ESTD. 1939

KARNATAK LAW SOCIETY'S
GOGTE INSTITUTE OF TECHNOLOGY
"JNANA GANGA" UDYAMBAG, BELAGAVI-590008,
KARNATAKA, INDIA.
Approved by AICTE & UGC
Permanently Affiliated and Autonomous Institution Under
Visvesvaraya Technological University, Belagavi
www.git.edu

ESTD. 1979

2020-21 Scheme

Department: MCA

Programme: MCA

1rd to 4th Semester Scheme of Teaching and Examination

1st and 2nd Semester Syllabus

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INSTITUTION VISION

Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity and entrepreneurial skills.

MISSION

To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

QUALITY POLICY

- Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment.
- Fostering cultural, ethical, moral and social values in the human resources of the institution.
- Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

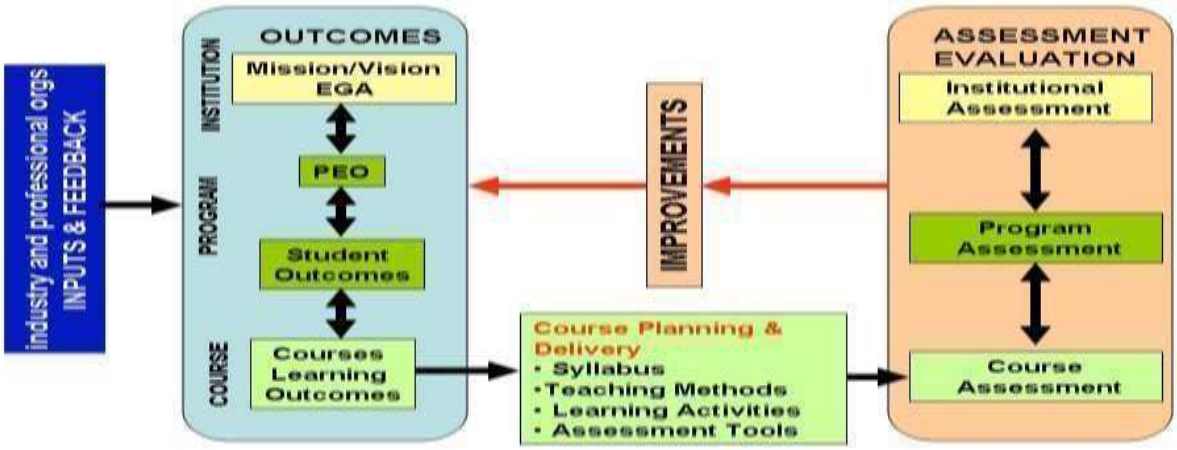
DEPARTMENT VISION

The department of Master of Computer Applications shall strive to stand out as par excellence in generating and grooming, technically competent and skilled intellectual professionals to meet the challenges of the modern computing industry.

MISSION

To train the graduates to become IT professionals having strong fundamental knowledge in the field of computer application with ethical values to meet increasing global challenges of ever evolving technologies.

OUTCOME BASED EDUCATION (OBE)



PROGRAM OUTCOMES (POs) :	
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.
2.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.
3.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.
4.	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.
5	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.
6	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.
7	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.
8	Postgraduates will be able to communicate effectively in both verbal and written form.
9.	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.
10.	Postgraduates will develop confidence for self-education and ability for life-long learning.
11.	Postgraduates can participate and succeed in competitive examinations.

12.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Real Life Problem Solving: Postgraduates of the programme will develop solutions to the real world problems by developing computer applications using the knowledge of mathematics, computer science and engineering in the diverse field of Information Technology.

PEO2: High-Quality Computer Professionals: The postgraduates shall practice and grow as computer professionals by conducting research, design, develop, test and maintain projects in varied fields of computer science and engineering using the state-of-the-art tools and technologies.

PEO3: Leadership Skills: The postgraduates will exhibit their leadership skills with ethics, integrity, competency and social responsibility.

PEO4: Lifelong Learning: The postgraduates shall always stand out of the crowd by enhancing their abilities in their profession through lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.

PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

PROGRAM SPECIFIC CRITERIA (PSCs):

PSC 1: Apply the knowledge of mathematics, computing and management through critical thinking in addressing the real time problems.

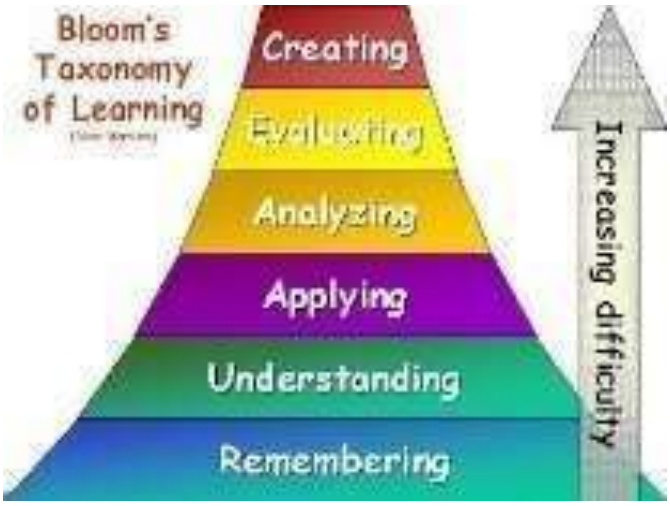
PSC 2: To design, analyze, model and realize physical systems, components or processes using modern software tools and technologies.

PSC 3: Prepare students to work professionally in multidisciplinary environments.

BLOOM'STAXONOMYOFLEARNINGOBJECTIVES

Bloom's Taxonomy in its various forms represents the process of learning. It was developed in 1956 by Benjamin Bloom and modified during the 1990's by a new group of cognitive psychologists, led by Lorin Anderson (a former student of Bloom's) to make it relevant to the 21stcentury. The **revised taxonomy** given below emphasizes what a learner "Can Do".

Lower order thinking skills(LOTS)		
L1	Remembering	Retrieve relevant knowledge from memory.
L2	Understanding	Construct meaning from instructional material including oral, written and graphic communication.
L3	Applying	Carry out or use a procedure in a given situation – using learned knowledge.
Higher order thinking skills(HOTS)		
L4	Analyzing	Break down knowledge into its components and determine the relationships of the components to one another and then how they relate to an overall structure or task.
L5	Evaluating	Make judgments based on criteria and standards, using previously learned knowledge.
L6	Creating	Combining or reorganizing elements to form a coherent or functional whole or into a new pattern, structure or idea.



Scheme of Teaching and Examination -1st to 4thSemesterMCA

As per the guidelines of UGC CBCS the courses can be classified into:

(i) Core Courses (PC): This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study. These courses will have 4 credits per course.

(ii) Foundation Courses: The Foundation Courses are of two kinds:

Compulsory Foundation: These courses are the courses based upon the content that leads to Knowledge enhancement. These courses provide opportunities to improve technological knowledge before entering industry as well as preparing students for higher degrees in technological subjects. They are mandatory for all disciplines. These courses will have 4 credits per course.

Foundation Electives: These are value based courses aimed at man making education. The course is related to **Humanities and Social Science Courses (HS).**

(iii) Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills.

(iv)Mandatory Non-Credit Courses (MNC): These courses are mandatory for students joining MCA Program and students have to successfully complete these courses before the completion of degree.

2020-21 Scheme of Teaching and Examination- 1st to 4th Semester M.C.A.

