L	L	L	L	M	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		M		L		M			
CO2	M		H		H		L		H			
CO3	H		M		H		L		M			
CO4	H		H		M		L		M			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MMA200012 **MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE** **3 1 0 4**

OBJECTIVES:

- Ability to apply knowledge of computing and mathematics appropriate to the discipline.
- Ability to analyze a problem and identify and define the computing requirements to solution.
- Ability to design and evaluate a computer-based system- process- component or program to meet desired needs.
- Ability to learn about graphs which is applicable in many fields.

UNIT I 12 Hrs

Logic: Statements – Truth Table - Connectives – Normal Forms – Predicate Calculus – Inference Theory.

UNIT II 12 Hrs

Combinatorics: Mathematical Induction –Pigeon Hole Principle – Principle of Inclusion and Exclusion – Recurrence Relations – Generating Functions.

UNIT III 12 Hrs

Groups: Basic Concepts – Groups – Subgroups – Kernel – Cosets – Homomorphism – Lagrange-s theorem (simple theorems and problems).

UNIT IV 12 Hrs

Graphs: Introduction to Graphs – Terminology – Matrix representation of Graphs –Incidence matrix – Adjacency matrix – Graph Isomorphism – Connectivity – Euler and Hamiltonian Paths (simple theorems and problems).

UNIT V 12 Hrs

Trees: Definition of Tree – Five Equivalent Conditions on Tree – Spanning Trees – Minimal Spanning Tree – Prim-s algorithm – Dijkstra-s algorithm – Kruskals algorithm (simple theorems and problems).

Total No. of Hrs: 60

REFERENCES:

1. Veerarajan .T (2006) *Discrete Mathematics* (5th ed), Tata McGraw Hill Publishing Co.
2. Tremblay J,P & Manohar .R (2004), *Discrete Mathematical Structures with applications to Computer Science*”, Tata McGraw Hill Publishing Co.
3. Kolman , Busby & Ross(2008) *Discrete Mathematical Structure*(6th ed), Pearson.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20ETL1	Subject Name : PROGRAMMING FUNDAMENTALS WITH C++							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL							ETL	2	0/0	1/0	3
L : Lecture T:Tutorial S Lr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To understand the basic concepts in Programming and It’s Structure												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the Basic concepts in Programming Logics											
CO2	To understand the Applications of Structured Language											
CO3	To have knowledge on Basic concepts in Graphical User Interface											
CO4	To program on the Basic concepts of Class and objects											
CO5	To understand and coding the specific problem solving for different class and objects											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	H	M	L	L	L	L	M	M	L	L	M
CO2	M	H	L	L	L	L	L	M	M	L	L	M
CO3	L	H	L	M	L	L	L	M	M	L	M	M
CO4	M	H	M	M	L	L	L	L	M	L	M	M
CO5	L	H	L	M	L	L	L	L	M	L	L	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	M		M		L		L		L			
CO2	M		M		L		L		L			
CO3	L		M		M		M		L			
CO4	L		M		M		L		M			
CO5	M		M		L		L		L			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20ETL1

PROGRAMMING FUNDAMENTALS WITH C++

2 0 1 3

OBJECTIVE:

- The student will be able to understand the concepts of classes and object
- Define classes for a given situation for specific problem solving
- Reuse available classes after modifications if possible
- Possess skill in object oriented thought process

UNIT I

9 Hrs

Principles of OOPs: Programming paradigms - basic concepts - benefits of OOPs - applications of OOPs Introduction to C++: History of C++ - structure of C++ - basic data types - type casting - type modifiers- operators and control structures- input and output statements in C++ Classes and objects-class specification- member function specification- scope resolution operator- access qualifiers- instance creation.

UNIT II

9 Hrs

Functions: Function prototyping- function components- passing parameters- call by reference- return by reference- inline functions- default arguments- overloaded function - Pointers - Array of objects- pointers to objects- this pointer- dynamic allocation operators- dynamic objects.

UNIT III

9 Hrs

Constructors: Constructors- parameterized constructors- overloaded constructors- constructors with default arguments- copy constructors- destructors- static class members and static objects. Operator overloading - Overloading unary and binary operator- overloading the operator using friend function- stream operator overloading and data conversion.

UNIT IV

9 Hrs

Inheritance: Defining derived classes- single inheritance- multiple inheritance- multi-level inheritance- hierarchical inheritance- hybrid inheritance- constructors in derived and base class- abstract classes- virtual function and dynamic polymorphism.

UNIT V

9 Hrs

Exception Handling: Exception handling mechanism- multiple catch- nested try- throwing exception - Streams in C++ - Stream classes- formatted and unformatted data- manipulators- file streams- file pointer manipulation- file open and close - Template functions and Template classes.

Total No. of Hrs: 45

REFERENCES:

1. Herbert Schildt (2017), *Complete Reference of C++*- (4th Ed)- McGraw Hill Education.
2. Core Ashok N. Kamthane(2006), *Object oriented Programming with ANSI & Turbo C++*, Pearson
3. H M Deitel & P J Deitel(2010), *C++: how to program*, Pearson Education.
4. Robert Lafore(2001), *Object Oriented Programming in Turbo C++*, Galgotia Publications.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G001	Subject Name : DATA STRUCTURES AND ALGORITHMS							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							T	3	1/0	0/0	4
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To understand the nature of Data structures and How ideally An Algorithm could be designed on ➤ To impart the basic concepts of data structures and algorithms ➤ To understand concepts about searching and sorting techniques												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand and impart the basic concepts of data structures and algorithms											
CO2	To apply the concepts of searching and sorting techniques of any type of data or their Structures											
CO3	To apply the data or pointer on stacks, queues, lists, trees and graphs											
CO4	To write algorithms and step by step approach in solving problems with fundamental data structures											
CO5	To impart the nested concepts of data structures and algorithms											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	H	L	L	L	L	L	M	M	L	L	L
CO2	M	M	M	L	L	L	L	M	L	L	L	L
CO3	M	M	M	M	L	L	L	M	M	L	M	L
CO4	L	H	L	M	L	L	L	L	L	L	M	L
CO5	L	H	L	M	L	L	L	L	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	L		L		M		L		L			
CO2	L		L		M		L		H			
CO3	L		L		M		L		M			
CO4	L		L		M		L		M			
CO5	L		L		M		L		L			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20G001

DATA STRUCTURES AND ALGORITHMS

3 1 0 4

OBJECTIVES:

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks, queues, lists, trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

UNIT I

12 Hrs

Arrays: Array as an Abstract data type-Polynomial abstract data types-Sparse Matrixes-Representation of array-Stacks and Queues –Stacks Abstract data type-Evaluation of expressions-Linked Lists-Singly Linked Lists-Circular lists- Doubly linked lists.

UNIT II

12 Hrs

Trees: Introduction-Binary Trees - Binary Tree Traversal- In order -Preorder- Post order-Binary Search Trees-Balanced Trees-Threaded Binary trees-Threads-In order Traversal –Inserting a Node-Heaps-Priority Queues-Definition -Insertion and Deletion of Max heap.

UNIT III

12 Hrs

Sorting: Insertion sort – Quick sort – Merge sort- Heap sort- Sorting on several keys- External sorting-k-way merging-Buffer Handling for Parallel Operation.

UNIT IV

12 Hrs

Graphs: Representation – Operations-Depth first search-Breadth first search-spanning trees-Minimum Cost Spanning Trees- Kruskals Algorithm-Prims Algorithm-Shortest Paths-Single source/All Destination - Nonnegative Edge Costs-General Weights-Static Hashing-Dynamic Hashing.

UNIT V

12Hrs

Algorithms: Divide and Conquer –Merge sort–Greedy Method-Knapsack Problem-Backtracking-The 8-Queens Problem-Branch and Bound-Traveling Sales Person Problem.

Total No. of Hrs: 60

REFERENCES:

1. Horowitz.E. Sahni-S& d Mehta (2002) *Fundamentals of Data Structures in C++* (2nd ed), Galgotia
2. Weiss M.A (1994), *Data structures & Algorithm Analysis in C++* (3rd ed) , Benjamin cummings.
3. Sara Baase (1998) *Computer Algorithms – Introduction to Design and Analysis* ,(3rd ed) AW.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G002	Subject Name : SOFTWARE ENGINEERING						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:NIL						T	3	1/0	0/0	4	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understand the basics of a software-design, cost estimation and their enhancements➤ It aims to develop a broad understanding of the discipline of software engineering➤ It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the construction of an ideal software systems design											
CO2	To a broad understanding of the discipline of software engineering design and development											
CO3	To implement the techniques for the analysis and design of complex software model.											
CO4	To analyze the Advanced Methods of Applications in software engineering											
CO5	For coding the different designs of a customized software and design											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	H	L	L	L	L	L	M	M	L	L	L
CO2	L	H	L	L	L	L	L	M	L	L	L	L
CO3	L	H	L	M	L	L	L	M	M	L	M	L
CO4	L	H	L	M	L	L	L	L	L	L	M	L
CO5	L	H	L	M	L	L	L	L	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	L		L		M		L		L			
CO2	L		L		M		L		H			
CO3	L		L		M		L		M			
CO4	L		L		M		L		M			
CO5	L		L		M		L		L			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T
MCA20G002 SOFTWARE ENGINEERING 3 1 0 4

OBJECTIVES:

- This course introduces the concepts and methods required for the construction of large software intensive systems.
- It aims to develop a broad understanding of the discipline of software engineering
- It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems.

UNIT I

12 Hrs

The Process: The Software Process- Software process- Software Process Models- Linear Sequential Model- Prototyping Model- RAD Model- Evolutionary Software Process Models - Project Management Concepts-The Management Spectrum- People- The Product- The Process.

UNIT II

12 Hrs

Software Process And Project Metrics: Measures- Metrics and Indicators- Metrics in the Process and Project domains- Software measurement - Metrics for Software Quality. Software Project Planning -Project Planning Objectives- Resources- Software Project Estimation- Decomposition Techniques- Empirical Estimation Models- Risk Analysis- Software Risks- Risk Projection.

UNIT III

12 Hrs

Project Scheduling And Tracking: Basic concepts- The relationship b/w people and Effort- Defining a Task Set for Software Project- Scheduling. Software Quality Assurance – Quality Concepts- Quality movement- Software quality assurance- Software Reviews. Software Configuration Management - The SCM Process- Identification of Objects in the software configuration- Version Control- Change Control- SCM standards.

UNIT IV

12 Hrs

Analysis Concepts And Principles: Requirement Analysis- Requirement Elicitation for Software-Analysis Principles - Software Prototyping- Specification. Analysis Modeling- Data Modeling - Functional modeling and Information Flow- Behavioral Modeling- The mechanics of Structured Analysis- The Data Dictionary.

UNIT V

12 Hrs

Software Testing Techniques: Software Testing Fundamentals- White-Box Testing- Basis Path Testing- Control Structure Testing- Black-Box Testing. Software Testing Strategies - A strategic approach to Software Testing - Strategic Issues- Unit Testing- Integration Testing -Validation Testing- System Testing- The Art Of Debugging.

Total No. of Hrs: 60

REFERENCES:

1. Ian Sommerville (2017), *Software Engineering* (5th ed.) , Addison Wesley.
2. Pressman R. S (2017) ,*Software Engineering*(5th ed.) , McGraw Hill.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G003	Subject Name : DATABASE TECHNOLOGIES							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL							T	3	1/0	0/0	4
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understand the Technical Applications in Data Storage and Restoration in machines➤ Understand basic database concepts- including the structure and operation of the relational data model.➤ Construct simple and moderately advanced database queries using Structured Query Language (SQL).												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the concepts of Organization of Data and Database											
CO2	To understand the Applications of Structure and operations of data model											
CO3	To understand and apply the concepts of Structured Query Language (SQL).											
CO4	To program the Advanced data base Applications and software											
CO5	To exercise the coding in object relational database systems and the data warehouse.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	H	M	L	L	L	L	M	M	L	L	M
CO2	M	H	L	L	L	L	L	M	L	L	L	M
CO3	L	M	L	M	L	L	L	M	M	L	M	L
CO4	M	H	M	M	L	L	L	L	L	L	M	M
CO5	L	H	L	M	L	L	L	L	L	L	L	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	M		M		L		L		L			
CO2	M		M		L		L		H			
CO3	L		L		M		M		L			
CO4	L		M		M		L		M			
CO5	L		M		L		L		L			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												

DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20G003

DATABASE TECHNOLOGIES

3 1 0 4

OBJECTIVES:

- Understand basic database concepts- including the structure and operation of the relational data model.
- Construct simple and moderately advanced database queries using Structured Query Language (SQL).
- Focus on advanced database topics- such as object relational database systems and the data warehouse.

UNIT I

12 Hrs

Introduction: An Overview of Database Systems-Introduction to Database Design -The Relational Model - Relational Algebra And Calculus- SQL - Queries- Constraints- Triggers.

UNIT II

12 Hrs

Storage And Indexing: Overview Of Storage And Indexing- Storing Data - Disks And Files- Tree-Structured Indexing-Hash-Based Indexing.

UNIT III

12 Hrs

Transaction Management: Overview of Transaction Management- Concurrency Control- Crash Recovery.

UNIT IV

12 Hrs

Object And Object Relational Databases: Concepts for Object Databases- Object Database Standards- Languages- and Design- Object-Relational and Extended-Relational Systems.

UNIT V

12 Hrs

Emerging Technologies : XML and Internet Databases- Data Mining Concepts - Overview of Data Warehousing and OLAP- Emerging Database Technologies and Applications.