Total credits for M.C.A. Program: 100

	Semester	Credits per Sem	Total credits
1st year	1	28	56
	2	28	
2nd year	3	28	44
	4	16	
	Total	**100**	**100**

Curriculum framework:

Sl. No.	Course		Credits
1	Professional Core	PC	63
2	Professional Elective	GE	12
3	Compulsory Foundation	CF	8
4	Seminar	SC	01
5	Internship	CC	02
6	Project	CC	14
	Total		100

Credit definition:

Lecture (L):One Hour /week – 1 credit
Tutorial (T): Two hour /week – 1 credit

Practicals (P): Two hours /week – 1 credit;

I Semester														
S.No.	**Course Code**	**Course Title& Category**		**Contact Hours**	**Contact Hours/ week**	**Credit Allocation**			**Total credit**	**Marks**				
				L – T - P		**L**	**T**	**P**		**CIE**		**SEE Theory Lab**		**TOTAL**
										Theory	**Lab**			
1.	20MCA11	Python Programming	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA12	Database Management Systems	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
3.	20MCA13	Computer Networks and Communication	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
4.	20MCA14	Object Oriented Software Engineering	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
5.	20MCA15	Computational Data Analytics	CF	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
6.	20MCA16	Digital Systems & Computer Organization	PC	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
		Total			32				28	300	100	300	100	800

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course **CF:** Compulsory Foundation **I**: Integrated course **MNC:** Mandatory Non-Credit Course

***Course as per University Guidelines**

S.No.	Course Code	Course Title & Category		Contact Hours	Contact Hours/ Week	Credit Allocation			Total Credit	Marks				
				L – T – P		L	T	P		CIE		SEE		Total
										Theory	Lab	Theory	Lab	
1	20MCA17	Basics of Programming Languages (I) (Bridge Course)	CF	2 – 0 – 2	2 – 0 – 2	2	-	2	MNC	50	25	50	25	150

II Semester														
S.No.	Course Code	Course Title & Category		Contact Hours	Contact Hours /week	Credit Allocation			Total credits	Marks				
				L -T- P		L	T	P		CIE		SEE		TOTAL
										Theory	Lab	Theory	Lab	
1.	20MCA21	Data Structures	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA22	Programming using Java& J2EE	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
3.	20MCA23	Web Design and Development	PC	4 – 0 –2	6	4	0	1	5	50	25	50	25	150
4.	20MCA24	Operating Systems	CF	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
5.	20MCA25	Research Methodology & Intellectual Property Right	PC	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
6.	20MCA26x	Elective – 1	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
7.	20MCA27x	Elective – 2	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100

8.	20MCA28	Professional Communication & Ethics	CF	2 – 0 – 0	2	-	-	-	MNC	50	N/A	N/A	N/A	50
9.	20MCA29	Employability Skill	CF	3 – 0 – 0	3	-	-	-	MNC	50	N/A	N/A	N/A	50
		Total			36				28	450	75	350	75	950

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course **CF:** Compulsory Foundation **GE:** Generic Elective **I**: Integrated course

Elective Groups

Note: Students are advised to select any one subject from the following elective groups for Elective-1 and Elective-2 respectively.

Elective Group-1 Elective Group-2

Sl.No.	Course Code	Course Title
1	20MCA261	Cyber Security and Cyber Law
2	20MCA262	Management and Entrepreneurship for IT Industry
3	20MCA263	Internet of Things *
4	20MCA264	Advanced Computer Networks
5	20MCA265	Software Testing

Sl.No.	Course Code	Course Title
1	20MCA271	Digital Marketing
2	20MCA272	Software Project Management
3	20MCA273	Information Network Security
4	20MCA274	Distributed Systems
5	20MCA275	Advanced Python

NOTE: The courses with the '*' mark indicate that the courses will be project based learning. For these courses the Semester End Examination will be a project.

Certification Course:

- One certification is compulsory and need to be completed before start of 4th semester.
- Choose certifications, which have industrial acceptance.

- Students must submit the certificate with valid score of the certifications they have completed to the department during 4th semester. **This is mandatory for the award of the credits and degree.**
- These certifications are evaluated by a panel formed at college level during 4th semester for the award of 1 credit.

III Semester														
S.No.	**Course Code**	**Course Title & Category**		**Contact Hours**	**Contact Hours/ Week**	**Credit Allocation**			**Total credit**	**Marks**				
										CIE		**SEE**		**TOTAL**
				L- T- P		**L**	**T**	**P**		**Theory**	**Lab**	**Theory**	**Lab**	
1.	20MCA31	Design & Analysis of Algorithms	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA32	Big Data Paradigm	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150

3.	20MCA33	C# Programming with .NET	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
4.	20MCA34	Machine Learning	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
5.	20MCA35x	Elective – 3	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
6.	20MCA36x	Elective – 4	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
7.	20MCA37	Mini Project	PC	0–0 – 2	2	0	0	2	2	N/A	50	N/A	50	100
				Total	32				28	300	150	300	150	900

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course **GE:** Generic Elective **I:** Integrated course

NOTE: Recommended to publish paper on Mini project work in any reputed journals like IEEE/ Springer/Elsevier (Science Direct)/Scopus/DBLP indexed conference etc.

Elective Groups

Note: Students are advised to select any one subject from the following elective groups for Elective-3 and Elective-4 respectively **Elective Group- 3Elective Group- 4**

Sl. No.	Course Code	Course Title
1	20MCA351	Recommender System
2	20MCA352	'R'Programming*
3	20MCA353	Cloud Computing
4	20MCA354	Advanced Database Management Systems
5	20MCA355	Information Storage Networks

Sl. No.	Course Code	Course Title
1	20MCA361	NoSQL
2	20MCA362	Full Stack development*
3	20MCA363	Artificial Intelligence
4	20MCA364	Block Chain Technology
5	20MCA365	Information Retrieval

NOTE: The courses with the '*' mark indicate that the courses will be project based learning. For these courses the Semester End Examination will be a project

IV Semester									
Sl. No.	**Course Code**	**Course Title& Category**		**Contact Hours/ Week**	**Credits**	**Marks**			**Total Marks**
						CIE	**SEE**		
							Demonstration, Presentation and Viva	**Dissertation**	
1	20MCA41	Industry Internship	PC	N/A	2	50	--	--	50
2	20MCA42	Project Work	PC	FT	12	50	100	50	200
3	20MCA43	Technical Seminar	SC	1	1	50	-	-	50
4	20MCA44	Certification (Cambridge / Technical Certification)	PC	1	1	--	--	--	--
		Total		**--**	**16**	**150**	**100**	**50**	**300**

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1st Semester Master of Computer Applications (M.C.A.)

Syllabus (2020-21 Scheme)

Python Programming (Integrated)

Course Code	20MCA11	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)

Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = 0Hrs Practical=12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce syntax, semantics and string handling mechanism of Python Programming and impart the knowledge of Lists, Dictionaries, Tuples.
2. To provide knowledge about development of Graphical User Interface and OOP concepts as used in Python.
3. To emphasize on various applications of NumPy arrays and use of Databases.
4. To introduce various applications of Pandas and knowledge of Data Loading, Storage and File Formats used in Python.
5. To explore various packages to visualize data.

Pre-requisite:

- **N/A**

Unit – I **10 Hours**

Introduction to Python basics

Variables: Naming and Using Variables, Avoiding Name Errors When Using Variables.**Strings -** A string is a sequence, Getting the length of a string using len, Traversal through a string with a loop, String slices, Strings are immutable, Looping and counting, The in operator, String comparison, String methods, Parsing strings, Format operator. **Lists -** A list is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Deleting elements, Lists and functions,
Lists and strings, Parsing lines, Objects and values, Aliasing, List arguments. **Dictionaries -** Dictionary as a set of counters, Dictionaries and files, Looping and dictionaries, Advanced text parsing. **Tuples -** Tuples are immutable, Comparing tuples, Tuple assignment, Dictionaries and tuples, Multiple assignment with dictionaries, The most common words, Using tuples as keys in dictionaries, Sequences: strings, lists, and tuples.

List of Experiments:

1. Based on the concept of List and Dictionary Data Structure

Unit – II **10 Hours**

Functions, classes and methods

Defining a function, Passing arguments: positional arguments, keyword arguments, and default values; Return values, returning a simple value, returning a dictionary; Passing a list: Modifying a list in a function; Passing an arbitrary number of arguments: Mixing positional and arbitrary arguments, Using arbitrary keyword arguments; Storing your functions in modules: Importing an entire module, Importing specific functions, Using as to give a function an alias, Using as to give a module an alias,
Importing all functions in a module. **Classes and objects –** Programmer defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, copying. **Classes and functions –** Time, Pure Functions, Modifers, Prototyping versus Planning. **Classes and methods –** Object Oriented features, Printing objects, The init method, str method, Operator overloading, Type based dispatch, Polymorphism, Interface and Implementation. **Graphical User Interfaces -** The Tkinter Module, Basic GUI Construction, Models, Views, and Controllers, Style, A Few More Widgets, ObjectOriented GUIs.
List of Experiments:

1. User Defined Functions
2. Classes
3. Graphical User Interface

Unit – III **11 Hours**

Using databases and SQL

What is a database, Database concepts, Database Browser for SQLite, Creating a database table, Structured Query Language summary, Spidering Twitter using a database, Basic data modeling, Programming with multiple tables, Constraints in database tables, Retrieve and/or insert a record, Storing the friend relationship, Three kinds of keys, Using JOIN to retrieve data.**NumPy -**Diving into NumPY, NumPy arrays, Special numeric values, Creating NumPy arrays, Creating ndarray.Operations on NumPy Arrays, Selecting elements explicitly, Slicing arrays with colons, Advanced indexing, Expanding arrays, **Arithmetic and linear algebra with arrays -** Arithmetic with two equal-shaped arrays, Broadcasting Linear algebra, Employing array methods and functions, Array methods.

List of Experiments:

1. **Working with databases**

Unit – IV **11 Hours**

Pandas

What is pandas? What does pandas do? Exploring series and DataFrame objects, Creating series, Creating DataFrames, Adding data, Saving DataFrames, Subsetting your data, Subsetting a series, Indexing methods, Slicing a DataFrame, Arithmetic, Function Application, and Mapping with pandas Arithmetic Arithmetic with DataFrames. Deleting missing information, Filling missing information. Managing, Indexing, and Plotting Index sorting, Sorting by values, Hierarchical indexing, Slicing a series with a hierarchical index, Plotting with pandas Plotting methods.**Data Loading, Storage, and File Formats –** Readingand Writing Data in Text Format: Reading Text Files in Pieces, Writing Data to Text Format, Working with Delimited Formats, JSON Data, Web Scraping.

List of Experiments:

1. Based on the concepts of Pandas

Unit – V **10 Hours**

Plotting and Visualization

A Brief matplotlib API Primer: Figures and Subplots, Colors, Markers, Line Styles, Ticks, Labels, Legends, Annotations and Drawing on a Subplot, Saving Plots to File, matplotlib Configuration; Plotting with pandas and seaborn: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

List of Experiments:

1. Visualization using matplotlib

Case studies

- A case study on encapsulation, generalization and interface design of functions by using Python turtle module.
- Application of Python's core data structure: for Word frequency analysis, for creating histogram of words in a file, for finding the most common words.
- Interacting with Web APIs.
- A case study on essential statistics for data science using pandas, matplotlib and seabornibraries.

Text Books

1. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, CreateSpace Independent Publishing Platform, 2016.

2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist”, 2nd Edition, Green Tea Press, 2015.

3. Hands on Data Analysis with NumPy and Pandas, Curtis Miller, Packt Publishing.

4. Wes McKinney: Python for Data Analysis- Data Wrangling with Pandas, NumPy, and IPython,2nd edition, 2017.

Course Outcome (COs)

At the end of the course, the student will be able to — Bloom’s Level

1. **Make Use** of String Handling functions and **Experiment With** core data structures like Lists, Dictionaries, Tuples. L 3
2. **Utilize** the key features of Object-Oriented Programming as used in Python. L 3
3. **Build** graphical user interfaces
4. **Make use of** databases and **Analyze** NumPy arrays L 4
5. **Analyze** Pandas and **summarize** data loading, file formats, storage. L 4
6. **Assess** different plotting and visualization methods. L 5
7. **Build** applications with Python L 6

Sl. No.	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
2.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
3.	Post graduates will develop confidence for self-education and ability for lifelong learning.	**10**

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**

2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern	**3**
	computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**2**							**2**		
CO2			**3**							**1**		
CO3			**3**							**1**		
CO4			**3**							**1**		
CO5		**1**	**2**							**2**		
CO6		**1**	**3**							**2**		
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**		
CO3	**2**		
CO4	**2**		
CO5	**2**	**1**	
CO6	**2**	**1**	

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:

Components	Addition of two IA tests	Addition of two OBE	Seminar/Two Assignments / Mini Project	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.

Lab component:

Components	Conduct of the lab	Journal submission	Lab Test	Total Marks
Lab	10	10	5	25

Total CIE: 50 (T) +25(L) = 75 marks

Minimum score to be eligible to SEE for this course : 40% in each component

Not eligible in any one of the component will be considered as NOT eligible for the Course

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Database Management Systems (Integrated)

Course Code	20MCA12	**Credits**	05

Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs Practical =12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To provide the knowledge of identifying structure of database system using data models and ER models.
2 To emphasize on database design approaches with normalization.
3 To impart knowledge on designing the SQL and XML schema.
4 To explore object oriented database management systems and XML storage concepts.
5 To provide knowledge of PL/SQL, cursor and index.

Pre-requisite:

- N/A

Unit – I **10 Hours**

Basic concepts

Introduction, Database and Need for DBMS, Characteristics, Users, Views, schema, 3-tier architecture, Introduction of Parallel, Distributed Databases, Mobile databases and Cloud databases, Models (Relational model, Object Models), Advantages and disadvantages of each model. **List of Experiments: NIL**

Unit – II **10 Hours**

Data Modeling and Relational Database Design

Entities-attributes, Relationship, Attributes, relationship set, Keys, ER diagrams, Relational Database Design Using ER- to-Relational Mapping, Normalization (1 NF, 2 NF, 3 NF, BCNF), Codd's rules, Generalization, Aggregation.

List of Experiments:

1. Case Study on Databases for ER Diagram and relationship identification.
2. Integrity rules and simple queries

Unit – III **12 Hours**

SQL

SQL Data Definition and Data Types, Specifying basic constraints in SQL, Schema change statements in SQL, Basic queries in SQL, JOINs and types of JOINs, More complex SQL Queries. Insert, Delete and Update statements in SQL, Views (Virtual Tables) in SQL. **List of Experiments:**

1. Nested queries
2. Types of joins
3. Aggregate functions 4. Views

Unit – IV **10 Hours**

Specialty Databases and Applications

Obstacles using Relational Data Model & Emergence of Special Databases, Object Oriented Databases (OODBMS) Feature, Advantages of OODBMS Architecture, ODL,OQL, OODBMS Vs RDBMS, Object Relational Database, Schema, Mapping, OODBMS Vs ORDBMS, XML, Structure of XML Data, XML Document Schema, Querying and Transformation, Application Program Interfaces to XML, Storage of XML Data, XML Applications. **List of Experiments: NIL**

Unit – V **10 Hours**

PL/SQL

Introduction to PL/SQL, language fundamentals, conditional and sequential control, Iterative processing and loops. Exception handlers, triggers. Functions, stored procedures. Creating and planning PL/SQL Creating indexes, changing an index, recreating an index, obtaining information about indexes, eliminating an index. Creating cursors, accessing cursor rows, attributes of cursors (explicit and implicit).

List of Experiments:

1. Triggers
2. Stored procedures and functions
3. Cursors and indexes.

Text Books

1. Elmasri and Navathe: Fundamentals of Database Systems, 6thEdition, Addison -Wesley, 2011.
2. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems,8th Edition, Pearson education,2009.
3. Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3 rd Edition,McGrawHill, 2003.
4. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, McGrawHill, 2006
5. Object-oriented modeling and design Rumbaugh and Blaha, PHI

Course Outcome (COs) Bloom's Level

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

1. **Organize** the basic concepts of DBMS and various databases used in real applications. L 3
2. **Design** relational database using ER model and normalization L6
3. **Apply** non-procedural structural query languagesfor various database applications L4

Analyze the concepts of Object Based Database, XMLdatabase and non-

4. L4

relational databases

Build PL/SQL applications with appropriate demonstration using triggers, stored

5. L3

procedures, cursors and indexes

6. **Design** a database application for various SQL statements L6

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications and management.	**1**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
3	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**											
CO2			**3**									
CO3	**2**											
CO4			**2**									
CO5			**2**									
CO6					**1**							
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2		**2**	
CO3	**1**		
CO4	**1**		
CO5	**1**	**1**	**1**
CO6			**1**

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

******** Computer Networks and Communications (Integrated)**

Course Code	20MCA13	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = 0 Hrs; Practical=12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To give an insight into computer networks, various networking devices and its applications in fast evolving technological world.
2 To impart the different layers in TCP/IP and OSI reference model with their functionalities and services.
3 To recognize the application of different algorithms to solve design issues.
4 To explore different data transmission modes along with error detection and correction methods.
5 To impart routing and congestion control concepts in data transmission.

Pre-requisite:

- N/A

Unit – I **10 Hours**

Introduction to computer networks and Physical Layer

Uses of Computer Networks, Network Hardware, Network software, Classification of Computer Networks, Reference Models, Network Protocol Stack (TCP/IP and ISO-OSI).
Physical Layer: Theoretical Basis for Data Communication, Data Transmission Concepts, Analog and Digital Data Transmission, Guided Transmission Media, Wireless Transmission, Digital Modulation and Multiplexing. **List of Experiments:**

1. Star topology
2. LAN Wired Network
3. Assignment on IP Tracing

Unit – II **10 Hours**

Data Link Layer and Medium Access Control Layer
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Broadband Wireless, Bluetooth, Data Link Layer Switching **List of Experiments:**

1. Client - Server architecture
2. Bottleneck Analysis of network
3. Framing techniques

Unit – III **12 Hours**

Network Layer
Network Layer Design issues, Routing algorithms- The Optimality Principal, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical routing, Routing for Mobile Host, Congestion Control Algorithms, Quality of Service, Internetworking, The Network Layer in the Internet, IP Addressing.