Total No. of Hrs: 60

REFERENCES:

1. Raghu Ramakrishnan & Johannes Gehrke (2004)- *Database Management Systems*(3rd ed), McGraw Hill.(UNIT I- II & III)
2. Elmasri-R&Navathe-S.B(2007) *Fundamentals of Database Systems*(5th ed), Pearson Education/Addison Wesley(UNIT IV & V).
3. Henry F Korth- Abraham Silberschatz & Sudharshan .S(2006) *Database System Concepts*(5th ed), McGraw Hill.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GL01	Subject Name: DATABASE LABORATORY	T / L / ETL	L	T / S.Lr	P / R	C
	Prerequisite:NIL	L	0	0/0	2/0	2

L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES :

- Student has to acquire basic concept of DBMS
- Students will be familiar with SQL and its use in DBMS.
- Student has to acquire knowledge of implementation DDL COMMANDS.
- Students will be able to develop real time applications.

COURSE OUTCOMES (COs) : (3- 5)

CO1	To understand the concepts of Organization of Data and Database
CO2	To implement the Applications of Structure and operations of data model
CO3	To implement the concepts of Structured Query Language (SQL).
CO4	To practice the Advanced data base Applications and software
CO5	To experiment the object relational database systems and the data warehouse.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	H	M	H	M
CO2	H	H	H	H	H	H	H	M	H	M	H	M
CO3	H	H	H	H	H	H	H	M	H	M	H	H
CO4	H	H	H	M	M	M	H	M	M	M	H	L
CO5	H	H	H	H	H	H	H	M	H	M	H	H

COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5			
CO1	H	H	H	M	H			
CO2	H	H	H	M	H			
CO3	H	H	H	M	H			
CO4	M	H	H	H	H			
CO5	H	H	H	M	H			

H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					
Approval												



Dr.M.G.R.
Educational and Research Institute
(DEEMED TO BE UNIVERSITY)
(An ISO Certified Institution)
University with Graded Autonomy Status
Maduravoyal , Chennai - 600 095



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20GL01

DATABASE LABORATORY

0 0 2 2

OBJECTIVES:

- Student has to acquire basic concept of DBMS
 - Students will be familiar with SQL and its use in DBMS.
 - Student has to acquire knowledge of implementation DDL COMMANDS.
 - Students will be able to develop real time applications.
1. Online reservation system
 2. Banking System
 3. Personal information
 4. Student mark processing system
 5. Hotel Management
 6. Stock Maintenance
 7. College admission system

Total No. of Hrs. needed to complete the Lab: 30



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GL02	Subject Name: DATA STRUCTURES LABORATORY						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:NIL						L	0	0/0	2/0	2	
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C:Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES :												
➤ To develop skills to design and analyze simple linear and non linear data structures												
➤ To Strengthen the ability to identify and apply the suitable data structure for the given real world problem												
➤ To Gain knowledge in practical applications of data structures												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Student has to acquire basic concept of data structure											
CO2	Students will be able to implement data structure concepts using C++											
CO3	Students will be able to develop real time applications.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	H	M	H	M
CO2	H	M	H	H	M	H	H	M	H	M	H	M
CO3	H	H	H	H	H	H	H	M	H	M	H	H
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		H			
CO2	H		M		H		M		H			
CO3	M		H		H		M		H			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20GL02

DATA STRUCTURES LABORATORY

0 0 2 2

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

1. Usage of Classes
2. Usage of Friend Functions
3. Inheritance
4. Polymorphism
5. Exception Handling
6. Polynomial Object and necessary Overloaded Operators
7. Singly Linked Lists
8. Doubly Linked Lists
9. Circular Linked Lists
10. Implementation of Stack (Using Arrays & Pointers)
11. Implementation of Queue (Using Arrays & Pointers)
12. Implementation of Circular Queue (Using Arrays & Pointers)
13. Evaluation of Expressions
14. Binary Tree Traversals
15. Binary Search Trees.

Total No. of Hours needed to complete the Lab: 30



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20ETL2	Subject Name : OBJECT ORIENTED ANALYSIS AND DESIGN							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Programming fundamentals with C++							ETL	2	0/0	1/0	3
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ Develop a working understanding of formal object-oriented analysis and design processes.➤ Develop an appreciation for and understanding of the risks inherent to large-scale software development-➤ Develop the skills to determine which processes and OOAD techniques should be applied to a given project.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the Basic concepts of object oriented system development											
CO2	To understand the methodology and UML											
CO3	To understand the concept of object oriented analysis identifying use case											
CO4	To understand the concept of object oriented design											
CO5	To understand the concept of software quality assurance											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	L	L	M	M	M	L	M	H
CO2	H	H	H	M	L	L	M	M	M	L	M	H
CO3	H	H	H	M	L	L	M	M	M	L	M	H
CO4	H	H	H	M	L	L	M	M	M	L	M	H
CO5	H	H	H	M	L	L	M	M	M	L	M	H
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	M		L		L		M		L			
CO2	M		L		L		M		L			
CO3	M		L		L		M		L			
CO4	M		L		L		M		L			
CO5	M		L		L		M		L			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20ETL2

OBJECT ORIENTED ANALYSIS AND DESIGN

2 0 1 3

OBJECTIVES:

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop an application and understanding of the risks inherent to large-scale software development.
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.

UNIT I

9 Hrs

Introduction OOSD Methodology - Unified approach – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle – S/W device process- High quality Software Object Oriented System Development- Reusability.

UNIT II

9 Hrs

Methodology and UML Introduction – Survey – Rumbugh- Booch- Jacobson methods – Patterns – Frameworks – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling diagrams – Interaction Diagrams- sequence diagrams.

UNIT III

9 Hrs

Object Oriented Analysis Identifying Usecase – Business object analysis – Usecase driven object oriented analysis – Usecase model – Documentation – Introduction- classification theory- Approaches for Identifying classes – Identifying object- relationships- attributes- methods – Super-sub class – Aggregation Class Responsibility – Object responsibility.

UNIT IV

9 Hrs

Object Oriented Design -Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – DBMS – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface

UNIT V

9 Hrs

Software Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

Total no. of Hrs : 45

REFERENCES:

1. Ali Bahrami(2003), *Object Oriented System Development*, McGraw Hill International Edition.
2. Craig Larman(2002) *Applying UML and Patterns*(2nd ed.) Pearson.
3. James Rumbaugh(2004) *Object Oriented Modeling Language* (2nd ed.), PHI.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G004	Subject Name : ADVANCED JAVA PROGRAMMING						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: Java Programming						T	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To learn to access database through Java programs, using Java Data Base Connectivity (JDBC)➤ To create dynamic web pages, using Servlets and JSP➤ To design a reusable software component, using Java Bean➤ To invoke the remote methods in an application using Remote Method Invocation (RMI)➤ To understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).												
COURSE OUTCOMES (COs) : (3- 5)												
CO1		To understand the Basic concept of JDBC										
CO2		To understand the concept of servlet										
CO3		To understand the basic concept of JSP										
CO4		To understand the java networking										
CO5		To understand the basic concepts of EJB										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	L	M	L	L	M	M	M	L	M	M
CO2	H	H	L	M	L	L	M	M	M	L	M	M
CO3	H	H	L	M	L	L	M	M	M	L	M	M
CO4	H	H	L	M	L	L	M	M	M	L	M	M
CO5	H	H	L	M	L	L	M	M	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	M		L		L		M		L			
CO2	M		L		L		M		L			
CO3	M		L		L		M		L			
CO4	M		L		L		M		L			
CO5	M		L		L		M		L			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T
MCA20G004 ADVANCED JAVA PROGRAMMING 3 1 0 4

OBJECTIVES:

- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To learn advanced java programming concepts like thread,swing,interface,etc.
- To develop network program in java
- To understand concepts needed for distributed, multitier and enterprise applications

UNIT I

12 Hrs

Introduction to Java - Features of Java - Classes – Objects – Methods - Constructors – Garbage Collection-Finalize() method-Overloading methods – Static and final methods – Inheritance – Overriding methods – Packages-Interface - Exception handling-Multithreaded programming

UNIT II

12 Hrs

I/O Streams – File Streams - Applet Programming- Swings- Socket programming – Proxy Servers – TCP / IP Sockets – Net Address – URL classes – Datagrams- Secure socket-Multicast sockets.

UNIT III

12 Hrs

Introduction of JDBC-Types of JDBC Drivers-Implementing JDBC Statements and ResultSet – ResultSetMetaData - Connection Pooling – Servlet -The Java Servlet Architecture – The GenericServlet and HttpServlet Classes – Building a Servlet – The ServletContext – Using Servlets to Retrieve HTTP Data-Concept of cookie- Session Tracking

UNIT IV

12Hrs

Introduction to JSP-Components of a JSP - JSP Directives - JSP Scripting Elements- JSP Actions - Managing session using JSP - Error Handling in JSP - Writing custom tags -JSTL - Using JavaBeans inside a JSP Page - Using JDBC in JSP -Writing simple JSP Page

UNIT IV

12 Hrs

Java Networking -Introduction to RMI - Object Serialization - deserialization –IIOP implementation-CORBA-IDL Technology-Naming services-CORBA programming models-JAR file creation.

UNIT V

12 Hrs

Introduction to Enterprise JavaBeans – server side component architecture-enterprise programming - session EJBs - EJB clients - entity EJBs - message driven beans

Total no. of Hrs : 60

REFERENCES:

1. Naughton,P & Schildt, H,*Java 2 The Complete Reference*(5th ed), TMH
2. Santosh Kumar K(2008), “*JDBC, Servlets and JSP Black Book*”, Kogent Solutions New Edition
3. Gerald Brose, Andreas Vogel & Keith Duddy(2001), “*Java Programming with CORBA: Advanced Techniques for Building Distributed Applications*(3rd ed.)”, Wiley Publication.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G005	Subject Name : INTERNET TECHNOLOGIES							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: HTML							T	3	1/0	0	4
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ Understand how CSS will affect web page creation.➤ Understand the role of JavaScript in web page creation.➤ Students will be able to write a ASP application.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the concepts and architecture of the World Wide Web.											
CO2	To understand and practice mark up languages											
CO3	To understand and practice embedded dynamic scripting on client side Internet Programming											
CO4	To understand and practice web development techniques on client-side											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	L	M	M	L	L	L	M	L	M
CO2	H	M	H	M	L	M	L	L	L	L	L	M
CO3	H	M	H	M	L	M	L	L	L	L	L	M
CO4	H	H	H	L	M	H	L	L	L	L	L	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		M		L		L		M			
CO2	H		H		M		L		M			
CO3	H		H		M		M		L			
CO4	H		M		M		H		M			
H/M/L indicates Strength of Correlation H- High, M- Medium ,L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T
MCA20G005 INTERNET TECHNOLOGIES 3 1 0 4

OBJECTIVES:

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice markup languages
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side

UNIT I

12 Hrs

Introduction To WWW: Internet Standards – WWW Architecture – Protocols: SMTP, POP3, HTTP: HTTP request – response — Webpage Design : Web site Design Principles- Planning the site and navigation.

UNIT II

12 Hrs

UI Design Markup Language (Html): Introduction to HTML and HTML5 - Formatting and Fonts -Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms. Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS.

UNIT III

12 Hrs

Introduction To Java Script: Introduction - Core features - Data types and Variables - Operators, Expressions, and Statements - Functions - Objects - Array, Date and Math related Objects - Document Object Model - Event HandlingControlling Windows & Frames and Documents - Form handling and validations.