List of Experiments:

1. Distance Vector Routing algorithm implementation
2. Wireless Network
3. Traffic shaping techniques

Unit – IV **10 Hours**

Transport Layer
The transport services, Elements of Transport Protocols, congestion control, The Internet Transport Protocols: TCP, UDP, Performance issues. **List of Experiments:**

Unit – V **10 Hours**

Application Layer
DNS-Domain Name System, Email, WWW, Introduction to Streaming Audio and Video and content delivery.

List of Experiments: NIL

Text Books

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th edition, Pearson Education.
2. Behrouz A. Forouzan, Data Communications and Networking, 4th Edition, Tata McGrawHill, 2006.
3. William Stallings, Data and Computer Communication, 8th Edition, Pearson Education, 2007.

Course Outcome (COs)

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

		Bloom's Level
1.	**Distinguish** between different networking models like TCP/IP and OSI.	L 4
2.	**Identify** different data transmission modes along with error detection and correction techniques.	L 3
3.	**Analyse and classify** routing and congestion control algorithms in data transmission.	L 4
4.	**Examine** the working principles of various transport and application protocols.	L 4
5.	**Compare** the design issues, services, interfaces, protocols and flow of data in computer networks and **Evaluate** different performance issues related to networking.	L 5
6	**Simulate** and analyze the different networking concepts to understand the real time working in NS2 environment.	L5

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2	Postgraduates will develop confidence for self-education and ability for lifelong learning	**10**
3	Postgraduates can participate and succeed in competitive examinations	**11**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.

2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2											
CO3	2											
CO4	1									1	1	
CO5	1											
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	PSO2	PSO3
CO1	2		
CO2	2		
CO3	1		
CO4	1		
CO5	1	1	1
CO6	1	1	1

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Object Oriented Software Engineering (Integrated)

Course Code	20MCA14	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs Practical = 12 Hrs; Total = 52 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To provide an idea of Object-Oriented Software Engineering, Software Product Development Activities and Modeling concepts using UML
2. To impart knowledge of software requirements, requirement elicitation and requirement analysis
3. To apply analytical skills to justify system and object design
4. To implement testing methodology to test a software product
5. To explore latest trends in reusable software components using patterns

Pre-requisite:

- N/A

Unit – I **10 Hours**

Introduction

Introduction to software engineering: what is software engineering, software engineering concepts, software engineering development activities. Modeling with UML: Introduction, Overview of UML, Modeling concepts

List of Experiments: NIL

Unit – II **10 Hours**

Requirement Elicitation and Analysis

Requirement elicitation: An overview of requirement elicitation, requirement elicitation concepts, requirement elicitation activities. Analysis: Overview of analysis, Analysis concepts, Analysis activities

List of Experiments:

1. Design software models for real life problems

Unit – III **10 Hours**

System Design

Overview of system design and design concepts: Overview of system design activities, design activities (addressing the design goals). Object design (Reusing Pattern Solution): Reuse concepts, Selecting Design Patterns and components **List of Experiments:**

1. System modeling using UML 2.0

Unit – IV **10 Hours**

Testing

An overview of testing, testing concepts, testing activities, managing testing **List of Experiments:**

1. Testing a source code using various methodologies

Unit – V **12 Hours**

Case studies based on patterns

Observer – decoupling entities from views, Adapter pattern- Wrapping around legacy code,
Bridge- Allowing for alternate implementations, Composite- representing recursive hierarchies, Façade- encapsulating subsystems, Singleton – when only single object is necessary.

List of Experiments:

1. Implementing patterns

Text Books

1. Object Oriented Software Engineering using UML, PATTERNS, and Java™, Bernd Bruegge, Allen H. Dutoit, Person publication, second edition

2. Design patterns, erich gamma, Richard helan, Ralph johman, John Vlissides,Pearson Publication,2013

Course Outcome (COs) Bloom's

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

Level

Identify various software development methodologies, development activities

1. L3 and UML notations
2. **Demonstrate** different requirement elicitation and analysis activities L3
3. **Analyze** design concepts and **construct** object design L4
4. **Utilize** different software testing methods L3
5. **Develop** solutions for real life problems using Design Patterns L3 6. **Apply** patterns to provide solution for a real-life problem L4

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
3	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications	
4	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**
5	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications	**6**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software	**1**
	design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**2**										
CO2			**2**									
CO3				**2**								
CO4					**2**							
CO5				**2**								
CO6				**2**								
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**		
CO3	**2**		
CO4		**2**	
CO5		**2**	**1**
CO6		**2**	

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.

Lab component:

Components	Conduct of the lab	Journal submission	Lab Test	Total Marks
Lab	10	10	5	25

Total CIE: 50 (T) +25(L) = 75 marks
Minimum score to be eligible to SEE for this course : 40% in each component
Not eligible in any one of the component will be considered as NOT eligible for the Course

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Computational Data Analytics (Theory)

Course Code	20MCA15	**Credits**	04
Course type	CF	**CIE Marks**	50
Hours/week:	4 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 52 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 52 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To explore the concepts of set theory and vectors
2. To impart knowledge of relations and their applications.
3. To recognize the applicability of regression analysis for the purpose of estimation.
4. To provide the clear sense of mathematics of probability and probability distributions. 5. To identify the potential areas to apply concepts of graph theory

Pre-requisite:

 N/A

Unit – I **10 Hours**

Set Theory, Matrices and Logic: Fundamentals of Set theory, inclusion-exclusion principle, pigeonhole principle, matrices, finding Eigen values and Eigen vectors, Basic Connectives and Truth Tables, Logic Equivalence, The laws of Logic, Logical Implications: Rules of Inference, Quantifiers, Proofs of theorems.

Unit – II **10 Hours**

Relations Properties of Relations,n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Computer recognition-Zero One Matrices and Directed graphs, Posets and Hasse Diagrams, Equivalence relation and Partitions, lattices.

Unit – III **10 Hours**

Correlation and Regression Analysis: Introduction, Methods of Studying Correlation, Scatter diagram method, Karl Pearson's Coefficient of Correlation, Probable Error, Correlation in Bivariate Frequency table, Rank Correlation Method.

Linear Regression Analysis: Introduction, Linear and non-linear regression, Lines of regression, Coefficients of regression. Correlation Analysis Vs Regression Analysis

Unit – IV **12 Hours**

Probability, Random variable and probability distribution

Introduction, Probability, A Priori Probability, Mathematics of probability, Addition Rule of Probability, Conditional Probabilities, The Multiplication Rule, Bayes Theorem on inverse probability, Concept of random variable, discrete probability distributions, continuous probability distributions, Mean, variance and co-variance and co-variance of random variables. Binomial and normal distribution, Exponential and normal distribution with mean and variables and problems.

Unit – V **10 Hours**

Graph Theory and Semi graphs

Graphs and Graphs models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring, Introduction to Semi graphs and their applications.

Text Books

1. Kolman, Busby,Ross“Discrete Mathematical Structures", 6th Edition Prentice Hall of India,2010.
2. C B Gupta, Vijay Gupta “An Introduction to Statistical Methods”, 23rd Edition, Vikas publishing House Pvt. Ltd, India
3. S C Gupta : Fundamentals of Statistics, 6th Revised and Enlarged Edition, Himalaya Publishing House,2009
4. R H Dhareshwar and SangeetaShetti, Business Statistics - II, R Chand & CO Publishers, 1st Edition, 2018

E.Sampathkumar, “SemigraphsandTheirApplications”, Academy of Discrete Mathematics

5.

and its applications, India

Course Outcome (COs) Bloom's

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

Level

1. **Apply** the fundamentals of set theory, matrices and logic for the given problem. L3
2. **Test** for Equivalence relations and lattices. L4
3. **Estimate** the values of parameters with building simple regression model. L5
4. **Apply** probability theorem using Bayes rule and Identify the applicability of L3 binomial and normal distribution
5. **Model** the given problem by applying concept of graph theory. L3

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications and management.	**1**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
3	Postgraduates will use research-based knowledge and research methods including design of experiments,analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**											
CO2	**2**											
CO3	**2**		**1**									**1**
CO4	**1**		**1**									
CO5	**2**											
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**		
CO3	**1**	**1**	
CO4	**1**		
CO5	**1**		

Course delivery methods	**Assessment methods**
	1. Internal Assessment Test
	2. Quiz
1. Lecture	**3. Assignment/Seminar/Project**
2. Power-Point Presentation	
3. Video	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.