UNIT IV

12 Hrs

ASP: The origin of ASP-ASP connection with IIS – set up Issues and management- ASP object model in overview – Handling Request and Response – client Server – interaction – the ASP request and Response Objects – Working with Form and Query String Collections _ Using Cookies and Server Variables – Other Request and response techniques

UNIT V

12 Hrs

ASP Applications and Sessions: Managing the stte on the Web – the ASP application and Session Objects – Server Process and the ASP server object – Server side processing in Dynamic pages – Server side Includes – the ASP Server Object – Scripting Objects- Creating Instances of Objects and Components – Scripting – dictionary Scripting –File System – Scripting – Text Stream Objects

Total no. of Hrs : 60

REFERENCES:

1. Harvey Paul Deitel Associates, Harvey Deitel and Abbey Deitel(2011), *Internet and World Wide Web - How To Program*(5th ed.), Pearson Education.
2. Thomas A Powell & Fritz Schneider(2013), *JavaScript: The Complete Reference*(3rd ed), Tata McGraw Hill.
3. David Flanagan(2011),*JavaScript: The Definitive Guide*(6th ed), O'Reilly Media.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20G006	Subject Name : ENTERPRISE RESOURCE PLANNING							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To make student able to build an understanding of the fundamental concepts of ERP systems, their architecture ➤ To learn different modules in ERP. ➤ To be able to map business processes using ERP concepts and techniques												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the Basic concept of ERP											
CO2	To understand the ERP and related technologies											
CO3	To understand ERP modules											
CO4	To understand ERP implementation life cycle											
CO5	To understand the concepts of vendors											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	L	L	L	L	M	M	L	M	L	M	M
CO2	H	L	L	L	L	M	M	L	M	L	M	M
CO3	H	L	L	L	L	M	M	L	M	L	M	M
CO4	H	L	L	L	L	M	M	L	M	L	M	M
CO5	H	L	L	L	L	M	M	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		L		PSO5			
CO1	M		M		L		M		M			
CO2	M		M		L		M		M			
CO3	M		M		L		M		M			
CO4	M		M		L		M		M			
CO5	M		M		L		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20G006

ENTERPRISE RESOURCE PLANNING

3 1 0 4

OBJECTIVES:

- To learn about Introduction to ERP and the Benefits of Implementation
- Developing a Business Case to Justify an ERP Implementation
- To understand Business Process Alignment and the value chain process.
- To learn about implementing and expanding of ERP

UNIT I

12 Hrs

Introduction to ERP – Evolution – Growth –Advantages of ERP- need of ERP- Integrated Management information - Business Modeling - Integrated Data Model - Chain – Supply and demand chain-Extended Supply chain

UNIT II

12 Hrs

ERP and Related Technologies – BPR – MIS – DSS – EIS - Data Warehousing - Data Mining – OLAP - A Manufacturing Perspective – MRP - BOM - Closed Loop MRP- MRP-II – DRP - JIT and Kanban - CAD/CAM – PDM - Data Management Benefits of PDM - MTO and MTS – ATO - CRM

UNIT III

12 Hrs

Benefits of ERP - ERP Modules – Finance - Plant Maintenance - Quality Management -Materials Management - ERP Market: SAP AG - People Soft - BAAN and ORACLE - JD Edwards

UNIT IV

12 Hrs

ERP Implementation Life Cycle – Pro-evaluation Screening - package Evaluation - Project planning phase - Gap – Analysis – reengineering – configuration - implementation team-Training – Testing-Going Live – End User Training - Post implementation - Business Models and BAPIs - Convergence on Windows NT - Application platforms - New Business segment and Features

UNIT V

12 Hrs

ERP Procurement Issues – Market Trends – Outsourcing ERP – Economics – Hidden Cost Issues – ROI – Analysis of cases from five companies

Total no. of Hrs : 60

REFERENCES:

1. Alexis Leon(2004) *Enterprise Resource Planning* , Tata McGraw-Hill, New Delhi.
2. Alexis Leon (2006) *Enterprise Resource Planning Demystified* , Tata McGraw-Hill, New Delhi.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GL03	Subject Name: ADVANCED JAVA PROGRAMMING	T / L / ETL	L	T / S.Lr	P/ R	C
	LABORATORY					
	Prerequisite: JAVA PROGRAMMING LABORATORY	L	0	0/0	2/0	2

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The course covers networking and database manipulation.
- To invoke the remote methods in an application using Remote Method Invocation (RMI)
- To design and develop web applications using Servlets and Java server pages.
- Student will learn how to work with JavaBeans.
- To understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB)

COURSE OUTCOMES (COs) : (3- 5)

CO1	Covers networking and database manipulation.
CO2	Invoke the remote methods in an application using Remote Method Invocation (RMI)
CO3	Design and develop web applications using servlets and Java server pages.
CO4	Learn how to work with JavaBeans.
CO5	Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB)

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	M	H	H	M
CO2	H	H	H	M	H	H	H	M	M	H	H	M
CO3	H	H	H	H	H	H	H	M	M	H	H	H
CO4	H	H	H	H	H	H	H	M	M	H	H	H
CO5	H	H	H	H	H	H	H	M	M	H	H	H
COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5							
CO1	H	H	H	M	H							
CO2	H	H	H	M	H							
CO3	H	H	H	M	H							
CO4	H	H	H	M	H							
CO5	H	H	H	M	H							

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20GL03 ADVANCED JAVA PROGRAMMING LABORATORY

0 0 2 2

OBJECTIVES:

- Develop the ability to solve real-world problems through Java programming
 - Develop efficient Java applets and applications
 - Student will be able to develop distributed business applications, develop web pages using advanced server-side programming through Servlets and Java server pages.
-
1. Write a Java program using inheritance to create a base class Teacher and a sub class PhysicsTeacher. PhysicsTeacher extends the designation and college properties and work() method from base class.
 2. Write a Simple Java program to calculate bonus for different departments using method overriding
 3. Write a java program that reads on file name from the user ,then displays information about whether the file exists, whether the file is readable , whether the file is writable, the type of the file and the length of the file in bytes.
 4. Develop an applet programs to display basic shapes and fill them , draw different items using basic shapes and set background and foreground colors using graphics class.
 5. Develop Student information system using JDBC.
 6. Implementation of Socket Programming.
 7. Develop employee information systems using Servlets and JDBC
 8. Develop basic arithmetic functions using JSP.
 9. Implementation of Object Serialization for stock market using RMI.
 10. Developing a web application for income-tax calculation using session bean.

Total No. of Hrs. needed to Complete the Lab : 30



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GL04	Subject Name: INTERNET PROGRAMMING LABORATORY	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL	L	0	0/0	2/0	2

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To learn how to create a simple web page using html along with the usage of style sheets, lists, creation or tables with borders, padding and colors.
- Use Cascading Style Sheets (CSS) to design web pages
- Use CSS to create web pages with specialized fonts and design elements
- Use JavaScript to control browser frames and windows

COURSE OUTCOMES (COs) : (3- 5)

CO1	Implement interactive web page(s) using HTML, CSS and VBScript.
CO2	Build Dynamic web site using server side PHP Programming and Database connectivity
CO3	Design a responsive web site using HTML5 and CSS3.
CO4	To acquire knowledge and skills for creation of web site considering both client and server side

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	M	H	H	M
CO2	H	H	H	M	H	H	H	M	M	H	H	M
CO3	H	M	H	H	H	H	H	M	M	M	H	H
CO4	H	H	M	H	H	H	H	M	M	H	H	H
COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5							
CO1	H	H	H	H	H							
CO2	H	M	H	H	H							
CO3	H	H	H	H	H							
CO4	M	H	H	H	H							

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20GL04

INTERNET PROGRAMMING LABORATORY

0 0 2 2

Objectives:

- To learn how to create a simple web page using html along with the usage of style sheets, lists, creation or tables with borders, padding and colors.
 - Use Cascading Style Sheets (CSS) to design web pages
 - Use CSS to create web pages with specialized fonts and design elements
 - Use JavaScript to control browser frames and windows
1. Create a web page with the following usingHTML5
 - (i) To embed an image map in a webpage
 - (ii) To fix the hotspots
 - (iii) Show all the related information when the hot spots are clicked.
 2. Create a web page with all types of Cascading style sheets.
 3. Implement Client Side Scripts for Validating Web Form Controls using JavaScript.
 4. Develop and demonstrate a HTML file that includes JavaScript that uses functions for the following problems:
 - a) Parameter: A string
Output: The position in the string of the left-most vowel
 - b) Parameter: A number
Output: The number with its digits in the reverse order
 5. Write a VBScript for Loan Calculation.
 6. Designing Quiz Application Using VBScript
 7. Develop PHP program using Arrays, control structures, looping structures and Form Handling
 8. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings
 9. Develop a web application for Airline Reservation System using PHP

Total No. of Hrs. needed to Complete the Lab : 30



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20ETL3	Subject Name : DATA ANALYTICS AND R PROGRAMMING							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							ETL	2	0/0	1/0	3
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To work with Big data platform ➤ To analyze the HADOOP and Map Reduce technologies associated with big data ➤ To explore on Big Data applications Using Pig and Hive. ➤ To understand the fundamentals of various big data analysis techniques.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1		Explain the motivation for big data systems and identify the main sources of Big Data in the real world.										
CO2		Demonstrate an ability to use framework Hadoop to efficiently store retrieve and process Big Data for Analytics.										
CO3		Implement several Data Intensive tasks using the Map Reduce Paradigm										
CO4		Apply several newer algorithms for Clustering Classifying and finding associations in Big Data										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	H	H	H	H	H	H	M	M
CO2	M	M	M	M	H	H	H	H	H	H	M	M
CO3	M	M	M	M	H	H	H	H	H	H	M	M
CO4	M	M	M	M	H	H	H	H	H	H	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	L		M		M		H		H			
CO2	L		M		M		H		H			
CO3	L		M		M		H		H			
CO4	L		M		M		H		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20ETL3

DATA ANALYTICS AND R PROGRAMMING

2 0 1 3

OBJECTIVES:

- To work with Big data platform
- To analyze the HADOOP and Map Reduce technologies associated with big data
- To explore on Big Data applications Using Pig and Hive.
- To understand the fundamentals of various big data analysis techniques.

UNIT I INTRODUCTION TO BIG DATA

9 Hrs

Introduction to Big Data Platform – Challenges of conventional Systems – Nature of Data Evolution Of Analytic Scalability – Intelligent data analysis – Analytic Processes and Tools – Analysis vs Reporting – Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions – Re-sampling – Statistical Inference – Prediction Error.

UNIT II MINING DATA STREAMS

9 Hrs

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments - Counting Oneness in a Window – Decaying Window – Real time Analytics Platform (RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III INTRODUCTION TO BIG DATA ANALYTICS & R PROGRAMMING

9 Hrs

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Introduction to R and R Studio , Basic Analysis in R, Intermediate R, Intermediate analysis in R, Advanced Analytics – K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis.

UNIT IV HADOOP

9 Hrs

History of Hadoop – The Hadoop Distributed File System – Components of Hadoop Analyzing the Data with Hadoop – Scaling out – Hadoop Streaming – Design of HDFS – Java Interfaces to HDFS Basics – Developing a Map Reduce Application – How Map Reduce Works – Anatomy of a Map Reduce Job run Failures - Job Scheduling – Shuffle and Sort – Task execution - Map Reduce Types and Formats – Map reduce features.

UNIT V FRAMEWORKS

9 Hrs

Applications on Big Data Using Pig and Hive - Data Processing operators in Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of Hbase and ZooKeeper – IBM InfoSphere BigInsights and Streams. Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications.

Total No. of Hrs: 45

REFERENCES:

1. Prajapati, Big Data Analytics with R and Hadoop, 2014
2. Stephan Kudyba, Big Data, Mining and Analytics: Components of Strategic Decision Making. Auerbach Publications, March 12, 2014
3. Michael Minicli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications.2013



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

4. Dr. Mark Gardener, Beginning R: The Statistical Programming Language (Wrox), 2013

Subject Code: MCA20G007	Subject Name : ENTERPRENEURSHIP DEVELOPMENT					T / L/ ETL	L	T / S.Lr	P/ R	C		
	Prerequisite:NIL					T	3	0/0	0/0	3		
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To know about nature and importance of entrepreneur➤ To develop and strengthen entrepreneurial quality and motivation➤ To develop small and medium enterprises sector which is necessary for employment generation and wider dispersal of industrial ownership➤ To understand the incentive and subsidies for different types of sector➤ To focus on growth of Entrepreneurial Venture												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To know about nature and importance of entrepreneur											
CO2	To develop and strengthen entrepreneurial quality and motivation											
CO3	To develop small and medium enterprises sector which is necessary for employment generation and wider dispersal of industrial ownership											
CO4	To understand the incentive and subsidies for different types of sector											
CO5	To focus on growth of Entrepreneurial Venture											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	H	H	H	H	H	H	M	M
CO2	M	M	M	M	H	H	H	H	H	H	M	M
CO3	M	M	M	M	H	H	H	H	H	H	M	M
CO4	M	M	M	M	H	H	H	H	H	H	M	M
CO5	M	M	M	M	H	H	H	H	H	H	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	L		M		M		H		H			
CO2	L		M		M		H		H			
CO3	L		M		M		H		H			
CO4	L		M		M		H		H			
CO5	L		M		M		H		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									
Approval												

MCA20G007

ENTREPRENEURSHIP DEVELOPMENT

3 0 0 3

OBJECTIVES:

- To impart basis managerial knowledge and understanding
- To develop and strengthen entrepreneurial quality and motivation
- To develop small and medium enterprises sector which is necessary for employment generation and wider dispersal of industrial ownership

UNIT I

9 Hrs

Entrepreneur: Meaning – Definition – Nature and Importance of Entrepreneur – Classification of Entrepreneurs - Characteristics and Qualities of Entrepreneur - Role of Entrepreneurs in the economic development – Factors affecting entrepreneurial growth.

UNIT II

9 Hrs

Entrepreneurship: Concept – Distinction between Entrepreneur and Entrepreneurship - Entrepreneurship Development Programs (EDP): Meaning and Need of EDP – Role of EDP – Significance of EDP - Stages in EDP- Role of Government in Organizing EDP.

UNIT III

9 Hrs

Establishing a Small Enterprise: Process of setting a New Business – Problems of New Venture – Selection of Viable Project – Project Development and Selection – Preparation of Project Report – Project Appraisal – Business Location – Legal Requirements – Legal Requirements of Establishing a New Unit - Steps to start an industrial unit

UNIT IV

9 Hrs

Incentives and Subsidies: State and Central Govt. – Aims – Backward Areas – Industrial Estates –Role of DIC-SISI-TCO in Entrepreneurial Growth.

UNIT V

9 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Growth of Entrepreneurial Venture: Importance of Strategic Planning for Emerging Ventures – Entrepreneurial Growth
 - Concept and Management – Raising funds for New Venture – Role and Significance of Venture Capital – Issues and Challenges of Family Owned Business

Total No of Hrs : 45

REFERENCES:

1. Sangeetha Sharma(2016), *Entrepreneurship Development*, PHI Learning Pvt Limited.
2. *Guide to Entrepreneurs Industrial Development* , Govt. of Tamil Nadu, SIPCOT
3. Singh P N(1986) , *Developing Entrepreneurship for Economic Growth*.

Subject Code: MCA20G008	Subject Name : C# AND .NET FRAMEWORK						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: INTERNET PROGRAMMING						T	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ Getting started with .net, data types & variables, using the .net framework , branching & flow control➤ To Understand Classes & objects, properties & methods, object oriented techniques➤ To design and develop windows application using ADO.NET➤ To Learn web based applications on .NET(ASP.NET)➤ To Know the concept of .Net Remoting and Security												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Getting started with .net, data types & variables, using the .net framework , branching & flow control											
CO2	To Understand Classes & objects, properties & methods, object oriented techniques											
CO3	To design and develop windows application using ADO.NET											
CO4	To Learn web based applications on .NET(ASP.NET)											
CO5	To Know the concept of .Net Remoting and Security											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	M	L	L	M	M	M
CO2	H	H	H	H	H	H	M	L	L	M	M	M
CO3	H	H	H	H	H	H	M	L	L	M	M	M
CO4	H	H	H	H	H	H	M	L	L	M	M	M
CO5	H	H	H	H	H	H	M	L	L	M	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	H		H		H		M		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												

MCA20G008

C# AND .NET FRAMEWORK

3 1 0 4

OBJECTIVES:

- A working knowledge of the C# programming language.
- Apply and practice logical ability to solve the problems.
- The ability to effectively use visual studio .NET.
- An understanding of the goals and objectives of the .NET Framework. .NET is a revolutionary concept on how software should be developed and deployed.

UNIT I

12 Hrs

Introduction to C# -Introducing C#- Understanding .NET - Overview of C# - Literals – Variables - Data types – Operators – Expressions – Branching – Looping – Methods – Arrays - Strings – Structures - Enumerations

UNIT II

12 Hrs

Object Oriented Aspects of C# Classes – Objects – Inheritance – Polymorphism –Interfaces - Operator overloading – Delegates – Events - Errors and Exceptions

UNIT III

12 Hrs

Application development on .NET-Building window Applications - Accessing Data with ADO.NET

UNIT IV

12 Hrs

Web based application development on .NET Programming - web applications with Web Forms - Programming web services

UNIT V

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

The CLR and the .NET Framework - Assemblies - Versioning – Attributes – Reflection - Viewing Metadata - Type Discovery - Reflecting on a Type – Marshalling – Remoting- Understanding server object Types - Specifying a server with an interface - Building a server - Building the client - Using single call – Threads

Total no. of Hrs : 60

REFERENCES:

1. Balagurusamy,E(2004) *Programming in C#*, Tata McGraw-Hill.
2. Liberty ,J (2002) *Programming in C*(2nd ed.),O'Reilly.
3. Herbert Schildt(2004) *The complete Reference:C#*,Tata McGraw-Hill.
4. Robinson et al(2002) *Professional C#*(2nd ed.)Wrox press.

Subject Code: MCA20G009	Subject Name : PYTHON PROGRAMMING						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:NIL						ETL	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To learn how to design Python applications. ➤ To learn how to write loops and decisions statements in Python ➤ To learn how to use inheritance in Python for reusability. ➤ To learn how to read and write files in Python. ➤ To understand database application and web application framework												
COURSE OUTCOMES (COs) : (3- 5)												
CO1		To understand the Basics of Python programming										
CO2		To understand control statements										
CO3		To understand the concept of inheritance										
CO4		To understand file handling										
CO5		To understand the database concepts and web application framework										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	L	L	M	L	M	L	M	M
CO2	H	H	H	H	L	L	M	L	M	L	M	M
CO3	H	H	H	H	L	L	M	L	M	L	M	M
CO4	H	H	H	H	L	L	M	L	M	L	M	M
CO5	H	H	H	H	L	L	M	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		H			
CO2	H		H		H		M		H			
CO3	H		H		H		M		H			
CO4	H		H		H		M		H			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO5	H	H	H	M	H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low								
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill
				✓				
Approval								

MCA20G009

PYTHON PROGRAMMING

3 1 0 4

OBJECTIVES:

- To learn how to design Python applications.
- To learn how to write loops and decisions statements in Python
- To learn how read and write files in Python.
- To learn how to use inheritance in Python for reusability.

UNIT I

12 Hrs

Data Types and Data Structures: Introduction to Python - using the Python interpreter- Overview of programming in Python- Python built-in types- Arithmetic in Python- Program input and Program output- Variables and assignment. Strings and string operations - List basics - List operations- Dictionaries- Dictionary basics and Tuples

UNIT II

12 Hrs

Control Structures: Control Statements: if statements- while statement- for statements- functions- formal arguments- variable-length arguments- Exceptions- detecting and handling exceptions.

UNIT III

12 Hrs

Classes files and modules: Introduction to Classes and Objects: classes- class attributes- instances- instance attributes- binding and method invocation- inheritance- polymorphism- Built-in functions for classes and instances.

UNIT IV

12 Hrs

Files and input/output: reading and writing files- methods of file objects- using standard library functions- dates and times

UNIT V

12 Hrs

Database and : Python database application programmer's interface (DB- API)- connection and cursor objects - Type objects and constructors - python database adapters. Creating simple web clients - introduction to CGI- CGI module- building CGI applications - python web application frameworks - Django.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Total no. of Hrs : 60

REFERENCES:

1. Wesley J. Chun (2000), *Core Python Programming* (2nd ed.), Pearson Education.
2. Guido Van Russom, Fred L.Drake (2003), *An Introduction to Python*, Network Theory Limited.
3. Magnus Lie Hetland (2009) , *Beginning Python: From Novice To Professional* (2nd ed.).

Subject Code: MCA20GL05	Subject Name : C # and .NET PROGRAMMING LABORATORY						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite: INTERNET PROGRAMMING LABORATORY						L	0	0/0	2/0	2	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ Understand, analyze and use language interfaces and inheritance.➤ Familiar with using .NET collections (sets- lists- dictionaries).➤ To develop windows application using database connectivity➤ Understand, analyze and use exceptions- Windows Forms.➤ Build interactive web applications using ASP.NET and C#.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understand, analyze and use language interfaces and inheritance.											
CO2	Familiar with using .NET collections (sets- lists- dictionaries).											
CO3	To develop windows application using database connectivity											
CO4	Understand ,analyze and use exceptions- Windows Forms- .NET Remoting and Serialization.											
CO5	Build interactive web applications using ASP.NET and C#.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	L	M	L	M	H	M
CO2	H	H	H	H	H	H	L	M	L	M	H	M
CO3	H	H	H	H	H	H	L	M	L	M	H	M
CO4	H	H	H	M	H	M	L	M	L	M	H	M
CO5	H	H	H	H	H	H	L	M	L	M	H	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		L			
CO2	H		H		H		M		L			
CO3	H		H		H		M		L			
CO4	M		H		H		M		L			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO5	H	H	H	M	L						
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low											
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills		
							✓				
Approval											

MCA20GL05

C # and .NET PROGRAMMING LABORATORY

0 0 2 2

OBJECTIVES:

- Understand, analyze and use language interfaces, and inheritance.
- Familiar with using .NET collections (sets, lists, dictionaries).
- Understand, analyze and use exceptions, Windows Forms, .NET Remoting and Serialization.
- Build interactive web applications using ASP.NET and C#.

- 1) Write a program to implement multilevel inheritance. Accept and display data for one student.
 Class student, Data Members : Roll_no , name
 Class Test, Data Members : marks1 , marks2
 Class Result, Data Members : total
- 2) Consider the Database STUDENT consisting of following tables: tbl_Course (CourseID:int, CourseName: string)
 tbl_Student (USN: string, StudName: string, Address: string, CourseID: int, YrOfAdmsn: int)
 Develop suitable windows application using C#.NET having following options:
 - a) Entering new course details. b) Entering new student details. c) Display the details of students (in a Grid) who belong to a particular course. d) Display the details the students who have taken admission in a particular year.
- 3) Create the application using ASP.NET Server controls that accepts name, password ,age , email id, and user id. All the information entry is compulsory. Password should be reconfirmed. Age should be within 21 to 30. Email id should be valid. User id should have at least a capital letter and digit as well as length should be between 7 and 20 characters.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

4) Create a web application to insert 3 records inside the SQL database table having following fields(DeptId, DeptName, EmpName, Salary). Update the salary for any one employee and increment it to 15% of the present salary. Perform delete operation on 1 row of the database table.

- 5) Consider the Database STUDENT consisting of following tables: tbl_Course (CourseID:int, CourseName: string)
tbl_Book (BookID :int, BookTitle: string, Author: string, CourseID: int)
tbl_Student (USN: string, StudName: string, CourseID: int)
tbl_BookIssue(USN: string, BookID: int, IssueDate: Date)

Develop suitable windows application using C#.NET having following options:

- a) New Course Entry , b)New Book Entry, c)New Student Entry
d) Issue of books to a student, e) Generate report (display in a grid) showing all the books belonging to particular course. f)Generate report (display in a grid) showing all the books issued on a particular date.g)Generate report (display in a grid) showing all the books issued to a particular student.
- 6) Develop a Web Application using C#.NET and ASP.NET for a Bank. The BANK Database should consist of following tables:
a)tbl_Bank (BankID: int, BankName: string),b)tbl_Branch (BranchID: int, BankID: int, BranchName: string) c)tbl_Account (AccountNo:int, BankID: int, BranchID: int, CustomerName: string, Address: string, ContactNo: int, Balance: real)
(Note: AccountNo and BankID together is a composite primary key).

The master page of this web application should contain hyperlinks to New Bank Entry, New Branch Entry (of selected Bank), New Customer Entry (based on branch and bank) and Report Generation.

The hyperlinks should navigate to respective content pages. These content pages provide the fields for respective data entry. The reports should be generated (display in grid) as below:

- a. Display all records of particular bank.
b. Display all records of a branch of particular bank.
c. The balance should be displayed for the entered account number (Bank and Branch are input through ComboBox controls and Account number is input through TextBox).

- 7) Write a Program using Language Integrated query. Create the table with the given fields.

FIELD NAME	DATA TYPE
------------	-----------

SRollno	int
---------	-----

SName	string
-------	--------



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

SAddress string

SFees int

Total No. of Hours needed to Complete the Lab : 30

Subject Code: MCA20GL06	Subject Name PYTHON PROGRAMMING LABORATORY							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							L	0	0/0	2/0	2
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To acquire programming skills in core and object oriented python➤ To understand the concepts of files and data structures like list, tuples, dictionary,etc➤ To develop the skill of designing GUI➤ To develop the ability to write the database application in python												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	➤ Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python											
CO2	➤ Express different Decision Making statements and Functions											
CO3	➤ Interpret Object oriented programming in Python											
CO4	➤ Understand and summarize different File handling operations											
CO5	➤ Explain how to design GUI Applications in Python and evaluate different database operations											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	L	M	L	M	H	M
CO2	M	H	H	H	H	H	L	M	L	H	H	M
CO3	H	H	M	H	H	H	L	M	L	M	H	M
CO4	H	H	H	M	H	M	L	M	L	M	H	M
CO5	H	H	H	H	M	H	L	M	L	M	H	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		L			
CO2	H		H		H		M		L			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO3	H	H	H	M	L							
CO4	M	H	H	M	L							
CO5	H	H	H	M	L							
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					
Approval												

MCA20GL06 PYTHON PROGRAMMING LABORATORY

0 0 2 2

OBJECTIVES:

- To acquire programming skills in core and object oriented python
- To understand the concepts of files and data structures like list, tuples, dictionary, etc
- To develop the skill of designing GUI
- To develop the ability to write the database application in python

1. Write a program to perform different arithmetic operations on numbers in python
2. Write a program to create, concatenate and print a string and accessing a substring from a given string
3. Write a program to create, append and remove lists in python
4. a) Write a python program to print the first half values in one line and the last half values in one line from the given list .b) Write a python program to check whether a given key already exists in a dictionary
5. Write a python program to find the factorial of a given number using recursive function.
6. a) Write a program to create a class to implement pow (x,n) .
 b) Create a class to convert integer to a roman numeral
7. Create a python program to demonstrate the concept of inheritance.
8. Write a python program to count the frequency of characters in a given file



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

9. Write a python program to print the current date in the following format “ Sun May 29 02: 26:23 IST 2020 “.

10. Write a python program to create a small GUI application for insert ,update and delete in a table using Oracle as backend and front end for creating form.