2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Digital Systems and Computer Organization (Theory)

Course Code	20MCA16	**Credits**	04
Course type	PC	**CIE Marks**	50
Hours/week:	4 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 52 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 52 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To explore different number system representation and conversion from one number system to another.
2. To impart the theorems and properties of Boolean algebra.
3. To provide a clear idea of the basic structure, operation, performance of a digital computer.
4. To explore the different ways of communicating with I/O devices, interfaces, arithmetic operations and algorithms on signed fixed-point numbers.
5. To explore the working of hierarchical memory system including cache memory and virtual memory.

Pre-requisite:

- N/A

Unit – I 12 Hours

Binary Systems, Combinational Logic, Boolean Algebra and Logic Gates

Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Subtraction using r's and r-1 complements, Binary Code, Binary storage and Registers, Binary Logic, Integrated Circuits.

Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates.

Unit – II 10 Hours

Simplification Of Boolean Functions

The Map method, Two-and-Three variable maps, Four-variables Map, NAND and NOR Implementation, Other Two-Level Implementations, Don't Care Conditions. Introduction: Adders, Subtractors, Binary Parallel Adder, Decimal Adder. Multiplexer and De-Multiplexer

Unit – III 10 Hours

Basic Structure of Computers, Machine Instructions and Programs

Computer types, Functional Units, Basic Operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer, Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic Input / Output operations.

Unit – IV **10 Hours**

Input / Output Organization, Arithmetic

Accessing I/O Devices, Interrupts, DMA Processor Examples, Buses.

Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication,

Unit – V **10Hours**

The Memory System

Some Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Speed, Size, Cost, Cache Memories, Virtual Memories, Memory Management Requirements, Secondary Storage.

Text Books

1. M. Morris Mano , Michael D. Ciletti,Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, 6th Edition, 2018, Pearson
2. Soumitra Kumar Mandal, Digital Electronics- Principles and Applications, TataMcGrawHill, 2015.
3. Carl Hamacher, Zvonko Vranesic Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw-Hill, 2011
4. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, 3rdEdition,2012.

Course Outcome (COs) Bloom's Level

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

1. **Make use of** number systems, binary logic, and logic gates to understand the basic operation of computer. L 3
2. **Apply** the theorems and properties of Boolean algebra to simplify Boolean expressions and **Construct** logical circuits. L 4
3. **Interpret** Machine level details in understanding basic structure and operation of a digital computer. L 3
4. **Identify** different ways of communication with I/O devices and **Apply** arithmetic operations on binary number system. L 4
5. **Discover** how programs and data are stored and represented in a computer system. L 4

	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
3.	Postgraduates can participate and succeed in competitive examinations.	**11**

Program Specific Outcome of this course (PSOs)	PSO No.

1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**										**2**	
CO2	**2**										**2**	
CO3		**2**									**2**	
CO4		**2**									**2**	
CO5		**1**									**2**	
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1		**2**	
CO2		**2**	
CO3	**2**		
CO4	**2**		
CO5	**2**		

Course delivery methods	**Assessment methods**
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**

3. Video **3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Basics of Programming Languages (Integrated) (Bridge Course)

Course Code	20MCA17	**Credits**	MNC
Course type	CF	**CIE Marks**	50 (T) +25(L)
Hours/week:	2 – 0 – 2	**SEE Marks**	N/A
Total Hours	Lecture = 35 Hrs; Tutorial = 0 Hrs. Practical = 10 Hrs; Total = 45 Hrs	**SEE Duration**	N/A

Course learning objectives

1. To provide the basics of programming like decision making, looping and arrays.
2. To explore implementation of functions and structures.
3. To emphasize on pointers and dynamic memory allocation
4. To introduce the concepts of classes, objects, member functions and constructors.
5. To impart the knowledge of object-oriented concepts like encapsulation, inheritance, and polymorphism.

Pre-requisite:

- N/A

Unit – I **07 Hours**

C Programming: decision making, control structures and arrays:

Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the switch statement, the ?: operator, programming examples. The while statement, the do...while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples. one dimensional and two-dimensional arrays, declaration, and initialization of arrays, reading, writing and manipulation of above types of arrays.

List of Experiments:

1. Programs on Looping constructs like if..else, do...while, For etc.,
2. Programs on constructs like switch , continue 3. Programs on array handling.

Unit – II **07 Hours**

Functions, Structures

Concept of Function, User defined Function, System Defined Function, Types of parameter passing in function, Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures.

List of Experiments:

1. Programs on functions, parameter passing in function
2. Programs on handling structures, copying and comparing structure variables 3. Programs on handling Unions.

Unit – III **07 Hours**

Pointers, Dynamic Memory Allocations

Introduction to pointers, understanding pointers, Accessing the address of a variable, declaring pointer variable, initialization of pointer variable, accessing a variable through its pointers. Pointers as function arguments, functions returning pointers. Dynamic memory allocation, allocating a block of memory MALLOC, allocating multiple blocks of memory: CALLOC, releasing the used space: free.

List of Experiments:

1. Programs on handling pointers, Accessing the address of a variable

2. Programs on Pointers as function arguments, functions returning pointers
3. Programs on Dynamic memory allocation (MALLOC, CALLOC etc.,)

Unit – IV **07 Hours**

Introduction to C++

Introduction to classes and objects, defining member functions, making an outside function inline, nesting of member functions, private member functions, arrays within a class, memory allocation for objects, static data member as static member functions, arrays of objects, objects as function arguments, returning objects. Constructors and destructors: introduction, constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of objects, copy constructor, destructors. **List of Experiments:**

1. Programs on classes and objects
2. Programs on handling member functions
3. Programs on Constructors and destructors

Unit – V **07Hours**

Object Oriented concepts in C++

Introduction to inheritance, defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, abstract classes. Constructors in derived classes. Pointers, virtual functions and polymorphism.

List of Experiments:

1. Programs on inheritance
2. Programs on Pointers , virtual functions
3. Programs on polymorphism

Text Books

1. Object oriented programming with C++, E. Balaguruswamy, Tata McGraw Hill.
2. Herbert Schildt: C++ The Complete Reference, 4th Edition, Tata McGraw Hill, 2014.
3. K R Venugopal, RajkumarBuyya,TRavishanker: Mastering
4. Programming in ANSI C, E Balaguruswamy, 7th Edition, McGraw Hill 5. C The Complete Reference, Herbert Schild,4th Edition, McGraw Hill.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level 1.
Develop C programs with basic concepts like decision making, looping and functions.	L 3
2. **Adapt** the common data structures typically found in C programs namely arrays, structures, unions.	L 6
3. **Utilize** memory using pointer technology and memory management using calloc, malloc and free.	L 3
4. **Apply** the concept of overloading, default parameters, Constructors and destructors in a C++ program.	L 3
5. **Demonstrate** the concepts of data abstraction, information hiding and encapsulation by writing C++ program.	L 2

6. **Analyze** problem statement and choose suitable constructs to write efficientC / L4 C++ Program.

	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
3.	Postgraduates can participate and succeed in competitive examinations.	**11**

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**
CO 1	**1**										**2**	
CO 2	**2**										**2**	
CO 3		**2**									**2**	
CO 4		**2**									**2**	
CO 5		**2**									**2**	

CO 6		3										
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	PSO2	PSO3
CO1	2		
CO2		2	
CO3	2		
CO4		2	
CO5		2	
CO6	2		

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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2nd Semester Master of Computer Applications (M.C.A.)
Syllabus (2020-21 Scheme)

Data Structures (Integrated)

Course Code	20MCA21	**Credits**	05
Course type	PC	**CIE Marks**	50(T) +25(L)

Hours/week:	4 – 0 – 2	**SEE Marks**	50(T) +25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = 0 Hrs; Practical = 12Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To provide knowledge of data structures like stacks, queues, linked lists, and trees
2. To impart benefits of dynamic and static data structure implementations.
3. To provide guidelines on selection of the appropriate data structure for modeling a given problem.
4. To impart the understanding on graphs.
5. To explore the usage of different data structures in real time applications

Pre-requisite:

- Basics Of Programming Languages

Unit – I **10 Hours**

Introduction to Data Structures

Functions, Recursion, Implementing Structures and Union, Pointers, Scope of Variables Pointers and Dynamic Memory Allocation, ADT, File Handling **List of Experiments:**

1. Dynamic memory allocations

Unit – II **10 Hours**

Stack and Queues

Stack: Primitive operation, implementing the push operation. Example: Infix, postfix and prefix, evaluating a postfix expression, converting an expression from infix to postfix Queue: Queues, Priority Queues, Circular queue and its implementation, de-queue (doubly ended queue) **List of Experiments:**

1. Stack and its applications
2. Queues are its operations

Unit – III **10 Hours**

Linked List

Inserting and removing nodes from a list, Linked implementation of stacks, Linked implementation of queues, Linked list as a data structure, Linked lists using dynamic variable, Other list structures, Circular lists, Stack as a circular list, Queue as circular list, Primitive operations on circular lists, doubly linked lists

List of Experiments:

1. Singly Linked lists and its operations

Unit – IV **10 Hours Trees**

Binary trees, Operations on binary trees, Applications of binary trees. Representation of binary trees, choosing a binary tree representation, binary tree traversal using C, threaded binary trees. Representing list as binary tree: finding the K^{th} element, deleting an element, finding minimum and maximum element in a tree.

List of Experiments:

1. Binary Trees and its operations.

Unit – V **12 Hours**

Graphs and Sorting

The Graph Abstract Data Type, Graphs: Definitions, Applications of graphs, Representation of graphs, BFS (breadth first search), DFS (depth first search), Bubble sort, Selection Sort, Merge sort, Tree

sorting: Binary Tree sort, Heap Sort. Tree Searching: Insertion into a Binary search tree, Deleting from a BST. Searching techniques: linear search, binary search. **List of Experiments:**

1. Searching techniques
2. Sorting Techniques

Text Books

1. Yedidyah Langsam, Moshe J.Augenstein and Aaron M. Tenanbaum, Data structures using C, PHI.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education Asia.
3. Anany Levitin, Introduction to design and analysis of algorithms, Pearson Education, 2003
4. Robert Kruse, C L Tondo, Bruce Leung and Shashi Mogalla: Data Structures and Program Design in C, 2nd Edition, Pearson Education.

	Course Outcome (COs)	Bloom's Level
At the end of the course, the student will be able to		
1.	**Recall** and **Apply** the basic concepts of C programming like functions, recursive functions, structures, unions and pointers.	L 3
2.	**Build and Construct** various operations on stacks and queues.	L3
3.	**Analyze and Build** linked data structures such as linked lists and	

binary trees. L4

4. **Examine and develop** applications that require advanced data structures like BST, AVL trees etc., with both static and dynamic memory allocation. L4

5. **Choose** appropriate searching and sorting technique in application development. L5

6. **Implement** the data structure concepts using a programming language. L5

Sl. No	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
3.	Postgraduates can participate and succeed in competitive examinations.	**11**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**										**2**	
CO2			**2**								**2**	
CO3			**2**								**2**	
CO4			**2**								**2**	
CO5			**2**								**2**	
CO6			**2**									
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**		
CO3	**2**		
CO4	**2**		
CO5	**2**		
CO6	**2**		

Course delivery methods

1. Lecture

Assessment methods

1. Internal Assessment Test

2. Power-Point Presentation **2. Quiz**

3. Video **3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			

Minimum score for passing this course : 40% in each component compulsory
Not eligible in any one of the component will be considered as NOT eligible for the Course

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Programming Using Java & J2EE (Integrated)

Course Code	20MCA22	**Credits**	05
Course type	PC	**CIE Marks**	50(T) +25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50(T) +25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs; Practical = 12Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To provide emphasize on the strengths of Java Language like interface, Multithreaded programming and exceptions.
2. To introduce the core components of advanced Java programming language like JSP, Servlets, JDBC and Java Beans.
3. To explore servlet life cycle and handling request headers, response headers, and status codes in servlets
4. To elaborate life cycle of JSP with the advantages of JSP and how to make use of action tags, implicit objects, directive tags, and scriptlet tags
5. To explore database connectivity using JDBC API

Pre-requisite:

- N/A

Unit – I **10 Hours**

The Java Language, Inheritance and Interfaces

The Java language**:** The Java Buzz words ,Object Oriented Programming, The Three OOP Principles, A first simple program, Introducing Classes: class fundamentals, declaring objects, introducing methods, constructors, The this keyword, Inheritance: Basics of inheritance, Method Overriding, Dynamic Method Dispatch, Using Abstract classes Interfaces, Default Interface Methods, Use static methods in an Interface **List of Experiments:**

1. Interfaces

Unit – II **10 Hours**

Exception handling and Multithreaded Programming

Exception Handling: Exception Handling Fundamentals, Exception types, uncaught exceptions, Using try and catch, multiple catch clauses, Nested try statements, throw, throws, finally, Java's built-in Exceptions. Multithreaded Programming, the Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization **List of Experiments:**

1. Exceptions
2. Multithreaded Programming

Unit – III **10 Hours**

Servlets

Servlet Structure, Lifecycle, Single Thread model interface, Handling Client Request: Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies

List of Experiments:

1. Servlet handling data from client(Client request)
2. Servlet cookies

Unit -IV

12 Hours

Java Server Pages and Controlling the Structure of generated servlets

Overview of JSP Technology, Need of JSP, Benefits of JSP, Basic syntax, using JSP expressions, writing scriptlets, Using scriptlets to make parts of JSP conditional, predefined variables. The JSP page directive, import attribute, session attribute, isELignored attribute, buffer and auto flush attributes, info attribute, errorPage and isErrorPage attributes, isThreadsafe Attribute, extends attribute, language attribute, Including files and applets in JSP Pages, using Java beans components in JSP documents **List of Experiments:**

1. JSP Scripting tags
2. All attributes of JSP Page directive tags
3. JSP Action tags(JSP: include, JSP: forward)
4. JSP application using Java Bean class

Unit –V **10 Hours**

JDBC

Talking to Database, Types of JDBC, Essential JDBC program, JDBC Drivers, packages, Callable Statement, Statement Objects, using Prepared Statement JDBC in Action Result sets, Batch updates

List of Experiments:

1. JDBC(Database Connectivity with different Statement objects)in Java/JSP/Servlet

Text Books

1 Herbert Schildt, Java The Complete Reference, Eight Edition. Tata McGraw-Hill Edition – 2011

2 Marty Hall, Larry Brown, Core Servlets and Java Server Pages. Volume 1: Core Technologies. Second Edition

3 Java 6 Programming Black Book, Dreamtech Press. 2012

4 Web Technologies: HTML, Javascript, XML and , PHP, Java, JSP ASP.net, Ajax Black Book Kogent learning Solutions Inc/Wiley india 2008

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Build** console applications usingthe basic concepts of OOP and exceptions	L3

		handling mechanisms of core Java technology
2.	**Develop** console applications using multiple threads and interface key features of Java.	L3
3.	**Develop** web applications using servlets to process client request, cookies and session tracking. **Construct** powerful web applications using Java Server Pages with implicit variables JSP action tags, directive tags, and Java Beans	L3
4.	**Apply** JDBC API to access the different databases like MySQL, Oracle and DB2 from Java applications	L3
5.	Develop secure Java web applications for any enterprise business logic.	L6
6		

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
2	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications	**4**
3	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications	**6**

Program Specific Outcome of this course (PSOs)	PSO No.

1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success	**2**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1				**2**		**l**						
CO2				**2**		**1**						
CO3				**3**		**2**						
CO4				**3**		**2**						
CO5			**3**	**3**		**3**						
CO6			**3**	**3**		**3**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**	**1**	**-**
CO2	**1**	**1**	**-**
CO3	**2**	**3**	**-**
CO4	**2**	**3**	**-**
CO5	**3**	**3**	**-**
CO6	**3**	**3**	**-**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.

Lab component:

Components	Conduct of the lab	Journal submission	Lab Test	Total Marks
Lab	10	10	5	25

Total CIE: 50 (T) +25(L) = 75 marks

Minimum score to be eligible to SEE for this course : 40% in each component

Not eligible in any one of the component will be considered as NOT eligible for the Course

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Web Design and Development (Integrated)

Course Code	20MCA23	**Credits**	05
Course type	PC	**CIE Marks**	50(T) +25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50(T) +25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs; Practical = 12Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To introduce the basics of designing webpage with HTML, CSS, JavaScript and jQuery.
2 To emphasize the backend coding using PHP.
3 To guide on connecting web applications to backend database MySQL.
4 To impart the knowledge of creating asynchronous calls to server resources using AJAX.
5 To provide a glance of practical web page application development.