Total No. of Hours needed to Complete the Lab : 30

Subject Code: MCA20GL07	Subject Name : Implant Training / Internship						T / L/ ETL	L	T / S.L r	P/ R	C	
	Prerequisite:NIL						0	0	0/0	2/0	2	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES : <ul style="list-style-type: none">➤ Develop and improve technical skills in communication, technology and teamwork.➤ Meet professional role models and potential mentors who can provide guidance feedback, and support.➤ Expand network of professional relationships and contacts.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To get an insight of an industry pertaining to the domain of study.											
CO2	To acquire skills and knowledge for a smooth transition into the career											
CO3	To gain field experience and get linked with the professional network.											
CO4	Enhance and/or expand the student's knowledge of a particular area											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	M	H	M	M	H	H
CO2	H	H	H	H	M	H	M	M	M	M	H	H
CO3	H	H	H	H	L	H	M	L	M	M	H	H
CO4	H	H	H	H	L	H	H	L	L	M	H	H
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		H			
CO2	H		H		H		M		H			
CO3	H		H		H		M		M			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO4	H	H	H	M	H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low								
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill
							✓	
Approval								

Subject Code: MCA20GP01	Subject Name : PROJECT WORK						T / L/ ETL	L	T / S.L r	P/ R	C	
	Prerequisite:NIL						0	0	0/0	15/0	15	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVES : Students will have an ability to identify, formulate and implement computing solutions. Students will have an ability to design and conduct experiments, analyze and interpret data related software development projects.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To prepare students to excel in computer applications to succeed in industry/ technical profession.											
CO2	To train students with good computing breadth so as to comprehend, analyze, design and create computing solutions for the real life problems											
CO3	To design a system, component or process as per needs and specification of the clients											
CO4	To work on multidisciplinary tasks and will be aware of the new and emerging disciplines that will impact development											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	M	L	L	M	H	H
CO2	M	H	H	H	M	H	M	L	L	M	H	H
CO3	H	H	H	H	M	H	M	L	L	M	H	H
CO4	H	H	H	H	L	H	H	L	L	M	H	H
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		H			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO2	H	H	H	M	M			
CO3	H	H	H	M	H			
CO4	H	H	H	M	M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low								
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill
							✓	
Approval								

Subject Code: MCA20GE01	Subject Name : DATA COMMUNICATION AND NETWORKS						T / L/ ETL	L	T / S.Lr	P/ R	C	
	Prerequisite:NIL						T	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To study about the physical arrangement of networks, types and modes of networks, data conversions and transmission medium.➤ To study the detection and correction of errors, link control and link protocols of data link layer➤ To study about the standardized data interface and it’s working principle➤ To study the logic of link mechanisms used in networks and different layers of TCP/IP.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the Basic categories of networks											
CO2	To understand the error control and data link protocol											
CO3	To understand the multiplexing and switching											
CO4	To understand the Design concepts of ATM											
CO5	To understand the network devices and TCP/IP protocol											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	M	M	L	L	L	L	M	L	M	M
CO2	M	H	M	M	L	L	L	L	M	L	M	M
CO3	M	H	M	M	L	L	L	L	M	L	M	M
CO4	M	H	M	M	L	L	L	L	M	L	M	M
CO5	M	H	M	M	L	L	L	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO1	L	M	L	M	L			
CO2	L	M	L	M	L			
CO3	L	M	L	M	L			
CO4	L	M	L	M	L			
CO5	L	M	L	M	L			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low								
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill
						✓		
Approval								

MCA20GE01

DATA COMMUNICATION AND NETWORKS

3 1 0 4

OBJECTIVES:

- To study about the physical arrangement of networks, types and modes of networks, data conversions and transmission medium.
- To study the detection and correction of errors, link control and link protocols of data link layer
- To study about the standardized data interface and it's working principle
- To study the logic of link mechanisms used in networks and different layers of TCP/IP.

UNIT I

12 Hrs

Data Communication Introduction: Networks – Protocols and standards – Standards organizations – Line configurations – Topology – Transmission mode – Categories of networks –OSI model- Functions of the layers- Transmission media- Guided media – Unguided media – Transmission impairment – Performance.

UNIT II

12 Hrs

Error Control And Data Link Protocols : Error detection and correction- Types of errors – Error Detection Techniques - Data link control - Flow control – Error control - Data link protocols –Asynchronous protocols – Synchronous protocols-Character oriented protocols – BIT oriented protocols

UNIT III

12 Hrs

Multiplexing and Switching: LAN Project 802 – Ethernet – Token bus – Token ring – FDDI- IEEE 802.6 (DQDB) – SMDS - Switching

UNIT IV

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

X.25, FRAME RELAY, ATM : X.25 Layers - Frame relay - Introduction – Frame relay operation – Frame relay layers – Congestion control – Leaky bucket algorithm - ATM: Design goals – ATM architecture – ATM layers – ATM applications. SONET / SDH: Synchronous transport signals – Physical configuration – SONET layers – Applications.

UNIT V

12 Hrs

Networking Devices And Tcp / Ip Protocol Suite : Repeaters – Bridges – Gateways – Routing algorithms – Overview of TCP/IP - Application layer - Domain Name System (DNS) – Telnet – File Transfer Protocol (FTP) – Trivial File Transfer Protocol (TFTP) – Simple Mail Transfer Protocol (SMTP), Simple Network Management Protocol(SNMP)

REFERENCES:

1. Behrouz A.Forouzan(2000), *Data Communication and Networking*(2nd ed.), Tata McGraw Hill.
2. William Stallings(2003), *Data and Computer Communication*(8th ed.) Pearson Education.
3. Andrew Tannenbaum.S(2003),*Computer Networks*(4th ed.), Pearson Education.

Subject Code: MCA20GE02	Subject Name : INTERNET OF THINGS AND WIRELESS SENSOR NETWORKS						T / L / ETL	L	T / S.Lr	P / R	C	
	Prerequisite:NIL						T	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understand the concepts of micro controller➤ To apply IoT Applications for specific domains➤ To understand the Programming Fundamentals with C using Arduino												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To Understand State of the Art - IoT Architecture.											
CO2	To understand the Programming Fundamentals with C using Arduino											
CO3	To Implement Data and Knowledge Management and use of Devices in IoT Technology.											
CO4	Working with Arduino for data acquisition with IOT Devices											
CO5	Creating and Programming a web service with ASP.NET / PHP											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	L	L	M	L	M	M
CO2	H	H	H	H	H	H	L	L	M	L	M	M
CO3	H	H	H	H	H	H	L	L	M	L	M	M
CO4	H	H	H	H	H	H	L	L	M	L	M	M
CO5	H	H	H	H	H	H	L	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		L			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO2	H	H	H	M	L			
CO3	H	H	H	M	L			
CO4	H	H	H	M	L			
CO5	H	H	H	M	L			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low								
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill
					✓			
Approval								

MCA20GE02 INTERNET OF THINGS AND WIRELESS SENSOR NETWORKS

3 1 0 4

OBJECTIVES:

- To understand the concepts of micro controller
- To apply IoT Applications for specific domains
- To understand the Programming Fundamentals in Arduino.

UNIT I

Introduction and definition to IOT - What is an IOT? - Explore the scenario for application of IOT Communication definitions Concepts - Capturing and Storing the data - What to do with the data...applying Expert Systems and Machine Learning; IOT Detailed understanding of Solution Architecture - IOT Device Architecture - IOT Network/Communication Architecture with an understanding on client server and loosely couple storage servers and message queues - IOT Application Architecture.

UNIT II

Programming Fundamentals with C using Arduino IDE - Understanding the Arduino IDE - Installing and Setting up the Arduino IDE - Connecting the Arduino IDE with devices - Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops -Functions, Array and Pointers - Strings and I/O - Using Arduino C Library functions for Serial, delay and other invoking functions - Working with LED and Switch example on Arduino C Library functions

UNIT III

Working with Arduino for data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding basic electronic components and power elements - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor -Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor - Working with Proximity Sensor - Working with Photo Diode - Working with Accelerometer and vibration sensor - Measuring Voltage and Current



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT IV

Working with Arduino for data acquisition with IOT Devices - Understanding the Outputs - Activating LED Lights - Activating Relays - Activating Buzzer - Running DC Motors - Running - Stepper Motors and Servo Motors

UNIT V

Programming Fundamentals with Web Applications for handling Data Communication from IOT Device - Understanding the data capture through web services - Creating and Programming a rest web service with ASP.NET / PHP - Calling and accessing the Web Service in a Client; Building and Using Communication Devices to data transfer from IOT Devices - Understanding the Communication Principles to Transfer the data from IOT Devices; Remote Communication to cloud/external application - Using WIFI to Transfer the data from IOT Sensor.

REFERENCES:

1. Michael Margolis(2011), *Arduino Cookbook*(2nd ed.), O'Reilly Media.
2. Michael Collier, Robin Shahan(2015), *Fundamentals of Azure*, Microsoft Press.

Subject Code:	Subject Name : GRID AND CLOUD COMPUTING						T / L/ ETL	L	T / S.Lr	P/ R	C	
MCA20GE03	Prerequisite:Client Server and Distributed Computing						T	3	1/0	0/0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
➤ To understand the Grid and Cloud Systems Design, architecture, data and resource management.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To Understand parallel and distributed computing.											
CO2	To know open grid service architecture											
CO3	To implement data and resource management on the Grid											
CO4	To understand the Cloud Architecture and Models											
CO5	To know about parallel and distributed Programming Paradigms											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	L	L	M	L	M	M
CO2	H	H	H	H	H	H	L	L	M	L	M	M
CO3	H	H	H	H	H	H	L	L	M	L	M	M
CO4	H	H	H	H	H	H	L	L	M	L	M	M
CO5	H	H	H	H	H	H	L	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO4	H	H	H	M	M							
CO5	H	H	H	M	M							
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												

MCA20GE03

GRID AND CLOUD COMPUTING

3 1 0 4

OBJECTIVES:

- To understand the Grid and Cloud Systems Design, architecture, data and resource management.

UNIT I

Introduction to Parallel and Distributed Computing - Cluster Computing - Grid Computing- Cloud Computing - Anatomy and Physiology of Grid- Web and Grid Services - Grid Standards - OGSAWSRF - Resource sharing - Trends, Challenges and Applications.

UNIT II

Open Grid Services Architecture (OGSA)-OGSI-OGSA use cases: Commercial data center (CDC), National Fusion collaboratory (NFS), Online media and entertainment – OGSA platform components - OGSA basic services - Policy Architecture- Security Architecture

UNIT III

Resource management on the Grid - Grid resource management systems- Work management-Layers of Grid computing. Globus GT3 Toolkit: GT3 Software Architecture model- Resource allocation- Resource management and Data management services.

UNIT IV



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Cloud Architecture and Model: Technologies for Network-Based System – System Models for Distributed and Cloud Computing. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand – Security in cloud.

UNIT V

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

REFERENCES:

1. Joshy Joseph & Craig Fellenstein (2009) , *Grid Computing*, IBM Press, Pearson Education, Indian Reprint.
2. Ian Foster & Carl Kesselman(2004), *The Grid 2: Blueprint for a New Computing Infrastructure*(2nd ed), Morgan Kaufmann Publishers.

Subject Code: MCA20GE04	Subject Name: DATA ANALYSIS AND BUSINESS INTELLIGENCE						T / L/ ETL	L	T	P	C	
	Prerequisite:NIL						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understand the design concept of a Data warehouse➤ To design the Multidimensional data model➤ To understand the Data analytics concepts➤ To understand and apply statistical methods to economic data, problems and trends➤ To Tools for BI like Cognos, Business Object, Intelligent Miner etc												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Analyze the Characteristics of Data Warehouses											
CO2	Determine Multidimensional data model											
CO3	Understand the Data Analytics like Standard Deviation, Correlation, Regression and Testing											
CO4	Capable of understanding the Data Preprocessing , Visualization and Variable reduction											
CO5	Business Intelligence tools Overview											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	M	H	M	H	M
CO2	H	H	H	H	H	H	H	M	H	M	H	M
CO3	H	H	H	H	H	H	H	M	H	M	H	H
CO4	H	H	H	M	H	M	H	M	M	M	H	L



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO5	H	H	H	H	H	H	M	M	M	L	L	
COs / PSOs	PEO1		PEO2		PEO3		PEO4		PEO5			
CO1	H		H		H		M		H			
CO2	H		H		H		M		H			
CO3	H		H		H		M		H			
CO4	M		H		H		H		H			
CO5	H		H		H		M		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE04

DATA ANALYSIS AND BUSINESS INTELLIGENCE

3 1 0 4

OBJECTIVES:

- To understand the Data Analytic concepts, tools and analysis of data using the tools.

UNIT I

Data warehousing: Introduction – Definition – Multidimensional data model – OLAP operations – Warehouse schema – Data warehousing architecture – Warehouse server – Meta data – OLAP Engine – Data warehouse backend process – Cloud data warehousing - Other features

UNIT II

Data analytics: Statistical data analysis – Fact based decision making using statistical data analysis – Descriptive model – Predictive model - Analyze and predict results based on historical patterns-Apply statistical methods to economic data, problems and trends

UNIT III

Statistics for Data Engineers: Mean, Median, Variance, Standard Deviation –Regression-Correlation Test: Chi square, Spearman Rank correlation, Pearson correlation coefficient – Parametric Test: period sample t-test, Two Independent t-test, One sample t-test – Non Parametric Test: The wilcoxon rank sum text and mannwhileny test, wilcoxon signed-ranked test

UNIT IV



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Business Intelligence: Introduction – Need for BI – Related Areas - Data Preprocessing – Visualization - Variable reduction, Principle components, Course of Dimensionality – Business Intelligence model - Design Business Intelligence model and conducting the analysis

UNIT V

Tools for BI: (Any one tool in depth) Tools Overview – Tools: Cognos, Business Object, Intelligent Miner, Siebel, BI Tool, Oracle Miner, SAS.

REFERENCES:

1. The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Ralph Kimball, Joe Casertra
2. Successful Business Intelligence: Secrets to Making BI a Killer App , By CindiHowson

Subject Code: MCA20GE05	Subject Name: IMAGE PROCESSING					T / L/ ET L	L	T/	P	C		
	Prerequisite: NIL					L	3	1	0	4		
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understood the Image processing.➤ To understood the image enhancement, image filtering and restoration												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Fundamental Steps in Image processing											
CO2	Getting enriched the Image Enhancement Concepts											
CO3	Understand the Image Filtering and Restoration											
CO4	Capable of understand the Image Data compression Techniques											
CO5	Computing the process of Image Segmentation											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	H	M	M	M	H
CO2	H	H	H	H	H	H	H	H	H	M	M	H
CO3	H	H	H	H	H	H	H	H	H	M	M	L
CO4	H	H	H	M	M	M	H	H	M	M	M	L



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO5	H	H	H	H	H	H	H	H	H	M	M	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE05

IMAGE PROCESSING

3 1 0 4

OBJECTIVES:

- To understand the Image processing.
- To understand the image enhancement, image filtering and restoration

UNIT I

12 Hrs

Introduction: Fundamental Steps in Image processing – Elements – Digital Image Fundamentals – Image representation – Modeling – Image enhancement – Image restoration – Image analysis – Image reconstruction from projections – Image data compression – Two-Dimensional Systems and Mathematical Preliminaries: Notation and definitions – Discrete and Fast Fourier Transform

UNIT II

12 Hrs

Image Enhancement: Point operations – Enhancement by point processing – Histogram modeling – Spatial operations – Enhancement in Frequency Domain – Transform operations – Multispectral Image Enhancement – Color Image Enhancement

UNIT III

12 Hrs

Image Filtering and Restoration: Degradation model – Diagonalization of circulant and block circulant matrices – Algebraic approach to restoration – Inverse and Wiener filtering – Finite impulse response Wiener filters – Other Fourier Transform Filters – Smoothing splines and Interpolation – Least square filters – Recursive and semirecursive filtering – Maximum entropy restoration – Bayesian methods – Coordinate transformation and Geometric correction – Blind deconvolution – Extrapolation of band-limited signals



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT IV

12 Hrs

Image Data compression: Fundamentals – Image compression models – Elements of information theory – Pixel coding – Predictive techniques – Transform coding theory – Transform coding of images – Hybrid coding and vector DPCM – Inter frame coding – Image coding in the presence of channel errors – Coding of two tone images – color and multi-spectral Image coding – Lossless and lossy compressions - standards

UNIT V

12 Hrs

Image Segmentation – Representation and Description – Recognition – Interpretation – Image analysis and Computer vision – Image reconstruction from Projections – Artificial Neural networks for color classification - Realization for real time processing – Three-dimensional Filters

Total no. of Hrs : 60

REFERENCE:

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, Second Edition, Prentice-Hall of India Private Limited, New Delhi, 1995.
2. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Addison-Wesley Publishing Company, New York, Third edition, 2008.

Subject Code: MCA20GE06	Subject Name: Soft Computing	T / L / ETL	L	T /	P	C
	Prerequisite: NIL	L	3	1	0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understanding the Soft Computing Constituents
CO2	Getting enriched the Building block hypothesis, working principle and the operators
CO3	Understand the Machine Learning using Neural Network, Adaptive Networks
CO4	Capable of performing the Operations on Fuzzy Sets and Fuzzy Relations
CO5	Computing the Fuzzy Inference Systems

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO4	H	H	H	M	M	M	H	M	M	M	M	L
CO5	H	H	H	H	H	H	H	M	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE06

SOFT COMPUTING

3 1 0 4

OBJECTIVES:

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

UNIT I INTRODUCTION TO SOFT COMPUTING

12 Hrs

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS

12 Hrs

Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III NEURAL NETWORKS

12 Hrs

Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks– Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning– Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT IV FUZZY LOGIC

12 Hrs

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning
 – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT V NEURO-FUZZY MODELING

12 Hrs

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees –
 Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

Total no. of Hrs : 60

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani(2003), *Neuro-Fuzzy and Soft Computing*, Prentice-Hall of India.
2. Kwang H.Lee(2005), *First course on Fuzzy Theory and Applications*, Springer-Verlag Berlin Heidelberg.
3. George J. Klir & Bo Yuan(1995), *Fuzzy Sets and Fuzzy Logic-Theory and Applications*, Prentice Hall.
4. James A. Freeman and David M. Skapura(2003), *Neural Networks Algorithms, Applications, and Programming Techniques*, Pearson Edn.
5. David E. Goldberg(2007), *Genetic Algorithms in Search, Optimization and Machine Learning*, Addison Wesley..
6. Mitsuo Gen & Runwei Cheng(2000), *Genetic Algorithms and Engineering Optimization*, Wiley Publishers.

Subject Code: MCA20GE07	Subject Name: SEMANTIC WEB						T / L/ ETL	L	T /	P	C	
	Prerequisite: Web Programming						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To understand the need of semantic web in web services ➤ To know the methods to discover, classify and build ontology for more reasonable results in searching ➤ To build and implement a small ontology that is semantically descriptive of chosen problem domain ➤ To implement applications that can access, use and manipulate the ontology												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Evolution of the Web											
CO2	Getting enriched the Ontologies and Taxonomies											
CO3	Understand the creation of Structured Web Documents and XML											
CO4	Knowing the Ontology Web Languages and Sub-Languages											
CO5	Capable of Development Tools for Semantic Web											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO4	H	H	H	M	M	M	H	M	M	M	M	L
CO5	H	H	H	H	H	H	H	M	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE07

SEMANTIC WEB

3 1 0 4

OBJECTIVES:

- To understand the need of semantic web in web services
- To know the methods to discover, classify and build ontology for more reasonable results in searching
- To build and implement a small ontology that is semantically descriptive of chosen problem domain
- To implement applications that can access, use and manipulate the ontology

UNIT I INTRODUCTION

12 Hrs

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies –Semantic Modeling –Potential of semantic web solutions and challenges of adoption

UNIT II ONTOLOGICAL ENGINEERING

12 Hrs

Ontologies – Taxonomies –Topic Maps – Classifying Ontologies – Terminological aspects: concepts, terms, relations between them – Complex Objects –Subclasses and Sub-properties definitions –Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building –Methods and methodologies for building ontologies – Multilingual Ontologies -Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning

UNIT III STRUCTURING AND DESCRIBING WEB RESOURCES

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying –Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing - RDFS –basic Idea – Classes –Properties- Utility Properties – RDFS Modeling for Combinations and Patterns-Transitivity

UNIT IV WEB ONTOLOGY LANGUAGE

12 Hrs

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions –Advanced Class Description – Equivalence – Owl Logic.

UNIT V SEMANTIC WEB TOOLS AND APPLICATIONS

12 Hrs

Development Tools for Semantic Web – Jena Framework – SPARQL –Querying semantic web -Semantic Wikis - Semantic Web Services – Modeling and aggregating social network data -Ontological representation of social relationships, Aggregating and reasoning with social network data

Total no. of Hrs : 60

REFERENCES:

1. Liyang Yu(2011), *A Developer's Guide to the Semantic Web*(1st ed.), Springer.
2. John Hebel, Matthew Fisher, Ryan Blace & Andrew Perez-Lopez(2009), *Semantic Web Programming*(1st ed.), Wiley.
3. Grigoris Antoniou & Frank van Harmelen(2008), *A Semantic Web Primer*(2nd ed.), MIT Press.
4. Dean Allemang & James Hendler(2011), *Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL*(2nd ed.), Morgan Kaufmann.

Subject Code: MCA20GE08	Subject Name: SERVICE ORIENTED ARCHITECTURE AND WEB SERVICES						T / L/ ETL	L	T	P	C	
	Prerequisite: NIL						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<ul style="list-style-type: none">➤ To provide fundamental concepts of Service Oriented Architecture..➤ To gain knowledge about SOAP, UDDI and XML to create web services.➤ To know about the Cloud Computing architecture and services.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Roots of Service Oriented Architecture and Characteristics of SOA											
CO2	Getting enriched the knowledge in Creating Well-formed XML											
CO3	Understand the creation of Structured Web Documents and XML											
CO4	Knowing the Overview Of SOAP, WSDL and HTTP											
CO5	Capable of designing Cloud computing platform											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	M	M	M	H	M	M	M	M	L
CO5	H	H	H	H	H	H	H	M	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE08 SERVICE ORIENTED ARCHITECTURE AND WEB SERVICES

3 1 0 4

OBJECTIVES:

- To provide fundamental concepts of Service Oriented Architecture..
- To gain knowledge about SOAP, UDDI and XML to create web services.
- To know about the Cloud Computing architecture and services.

UNIT I SOABASICS

12 Hrs

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate -Principles of service orientation – Service Layers.

UNIT II XML AND WEB SERVICES

12 Hrs

XML structure – Elements – Creating Well-formed XML - Name Spaces – Schema Elements, Types, Attributes – XSL Transformations – Parser –Web Services Overview – Architecture.

UNIT III WSDL, SOAP and UDDI

12 Hrs

WSDL - Overview Of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure –Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments – UDDI.

UNIT IV SOA in J2EE and .NET

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

SOA platform basics – SOA support in J2EE – Java API for XML-based web services(JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries(JAXR) - Java API for XML based RPC (JAX-RPC) – JAX-RS SOA support in .NET – ASP.NET web services.

UNIT V CLOUD COMPUTING

12 Hrs

Vision of Cloud computing – Cloud Definition – Characteristics and Benefits – Virtualization – Cloud computing Architecture – Cloud Reference Model, Types of Clouds – Cloud Platforms in Industry.

Total no. of Hrs : 60

REFERENCES:

1. Thomas Erl(2006), *Service-Oriented Architecture: Concepts, Technology, and Design*, Pearson Education.
2. Heather Williamson(2015), *XML, The Complete Reference*, McGraw Hill Education.
3. Frank. P. Coyle(2002), *XML, Web Services And The Data Revolution*, Pearson Education.
4. Sandeep Chatterjee & James Webber(2005), *Developing Enterprise Web Services. An Architect's Guide*, Pearson Education.
5. Newcomer & Lomow(2005), *Understanding SOA with Web Services*, Pearson Education.
6. Dan woods & Thomas Mattern(2006), *Enterprise SOA designing IT for Business Innovation*(1st ed.), O'REILLY.
7. Rajkumar Buyya , Christian Vecchiola & ThamaraiSelvi, S(2013), *Mastering Cloud Computing*, McGraw Hill Education.

Subject Code: MCA20GE09	Subject Name: PROGRESSIVE WEB APPLICATION DEVELOPMENT						T / L/ ETL	L	T /	P	C	
	Prerequisite:NIL						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To learn the key aspects of a Progressive Web App (PWA)? ➤ To know about the components t made of. ➤ To understand How are events implemented in angular code? ➤ To Understand the Directives ➤ To gain insight onto HTTP Service.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Features of Progressive Web App											
CO2	Getting enriched the Working with the component HTML and Style Sheet											
CO3	Understand the component life cycle events											
CO4	Capable of Implementing a simple pipe for a date substitution											
CO5	Building custom services and module to integrate components											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	M	M	M	H	M	M	M	M	L
CO5	H	H	H	H	H	H	H	M	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		H		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		H		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE09 PROGRESSIVE WEB APPLICATION DEVELOPMENT

3 1 0 4

UNIT I

12 Hrs

PWA and Angular 2 –Introduction-PWA - Features of Progressive Web App (PWA) - Different PWA Platforms; What is Angular 2 - Angular 2 Architecture - Angular 2 features; Install Node.js server - Install Git hub - Install Typescript - Install Angular 2 - Install Angular CLI; Working with Angular CLI features - Creating an Angular Project - Creating component - Creating a module - Creating a service - Creating pipes - Creating directive - Creating Enumeration.

UNIT II

12 Hrs

Components : What is a Component made of? - Working with the component HTML and Style Sheet - Working with component type script code - Understanding typescript basics - Adding the component to the module; Understanding and working with flex layout - Installing the Flex Layout - Building and working with different Layouts; Install and implement Angular Material components - Adding a Material UI component to angular component - Working with Angular Material UI Elements - Working with Material icons

UNIT III

12 Hrs

Events -How are events implemented in angular code? - Understanding component life cycle events - Responding to common component UI events; Understanding the structure of the component class - Defining the properties and variables - Understanding Data binding - Defining the methods - Defining and understanding @Input - Defining and understating the @Output

UNIT IV

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Understanding Directives - Working with ngIf - Working with ngFor - Understanding Pipes - Implementing a simple pipe for a date substitution - Creating custom Pipes; Understanding Navigation in Angular 2 - How is router enabled? - Understanding the base routing? - Working with router outlet - Understanding router events; What is MVC/ Web API? - How to create an MVC application with Microsoft Visual Studio? - How to create an entity to show json output? - Creating and running the MVC Service

UNIT V

12 Hrs

Understanding HTTP Service - Understanding and Working with Dependency Injection - Calling an MVC Service with HTTP Service - Handling Json Data from MVC and binding the data; How is code reusability ensured in Angular 2? - Building custom services - Building module to integrate component - Building components into parents to facilitate interaction; How to build custom service? - How to add the service to a module? - Calling a service inside a component; Understanding web hosting? - Understanding angular build environment - How to build the production code? - Deployment of the production code to web site

Total no. of Hrs : 60

REFERENCES:

1. Jake Spurlock, „Bootstrap“, O'Reilly Media, 2013
2. Alex Pop, Learning AngularJS for .NET Developers“, Packt Publishing Ltd., 2014.