Pre-requisite:

1. Knowledge of basic programming

Unit – I **10 Hours**

Coding the Front End: HTML and CSS

Structuring the page with HTML, styling the page with CSS, sizing and positing page elements, creating the page layout. **List of experiments:**

1. HTML and CSS

Unit – II **12 Hours**

Coding the Front End: JavaScript

An overview of JavaScript, understanding variables, building expressions, controlling the flow of JavaScript, harnessing the power of functions, working with objects, working with arrays, manipulating strings, dates and numbers.

List of experiments:

1. Validations in JavaScript

Unit – III **10 Hours**

Coding the Front End: jQuery

Developing pages faster with jQuery, Livening Up Your Page with Events and Animation, getting to know jQuery UI. **List of experiments:**

1. Events and animation in jQuery

Unit – IV **10 Hours**

Coding the Back End: PHP and MySQL and Coding Dynamic Web Pages

Learning PHP coding basics, using PHP to access MySQL Data. Melding PHP and JavaScript with AJAX and JSON, building and processing web, validating form data.

List of experiments:

1. Dynamic pages in PHP
2. Database applications
3. Web applications in PHP with Java script, AJAX and JSON

Unit – V **10 Hours**

Advanced PHP Techniques

Interacting with the file system using session control in PHP and exception handling. **List of experiments:**

1. Session handling
2. File handling in PHP

Text Books

1. Paul McFedries, Web Coding & Development All-in-One For Dummies, Web Coding & Development All-in-One For Dummies
2. Luke Welling, Laura Thompson, PHP and MySQL web development, Second edition, Sams Publishing

Course Outcome (COs) Bloom's

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

Level

1. **Utilize** HTML tags and CSS to design web applications L 3
2. **Make use** of JavaScript for client side scripting L 3
3. **Build** web applications with animations and event handling L 3
4. **Develop** web applications with PHP and MySQL L 3
5. **Construct** web applications with sessions, files and images, AJAX and JSON L 3 6. **Develop** real time dynamic web applications L 6

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
2	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**
3	Postgraduates will demonstrate knowledge of professional and ethical responsibilities	**7**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to	**2**

	deliver quality applications for business success.	
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1					**2**							
CO2			**2**		**2**							
CO3					**2**							
CO4					**2**		**1**					
CO5			**2**		**2**							
CO6					**2**		**1**					
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**	**2**	
CO3	**2**		
CO4	**2**	**2**	
CO5	**2**	**2**	
CO6	**2**	**2**	

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Project/ Mini Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.

Lab component:

Components	Conduct of the lab	Journal submission	Lab Test	Total Marks
Lab	10	10	5	25

Total CIE: 50 (T) +25(L) = 75 marks

Minimum score to be eligible to SEE for this course : 40% in each component

Not eligible in any one of the component will be considered as NOT eligible for the Course

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			

Not eligible in any one of the component will be considered as NOT eligible for the Course

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Operating Systems (Theory)

Course Code	20MCA24	**Credits**	04
Course type	CF	**CIE Marks**	50
Hours/week:	4 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 52 Hrs; Tutorial = 0 Hrs; Practical = 0 Hrs; Total = 52 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To explore the fundamentals of Operating Systems.
2. To impart the mechanisms of Operating System to handle processes and threads, their communication.
3. To gain the knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms.
4. To impart the mechanisms involved in memory management in contemporary Operating System.
5. To explore the concepts of file management in Operating System.

Pre-requisite:

1. Digital Systems and Computer Organization (20MCA16)

Unit – I 10 Hours

Introduction to Operating Systems, System structures : Computer-System Organization, ComputerSystem Architecture, Operating-System Operations, Operating-System Services, User and OperatingSystem Interface, System Calls.

Unit – II 10 Hours

Process Management: Process, Process States, Process Description, Process Control, System call – fork, exec Process Scheduling: Basic Concept, Scheduling Criteria and Algorithms. Threads: overview, benefits, multicore programming, multithreading models.

Unit – III 11 Hours

Deadlocks and Concurrency Control: Principles of Concurrency, Semaphore, Message Passing, Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Classical problems of synchronization, Deadlock Detection and Dining Philosopher's problem using semaphores. **.**

Unit – IV 10 Hours

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Demand Paging, Page Replacement and Allocation of Frames

Unit – V 11 Hours

File and Disk Management

Implementing File systems: Directory Implementation, Allocation Methods, Free Space Management, Secondary Storage Structure: Disk Structure, Disk Scheduling and Disk Management.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 7th edition, Wiley India, 2006.
2. D.M Dhamdhere: Operating systems - A concept based Approach, 2nd Edition, Tata McGrawHill, 2002

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Make use** of modern computer organization and architecture to solve engineering problems with the help of operating system features.	L 3
2. **Utilize** CPU scheduling and process management techniques for better performance of computer systems.	L 3
3. **Select** appropriate process synchronization, deadlocks techniques to increase the degree of multiprocessing and cooperative processing.	L 3
4. **Experiment with** many memory management techniques to optimize primary and secondary memory.	L 3
5. **Analyze** the different file and directory structures in the operating systems.	L 4

Sl. no	**Program Outcome of this course (POs)**	**PO No.**
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
3	Postgraduates can participate and succeed in competitive examinations.	**11**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	**Target**

1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**											
CO2		**2**										
CO3		**2**										
CO4		**2**										
CO5		**2**									**1**	
Mention the lvels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1		**2**	
CO2	**2**		
CO3	**2**		
CO4		**2**	
CO5	**2**		**1**

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Research Methodology & Intellectual Property Rights (Theory)

Course Code	**20MCA25**	**Credits**	03
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 45Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To provide an overview of the research methodology and to elaborate the technique of defining a research problem.
2. To elaborate various aspects of reviewing the literature and to develop concepts of research designs.
3. To explore details of sampling design and to elaborate tests of hypotheses.
4. To provide different methods of analysis and display of dataand develop the art of interpreting and writing of research reports.
5. To explore various forms of the intellectual property rights and its relevance.

Pre-requisites :

- N/A

Unit – I **9 Hours**

Research Methodology, Defining the Research Problem

Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.

Unit – II **9 Hours**

Reviewing the literature, Research Design

Place of the literature review in research, How to Review the literature, Writing about the literature reviewed.

Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs.

Unit – III **9 Hours**

Sampling Design, Constructing Hypotheses

Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs.

The definition of a hypothesis, The function of a hypothesis, The testing of a hypothesis, The characteristics of a hypothesis, Types of hypothesis, Errors in testing a hypothesis.

Unit – IV **9 Hours**

Analysis and Display of Data, Interpretation and Report Writing

Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Methods of Communicating and Displaying Analyzed Data, Text, Tables, Graphs.

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Precautions for Writing Research Reports.

Unit – V **9 Hours**

Overview of Intellectual Property, Patents

Introduction and the need for intellectual property right (IPR) – Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, IPR in India : Genesis and development – IPR in abroad – Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994.

Patents – Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non – Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and license , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties – Patent office and Appellate Board

Text Books

1. C.R. Kothari, Gaurav Garg (2018), Research Methodology: Methods and Techniques, New Age International, 4th Edition.
2. Ranjit Kumar (2011), Research Methodology a step-by-step guide for beginners, SAGE Publications Ltd, 3rdEdition.
3. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
4. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

E-resource:

1. World Intellectual Property Organization. (2004). WIPO Intellectual property Handbook. Retrieved from

https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

Course Outcome (COs)

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

		Bloom's Level
1.	**Interpret** the basic concepts of research and the method of defining a research problem	L 2
2.	**Examine** the existing literature on a research problem and principles of research design	L 4
3.	**Inspect** sample design and the relevant test of hypothesis in a research problem	L 4
4.	**Analyze** and **Interpret** data and present the overall outcome in report format.	L 5
5.	**Make use of** knowledge on intellectual property rights in innovative research works.	L 3

	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	7
2.	Postgraduates will be able to communicate effectively in both verbal and written form.	8
3.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	12

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							**3**	**3**				
CO2							**2**	**3**				**2**
CO3							**2**	**1**				**3**
CO4							**3**	**3**				**3**
CO5							**3**	**3**				**1**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1			**2**
CO2	**2**		
CO3	**3**	**1**	
CO4	**3**	**1**	
CO5	**2**		**2**

Course delivery methods **Assessment methods**

1. **Lecture** 1. **Internal Assessment Test**
2. **Power-Point Presentation** 2. **Quiz**
3. **Video** 3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
➢ Writing two IA test is compulsory. ➢ **Minimum marks required to qualify for SEE : 20 out of 50**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**

3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Professional Communication and Ethics (Theory)

Course Code	20MCA28	**Credits**	MNC
Course type	CF	**CIE Marks**	50
Hours/Week:	2 – 0 – 0	**SEE Marks**	N/A
Total Hours	Lecture = 35 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 35 Hrs	**SEE Duration**	N/A

Course learning objectives

1 To emphasize the importance of communication and provide the basic knowledge of communication.
2 To train the learners to improve their listening and speaking skills.
3 To impart the knowledge of reading strategies and guide them to write letters, emails, memos and resumes according to the standards.
4 To prepare the learner to face job interviews and actively participate in group discussions.
5 To provide the knowledge of Ethics in the world of Information Technology, the importance of Ethical behavior of IT Professionals and issues in Software Development.