Subject Code: MCA20GE10	Subject Name: DATA VISUALIZATION						T / L/ ETL	L	T /	P	C	
	Prerequisite:NIL						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE :												
<div>➤ To understand how accurately represent voluminous complex data set in web and from other data sources</div> <div>➤ To understand the methodologies used to visualize large data sets</div>												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Context of data visualization											
CO2	Getting enriched the Fundamental Technology and Drawing with data											
CO3	Understand the D3 Setup and Deployment											
CO4	Capable of viewing Custom Data , Extracting Data and Fields Operations											
CO5	Computing the Charts – Line Chart – Pie Chart – Scatter Plot – Bubble Chart –Gantt Chart											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	M	M	M	H	M	M	M	M	L



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO5	H	H	H	H	H	H	M	L	L	L		
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
Approval												

MCA20GE10

DATA VISUALIZATION

3 1 0 4

OBJECTIVES:

- To understand how accurately represent voluminous complex data set in web and from other data sources
- To understand the methodologies used to visualize large data sets

UNIT I

12 Hrs

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools. visualizing data methods - Mapping - Time series - Connections and correlations - Scatter plot maps - Trees, Hierarchies and Recursion - Networks and Graphs, Info graphics.

UNIT II

12Hrs

INTERACTIVE DATA VISUALIZATION: Introduction to D3 - Fundamental Technology - Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geomapping – Exporting- Data to create Visualization with SVG - SVG – Styling CSS – Shapes – SVG Properties – SVG Text - Drawing – Transformations – Building Chart with SVG (Scalable Vector Graphics) - Shaping Web Pages – Selections – Attributes – Chaining Methods – Data Joins - Sizing – scales – axes – Loading – Filtering – Interactive Charts – Buttons using Data Join – Transition using Key



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT III

12 Hrs

D3-BASED REUSABLE CHART LIBRARY: Introduction to D3 – Setup and Deployment – Generate Chart – Customize Chart – How to Use APIs – Customize Style – Building Real time and Live Updating animated graphs with C3.

UNIT IV

12 Hrs

TABLEAU INTRODUCTION: Environment Setup – Navigation – File & Data Types. **DATA SOURCE:** Custom Data View – Extracting Data – Fields Operations – Editing Meta Data – Data Joining – Data Blending. Worksheets

UNIT V

12 Hrs

TABLEAU CHARTS: Bar Chart – Line Chart – Pie Chart – Scatter Plot – Bubble Chart – Gantt Chart – Histograms - Waterfall Charts. ADVANCED: Dashboard – Formatting – Forecasting – Trend Lines

Total no. of Hrs : 60

REFERENCES

1. Ben Fry, (2007) “Visualizing Data”, O’Reilly Media, Inc.,
2. Ritchie S. King - *Visual Storytelling with D3 – An Introduction to Data Visualization with D3*, Addison-Wesley, ISBN 10: 0321933176
3. Elijah Meeks (2017), *Data visualization with JavaScript*(2nd ed.), Manning Publications, ISBN: 9781617294488

Subject Code: MCA20GE11	Subject Name: EMBEDDED SYSTEMS						T / L/ ETL	L	T /	P	C	
	Prerequisite:						L	3	1	0	4	
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits												
T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : <ul style="list-style-type: none">➤ To understand the architecture of embedded processors, microcontrollers, and peripheral devices.➤ To understand the challenges in developing operating systems for embedded systems.➤ To learn about programming these systems in high-level languages such as C.												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	Understanding the Embedded system design process											
CO2	Getting enriched the Memory And Input / Output Management											
CO3	Understand the Processes And Operating Systems											
CO4	Knowing the Programming embedded systems in C											
CO5	Capable of Embedded System Development											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO1	H	H	H	H	M	H	H	M	M	M	M	L
CO2	H	H	H	H	H	M	H	H	H	M	M	L
CO3	H	H	H	H	H	H	M	M	H	M	M	L
CO4	H	H	H	M	M	M	H	M	M	M	M	L
CO5	H	H	H	H	H	H	H	M	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		H		M		M			
CO2	H		H		H		M		M			
CO3	H		H		H		M		M			
CO4	M		H		H		H		M			
CO5	H		H		H		M		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic	En gin	Hu ma nit	Pr og	Pr og	Op en	Pr act	Int er	So ft sk			
						✓						
Approval												

MCA20GE11

EMBEDDED SYSTEMS

3 1 0 4

OBJECTIVES:

- To understand the architecture of embedded processors, microcontrollers, and peripheral devices.
- To understand the challenges in developing operating systems for embedded systems.
- To learn about programming these systems in high-level languages such as C.

UNIT I

12 Hrs

Embedded Computing: Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller- ARM processor – Architecture - Instruction sets and programming.

UNIT II

12 Hrs

Memory And Input / Output Management : Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupt handling.

UNIT III

12 Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Processes And Operating Systems: Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues.

UNIT IV

12 Hrs

Embedded C Programming : Programming embedded systems in C – C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

UNIT II

12 Hrs

Embedded System Development :Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Introduction to Internet of Things - Design issues – Design methodologies – Case studies using IoT– Complete design of example systems.

Total no. of Hrs : 60

REFERENCES:

1. Andrew N Sloss, D. Symes, C. Wright(2006), “ARM System Developers Guide”, Morgan Kauffman/ Elsevier (unit 4).
2. Arshdeep Bahga, Vijay Madisetti(2015), “Internet of Things – A hands-on approach”, Universities Press.
5. Michael J. Pont(2007), “Embedded C”, Pearson Education.
6. Steve Heath(2005), “Embedded System Design”, Elsevier.
7. Wayne Wolf(2006), “Computers as Components:Principles of Embedded Computer System Design”, Elsevier.

Subject Code: MCA20GE12	Subject Name : Big Data Analytics	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Statistical Techniques	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE : ➤ To understand the basic concepts of Big data and Hadoop Environment						
COURSE OUTCOMES (COs) : (3- 5)						
CO1	To explore the fundamental concepts of big data analytics					
CO2	To learn to analyze the big data using intelligent techniques					
CO3	To understand the various search methods and visualization techniques					
CO4	To understand the applications using Map Reduce Concepts					



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H	H	L	H	L	L	L	L	L	M
CO2	H	H	M	H	H	H	L	L	L	L	L	L
CO3	H	H	H	H	M	H	L	L	L	L	L	L
CO4	M	H	M	H	L	H	L	L	L	L	L	L
COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5							
CO1	H	H	H	L	H							
CO2	M	H	H	L	H							
CO3	M	H	H	L	H							
CO4	M	M	H	L	H							
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												

MCA20GE12

BIG DATA ANALYTICS

3 1 0 4

OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques
- To understand the various search methods and visualization techniques.
- To understand the applications using Map Reduce Concepts

UNIT I

12 Hrs

Introduction To Big Data : Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference

UNIT II

12 Hrs

Mining Data Streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments –



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP)Applications – Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III

12 Hrs

Hadoop Environment: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoop file systems-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT IV

12 Hrs

Data Analysis Systems And Visualization : Link Analysis – Page Rank - Efficient Computation of Page Rank- Topic-Sensitive Page Rank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content Based Recommendations - Collaborative Filtering- Dimensionality Reduction

UNIT V

12 Hrs

Frameworks And Applications: IBM for Big Data –Framework - Hive – Shading – NoSQL Databases –Mango DB-CassandraHbase – Impala – Analyzing big data with twitter – Big data for Ecommerce – Big data for blogs.

Total no. of Hrs : 60

REFERENCES:

1. AnandRajaraman & Jeffrey David Ullman(2014), “*Mining of Massive Datasets*”, Cambridge University Press.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapi & Paul Zikopoulos(2012), “*Understanding BigData: Analytics for Enterprise Class Hadoop and Streaming Data*”, McGrawHill Publishing.
3. Franks(2012), “*Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streamswith Advanced Analytics*”, John Wiley & sons.

Subject Code:	Subject Name :	T / L/ ETL	L	T / S.Lr	P/ R	C
MCA20GE13	Software Project Management Prerequisite:NIL	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE : ➤ To apply project management concepts and techniques to an IT project.						
COURSE OUTCOMES (COs) : (3- 5)						
CO1	To know of how to do project planning for the software process					
CO2	To learn the cost estimation techniques during the analysis of the project.					



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO3		To understand the quality concepts for ensuring the functionality of the software										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	H	H	L	L	L	L	L	L	L	L
CO2	M	H	H	H	L	M	L	L	L	L	L	L
CO3	M	H	H	H	L	M	L	L	L	L	M	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H		M		L		M			
CO2	M		H		H		L		H			
CO3	H		H		H		L		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												

MCA20GE13

SOFTWARE PROJECT MANAGEMNET

3 1 0 4

OBJECTIVES:

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

UNIT I

12Hrs

Software Project Management Concepts: Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and allocate resources- TQM, Six Sigma



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT II

12 Hrs

Software Evaluation And Costing: Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting - cost-benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach - Choosing technologies, choice of process models, structured methods.

UNIT III

12 Hrs

Software Estimation Techniques: Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques - expert Judgment, Estimating by analogy. Activity Planning - Project schedules, projects and activities - sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT IV

12 Hrs

Risk Management: Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT I

12 Hrs

Globalization Issues In Project Management: Globalization issues in project management: Evolution of globalization-challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management

Total no. of Hrs : 60

REFERENCES:

1. Bob Hughes & Mike Cotterell(2012), *Software Project Management* (5th ed.), Tata McGraw- Hill Publications.
2. Futrell(2008), *Quality Software Project Management*, Pearson Education India.
3. Gobalswamy Ramesh(2003), *Managing Global Software Projects*, Tata McGraw Hill Publishing Company.
4. Richard H.Thayer “Software Engineering Project Management”, IEEE Computer Society

Subject Code:	Subject Name :	T / L/ ETL	L	T / S.Lr	P/ R	C
MCA20GE14	Game Programming Prerequisite:NIL	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE : Manage the production of a computer game and develop gaming frameworks and platforms						
COURSE OUTCOMES (COs) : (3- 5)						
CO1	To understand of game design and development					



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO2	To understand the processes, mechanics, issues in game design, game engine development											
CO3	To understand modeling, techniques, handling situations, and logic.											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	H	M	M	H	H	L	L	H	H	M
CO2	M	L	H	H	M	H	M	L	L	H	H	M
CO3	L	L	H	M	M	H	M	L	L	H	H	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		M		H		M		L			
CO2	H		H		M		M		L			
CO3	H		M		M		M		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						
Approval												

MCA20GE14

GAME PROGRAMMING

3 1 0 4

OBJECTIVES:

- To understand of game design and development
- To understand the processes, mechanics, issues in game design, game engine development
- To understand modeling, techniques, handling situations, and logic.

UNIT I

12Hrs



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

3d Graphics For Game Programming - Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation

UNIT II

12Hrs

Game Design Principles - Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

UNIT III

12Hrs

Gaming Engine Design - Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

UNIT IV

12Hrs

Gaming Platforms And Frameworks - Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity

UNIT V

12Hrs

Game Development - Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

Total no.of.Hrs :60

REFERENCES:

1. David H. Eberly(2006), *3D Game Engine Design A Practical Approach to Real-Time Computer Graphics*(2nd ed.), Morgan Kaufmann.
2. JungHyunHan(2011), *3D Graphics for Game Programming*(1st ed.).
3. Mike McShaffrly(2009), *Game Coding Complete*(3rd), Charles River Media.
4. Jonathan S. Harbour(2009), *Beginning Game Programming*(3rd ed.), Course Technology PTR.
5. Ernest Adams & Andrew Rollings(2006), *Fundamentals of Game Design*(1st ed.), Prentice Hall.
6. Roger E. Pedersen(2009), *Game Design Foundations*(2nd ed.), Jones & Bartlett Learning.

Subject Code:	Subject Name : DISTRIBUTED SYSTEMS	T / L/ ETL	L	T / S.Lr	P/ R	C
MCA20GE15	Prerequisite:NIL	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE : Knowledge of distributed systems techniques and methodologies.						
COURSE OUTCOMES (COs) : (3- 5)						
CO1	To expose students to both the abstraction and details of file systems.					
CO2	To introduce concepts related to distributed computing systems					



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

CO3		To focus on performance and flexibility issues related to systems										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	L	M	L	L	L	L	L	L
CO2	H	M	M	H	L	H	L	L	L	L	L	L
CO3	H	H	L	H	M	M	L	L	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		M		H		L		M			
CO2	H		H		M		L		H			
CO3	H		M		M		L		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												

MCA20GE15

DISTRIBUTED SYSTEMS

3 1 0 4

OBJECTIVES:

- To expose students to both the abstraction and details of file systems.
- To introduce concepts related to distributed computing systems.
- To focus on performance and flexibility issues related to systems



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT I

12Hrs

Introduction-Definition of a Distributed system-Goals- Types of Distributed system –Architectures-Architectural Styles-System Architectures –Architecture Versus middleware-Self management in Distributed systems.

UNIT II

12Hrs

Processes- Threads- Virtualization- Clients- Servers- Code migration-Communication-Fundamentals- Remote Procedure Call- Communication-Message – Stream – Multicast- Naming-Names, Identifiers and Addresses- Naming - Flat - Structured - Attributed based.

UNIT III

12Hrs

Synchronization-Clock synchronization-Local clocks-Mutual Exclusion-Global positioning of nodes-Election Algorithm-Consistency and Replication-Data-Centric consistency models- Replica management-Consistency protocols.

UNIT IV

12Hrs

Fault Tolerance -Process Resilience-Reliable Client- Server Communication- Distributed Commit- Recovery-Security-Secure Channels- Access control- Security Management.

UNIT V

12Hrs Distributed

Systems-Distributed Object-based Systems- File Systems –Web based Systems –Coordination- based Systems.

Total no. of Hrs : 60

REFERENCES:

1. Andrew S. Tanenbaum & Maarten Van Steen(2007), *Distributed System-Principles and Paradigms*(2nd Ed), Pearson Education.
2. George Coulouris, Jean Dollimore& Tim Kindberg(2002), *Distributed Systems Concepts and Design*, (3rded), Pearson Education.
3. HagitAttiya& Jennifer Welch(2004),*Distributed Computing: Fundamentals, Simulations and Advanced Topics*, Wiley.
4. MukeshSinghal(1994), *Advanced Concepts In Operating Systems*”, McGrawHill.
5. Tanenbaum & Van Steen,M(2004),*Distributed Systems*, Pearson Education.
6. Liu,M,L(2004),*Distributed Computing Principles and Applications*, Pearson Addison Wesley.

Subject Code:	Subject Name : KNOWLEDGE MANAGEMENT	T / L / ETL	L	T / S.Lr	P / R	C
MCA20GE16	Prerequisite:NIL	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE: To provide the basics of the emerging area of Knowledge Management to students. .						



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

COURSE OUTCOMES (COs) : (3- 5)

COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand knowledge management and its life cycle											
CO2	To know the capturing knowledge and fuzzy reasoning											
CO3	To learn about the various modes of knowledge conversion											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	M	H	L	M	L	L	L	L	L	L
CO2	H	M	H	H	L	H	L	L	L	L	L	L
CO3	H	H	M	H	M	M	M	L	L	L	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		M		M		L		M			
CO2	M		H		H		L		H			
CO3	H		M		H		L		H			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												

MCA20GE16

KNOWLEDGE MANAGEMENT

3 1 0 4

OBJECTIVES:

- To understand knowledge management and its life cycle
- To know the capturing knowledge and fuzzy reasoning
- To learn about the various modes of knowledge conversion



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

UNIT I

12Hrs

Knowledge management - KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge - intelligence – Experience – Common Sense – Cognition and KM – Types Of Knowledge – Expert Knowledge – Human thinking and learning

UNIT II

12Hrs

Knowledge management system life cycle - Challenges in Building KM Systems – Conventional Vs KM System Life Cycle (KMSLS) - Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation- Knowledge Architecture

UNIT III

12Hrs

Capturing knowledge - Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping –Blackboarding

UNIT IV

12Hrs

Knowledge codification - Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – KM , System deployment issues – user training – post implementation

UNIT V

12Hrs

Knowledge transfer and sharing - Transfer Methods – Role of the Internet – Knowledge Transfer in e-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing , Knowledge workers

Total no. of Hrs : 60

REFERENCES:

1. Elias.M. Award & Hassan M. Ghaziri (2000) ,*Knowledge Management*, Pearson Education.
2. Holsapple,C,W (2003) *Handbooks on Knowledge Management*, International Handbooks on Information Systems, Vol 1 and 2.

Subject Code: MCA20GE17	Subject Name : M -COMMERCE	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: E-COMMERCE	T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						
OBJECTIVE : ➤ To describe systems and technology in m-commerce and examine some of the applications in m-commerce						



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

COURSE OUTCOMES (COs) : (3- 5)

CO1	To understand the E – commerce strategies and value chains
CO2	To understand the M-commerce services
CO3	To understand M – commerce infrastructure and applications
CO4	To know the availability of latest technology and applications of M- commerce in various domains.
CO5	To apply mobile commerce in business-to-business application.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	H	M	H	L	L	L	M	M	M	L
CO2	L	L	M	M	M	H	H	L	L	M	M	L
CO3	L	L	H	H	M	H	H	L	L	H	H	L
CO4	M	L	H	M	M	H	H	L	L	M	M	L
CO5	L	L	M	M	L	H	H	L	L	M	H	L
COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5							
CO1	H	H	H	M	M							
CO2	M	M	H	M	M							
CO3	H	M	H	M	L							
CO4	M	M	H	M	L							
CO5	L	M	H	H	H							

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						
Approval												

MCA20GE17

M -COMMERCE

3 1 0 4

OBJECTIVES:

- To understand the E – commerce strategies and value chains
- To understand the M-commerce services
- To understand M – commerce infrastructure and applications.
- To know the availability of latest technology and applications of M- commerce in various domains.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

- To apply mobile commerce in business-to-business application.

UNIT I

12Hrs

Electronic Commerce - Introduction -The e-commerce environment - The e-commerce marketplace -Focus on portals, Location of trading in the marketplace - Commercial arrangement for transactions - Focus on auctions- Business models for e-commerce - Revenue models - Focus on internet start-up companies – the dot-com - E-commerce versus E business.

UNIT II

12Hrs

Mobile Commerce - Introduction – Infrastructure Of M– Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non-Internet Applications In M– Commerce –Wireless/Wired Commerce Comparisons

UNIT III

12 Hrs

Mobile Commerce Technology - A Framework For The Study Of Mobile Commerce – NTT Docomo's I– Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services –Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks

UNIT IV

12Hrs

Mobile Commerce: Theory And Applications - The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services –Mobile Portal – Factors Influencing The Adoption Of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – M–Commerce In The Automotive Industry– Location– Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building A Brand – M– Commerce Business Models

UNIT V

12Hrs

Business– To– Business Mobile E-Commerce - Enterprise Enablement – Email And Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking And Maintenance/Management – Remote IT Support –Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

Total no. of Hrs :60

REFERENCES:

1. Dave Chaffey(2009), *E-Business and E-Commerce Management*(3rd ed.), Pearson Education.
2. Brian E. Mennecke, Troy J. Strader(2003), *Mobile Commerce: Technology, Theory and Applications*, Idea Group Inc., IIR press.
3. Louis,P,J(2001), *M-Commerce Crash Course*, McGraw- Hill Companies.
4. Paul May(2001), *Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business*, Cambridge University Press.
5. Michael P. Papazoglou&Peter M.A. Ribbers(2009), *E-business organizational and Technical foundation* ,Wiley India.
6. Dr.Pandey& Saurabh Shukla(2011), *E-commerce and Mobile commerce Technologies* , Sultan Chand.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GE18	Subject Name : HEALTHCARE INFORMATION SYSTEMS							T / L / ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ To describe general functions, purposes and benefits of health information systems												
COURSE OUTCOMES (COs) : (3- 5)												
CO1		To understand the basic concepts of health care system.										
CO2		To know about creating and maintaining health care information systems										
CO3		To ensure access of clinical information system on the fly										
CO4		To understand IT governance and assessment of health care information system										
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	H	L	H	M	L	L	M	L	L
CO2	M	L	L	H	H	H	M	L	L	M	L	L
CO3	M	M	L	H	M	H	M	L	L	M	L	L
CO4	M	L	M	H	L	H	H	L	L	M	L	L
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	M		M		H		H		H			
CO2	M		H		M		H		M			
CO3	M		M		H		H		M			
CO4	M		L		H		H		M			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
						✓						
Approval												

MCA20GE18

HEALTHCARE INFORMATION SYSTEMS

3 1 0 4

OBJECTIVES:



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

- To understand the basic concepts of health care system.
- To know about creating and maintaining health care information systems
- To ensure access of clinical information system on the fly
- To understand IT governance and assessment of health care information system

UNIT I

12Hrs

Introduction- Introduction to health care information – Health care data quality – Health care information regulations, laws and standards.

UNIT II

12Hrs

Health Care Information Systems - History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support.

UNIT III

12Hrs

Information Technology -Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.

UNIT IV

12Hrs

Management of it Challenges - Organizing information technology services – IT alignment and strategic planning – IT governance and management.

UNIT V IT

12Hrs

Initiatives - Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study

Total no. of Hrs :60

REFERENCES:

1. Karen A Wager, Frances Wickham Lee & John P Glaser(2009), *Managing Health Care Information Systems: A Practical Approach for Health Care Executives*(2nd ed.), JohnWiley.
2. Marion J. Ball, Charlotte Weaver & Joan Kiel(2010) ,*Healthcare Information Management Systems: Cases, Strategies, and Solutions*(3rd ed.), Springer.
3. Rudi Van De Velde and Patrice Degoulet(2005), *Clinical Information Systems: A Component based Approach*”, Springer.
4. Kevin Beaver(2002), *Healthcare Information Systems*(2nd ed.),Best Practices, CRC Press.
5. Marion J. Ball(1995), *Healthcare Information Management Systems: A Practical Guide*, Springer-VerlagGmbH.

Subject Code:	Subject Name : COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS	T / L/ ETL	L	T / S.Lr	P/ R	C
MCA20GE19	Prerequisite:NIL	T	3	1/0	0/0	4



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
 T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology- progress- issues- and trends.
- A thorough introduction to computer graphics techniques- focusing on 3D modeling- image synthesis- and rendering.

COURSE OUTCOMES (COs) : (3- 5)

CO1	To understand the Basic concepts of computer graphics
CO2	To understand the 2D Transformations
CO3	To understand the 3D Transformations
CO4	To understand the Basic concepts of multimedia
CO5	To understand the applications of multimedia

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	H	M	L	L	L	L	M	L	L	M
CO2	M	L	H	M	L	L	L	L	M	L	L	M
CO3	M	L	H	M	L	L	L	L	M	L	L	M
CO4	M	L	H	M	L	L	L	L	M	L	L	M
CO5	M	L	H	M	L	L	L	L	M	L	L	M
COs / PSO	PSO1	PSO2	PSO3	PSO4	PSO5							
CO1	M	M	L	L	L							
CO2	M	M	L	L	L							
CO3	M	M	L	L	L							
CO4	M	M	L	L	L							
CO5	M	M	L	L	L							

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				✓								
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

OBJECTIVES:

- Designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.

UNIT I

12 Hrs

Introduction -Overview of Graphics System – Bresenham's Algorithms – Line Drawing and Circle Drawing Algorithms - DDA - Line Clipping - Text Clipping

UNIT II

12 Hrs

2D Transformations-Two dimensional transformations – Translation, Scaling and Rotations - Interactive Input methods - Polygons - Splines – Bezier Curves - Window view port mapping transformation

UNIT III

12 Hrs

3D Transformations-3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods - Visualization and polygon rendering – RGB Color models - animation – Key Frame systems - General animation functions - morphing. Histograms

UNIT IV

12 Hrs

Overview of multimedia -Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

UNIT V

12 Hrs

Multimedia systems and applications -Multimedia communication systems – Data base systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – video on demand

Total no. of Hrs : 60

REFERENCES:

1. Hearn D and Baker M.P(2004) *Computer graphics – C Version*(2nd Ed), Pearson Education.
2. Ralf Steinmetz & Klara Steinmetz (2004) *Multimedia Computing, Communications and Applications*, Pearson Education.
3. Siamon J. Gibbs & Dionysios C. Tsichritzis (1995) *Multimedia programming*, Addison Wesley.
4. John Villamil, Casanova & Leony Fernandez, Eliar (1998), *Multimedia Graphics*, PHI.



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

Subject Code: MCA20GE20	Subject Name : DATA MINING AND WAREHOUSING							T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite:NIL							T	3	1/0	0/0	4
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab												
OBJECTIVE : ➤ Will learn the techniques for Developing Proper Data Warehouses ➤ Designed to know about the recent techniques in data mining ➤ Understand and implement classical models and algorithms in data warehouses and data mining ➤ Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering												
COURSE OUTCOMES (COs) : (3- 5)												
CO1	To understand the Basic concepts of data warehousing											
CO2	To understand the data mining functionalities											
CO3	To understand the classification and prediction											
CO4	To understand the cluster analysis											
CO5	To understand the concept of mining object											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	H	M	L	L	M	L	M	L	M	M
CO2	L	L	H	M	L	L	M	L	M	L	M	M
CO3	L	L	H	M	L	L	M	L	M	L	M	M
CO4	L	L	H	M	L	L	M	L	M	L	M	M
CO5	L	L	H	M	L	L	M	L	M	L	M	M
COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	L		M		M		M		L			
CO2	L		M		M		M		L			
CO3	L		M		M		M		L			
CO4	L		M		M		M		L			
CO5	L		M		M		M		L			
H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low												
Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					✓							
Approval												



DEPARTMENT OF MCA – COMPUTER APPLICATION F/T

MCA20GE20 DATA MINING AND WAREHOUSING 3 1 0 4

OBJECTIVES:

- Will learn the techniques for Developing Proper Data Warehouses
- Designed to know about the recent techniques in data mining

UNIT I

12 Hrs

Introduction to Data Warehousing – Defining features , architecture of a Data Warehousing – Data Warehousing Schema – Dimensional modeling – ETL Process – Testing, Growth and maintenance - OLAP in Data Warehousing.

UNIT II

12 Hrs

Data Mining - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Mining Frequent patterns , Associations & correlations - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint Based Association Mining.

UNIT III

12 Hrs

Classification and Prediction - Issues Regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines - Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor.

UNIT IV

12 Hrs

Cluster Analysis - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods .

UNIT V

12 Hrs

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web

Total no. of Hrs : 60

REFERENCES:

1. Jiawei Han & Micheline Kamber(2008), *Data Mining Concepts and Techniques* (2nd ed) , Elsevier, Reprint.
2. Alex Berson & Stephen J. Smith(2007) , *Data Warehousing, Data Mining & OLAP*, Tata McGraw – Hill Edition.
3. Soman,K,P, ShyamDiwakar&Ajay,V(2006),*Insight into Data mining Theory and Practice*, Easter Economy Edition, Prentice Hall of India.
4. Gupta,G,K(2006),*Introduction to Data Mining with Case Studies*”, Easter Economy Edition, Prentice Hall of India.
5. Pang-Ning Tan, Michael Steinbach & Vipin Kumar(2007), *Introduction to Data Mining*, Pearson Education.