Pre-requisite:

- **N/A**

Unit – I **07 Hours**

Principles of Communication

Importance of Communication, Modes of Communication, Process of Communication, Levels of Communication.

Unit – II **07 Hours**

Listening and Speaking

Traits of a Good Listener, Types of Listening, Barriers to Effective Listening, Paralinguistic Features, Types of Speaking, Telephonic Conversation and Etiquette.

Unit – III **07 Hours**

Reading and Writing

Techniques for Good Comprehension, SQ3 Reading Technique, Letter Writing, Business Letters, Cover Letters, Resumes, Memos, Emails, Standards for Punctuation, Standards for the use of Numbers.

Unit – IV **07 Hours**

Interviews and Group Communication

Job Interviews: Stages of Interview, Face-to-face Interviews (Campus and On Site) and Telephonic Interviews.

Group Discussion as a part of Selection Process: Characteristics, Evaluation and Analysis.

Unit – V **07 Hours**

Ethics in Information Technology

What is Ethics? Ethics in the Business World, Ethics in Information Technology, IT Professionals, The Ethical Behaviour of IT Professionals, IT Users, Strategies to Engineer Quality Software, Key Issues in Software Development.

Text Books

1. Meenakshi Raman, Sangeeta Sharma, Technical Communication Principles and Practices, Second Edition: Oxford University Press.
2. George Reynolds, Ethics in Information Technology, Second Edition: Thomson Course Technology.
3. Lesikar, Flatley, Basic Business Communication, Tenth Edition: Tata McGraw Hill.

Course Outcome (COs)

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

Bloom's Level

1. **Explain** the knowledge of basic principles of communication. L 2
2. **Apply** the traits of a good listener and speaker to communicate successfully. L 3 **Improve** his reading skills and compose different types of letters, emails,
3. L 6 memos and resumes effectively.
4. **Discuss** effectively in job interviews and group discussions. L 6
   Utilize the knowledge of Ethics to make appropriate principle-based decisions
5. L 3 when faced with difficult situations.

Sl. No	Program Outcome of this course (Pos	PO No.
1	Postgraduates will be able to communicate effectively in both verbal and written form.	8
2	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional	9

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1								**3**				
CO2								**3**				
CO3								**3**				
CO4								**3**				
CO5									**3**			
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1		**2**	
CO2		**2**	
CO3		**2**	
CO4		**2**	
CO5		**3**	

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Elective Group-1

Cyber Security and Cyber Law (Theory)

Course Code	**20MCA261**	**Credits**	03
Course type	GE	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives 1. To introduce the concept of cybercrime and cyber offenses.
2. To emphasize on security challenges of mobile devices and organizational measures to handle such threats.
3. To explore the tools and methods used in cybercrime.
4. To elaborate on the legal perspectives of cybercrimes in India.
5. To introduce the concept of Computer forensics.

Pre-requisites :

1. Computer Networks & Communications (20MCA13)

Unit – I **9 Hours**

Introduction to Cybercrime, Cyber offenses

Definition and Origins of the Word Cybercrime, Cybercrime and Information Security, Who are Cybercriminals?, Classifications of Cybercrimes; Cybercrime - The Legal Perspectives, Cybercrimes - An Indian Perspective, Cybercrime and the Indian ITA 2000; A Global Perspective on Cybercrimes. How Criminals Plan the Attacks; Social Engineering; Cyberstalking; Botnets - The Fuel for Cybercrime, Attack Vector, Cloud Computing.

Unit – II **9 Hours**

Cybercrime in case of Mobile and Wireless devices, Phishing and Identity Theft

Proliferation of Mobile and Wireless Devices; Trends in Mobility, Security challenges posed by mobile devices, Registry settings for mobile devices, Authentication Service Security; Attacks on Mobile/Cell phones; Mobile Devices- Security implications for organizations; Organizational measures for handling mobile devices-related security issues; Organizational security policies and measures in mobile computing era.

Phishing; Identity theft.

Unit – III **9 Hours**

Tools and Methods Used in Cybercrime

Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

Unit – IV **9 Hours**

The Legal Perspectives

Cybercrime and the Legal Landscape around the World, Why Do We Need Cyberlaws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment.

Unit – V **9 Hours**

Computer Forensics

Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing.

Text Books

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives – Nina Godbole, Sunit Belapure, Wiley : April 2011 India Publications Released
2. Computer Forensics and Cyber Crime An Introduction by Marjie T. Britz ,Pearson publication, 2nd edition

Course Outcome (COs)

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

Bloom's Level

1. **Interpret** cybercrime and cyberoffenses. L 5
2. **Analyze** cybercrime in mobile devices, phishing and identity theft. L 4
3. **Examine** tools and methods used in cybercrime. L 4
4. **Recommend** the legal perspectives of cybercrimes. L 5
5. **Inspect** the various aspects of Computer forensics. L 4

	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	1
2.	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	7
3.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	12

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**

2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**						**3**					
CO2	**3**						**3**					**2**
CO3	**3**						**3**					
CO4							**3**					
CO5	**3**						**2**					**3**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**3**		**2**
CO2	**2**	**2**	**2**
CO3	**3**	**1**	**3**
CO4	**3**		**1**
CO5	**3**	**2**	**3**

Course delivery methods **Assessment methods**

1. **Lecture** 1. **Internal Assessment Test**
2. **Power-Point Presentation** 2. **Quiz**
3. **Video** 3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Management and Entrepreneurship for IT Industry

Course Code	20MCA262	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce the principles of Management and the importance of Planning
2. To provide knowledge about staffing and establishing coordination and control
3. To explore the role of Entrepreneurs in economic development
4. To introduce ERP and its importance
5. To explore the importance of intellectual property rights and relate the institutional support

Pre-requisite:

- **N/A**

Unit – I 9 Hours

Introduction, Planning

Meaning, nature and characteristics of management, scope and functional areas of management, goals of management, levels of management, brief overview of evolution of management.

Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of organization.

Unit – II 9 Hours

Staffing, Controlling

Meaning, process of recruitment and selection. Directing and controlling- meaning and nature of directing, leadership styles, motivation theories.

Meaning, steps in controlling, methods of establishing control, Communication- Meaning and importance, Coordination- meaning and importance

Unit – III **9 Hours Entrepreneur,**

Identification of business opportunities:

Meaning of entrepreneur, types of entrepreneurship, stages of entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India, barriers to entrepreneurship. Market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.

Unit – IV **9 Hours**

Preparation of project and ERP, Enterprise Resource Planning

Meaning of project, project identification, project selection, project report, need and significance of report, contents, formulation, guidelines by planning commission for project report

Meaning and Importance, ERP and Functional areas of Management, Marketing / Sales- Supply Chain Management, Finance and Accounting, Human Resources, Types of reports and methods of report generation

Unit – V **9 Hours**

Micro and Small Enterprises, Institutional support

Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India indusial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys)

MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, Introduction to IPR

Text Books

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Enterpreneurship- Kanishka Bedi- Oxford University Press-2017

Course Outcome (COs) Bloom's

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

Level

1. **Explain** the importance of Management and Planning in Entrepreneurship L 2
2. **Classify** staffing and controlling activities L 2
3. **Outline** the role of entrepreneurs in economic development L 2 4. **Utilize** the resources available effectively through ERP L 3
5. **Make use of** IPRs and institutional support in entrepreneurship L 3

Program Outcome of this course (POs)		PO No.
1.	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional	**9**

2.	Postgraduates will develop confidence for self-education and ability for life-long learning.	**10**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
2.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									**1**			
CO2									**1**			
CO3									**2**	**1**		
CO4									**2**	**1**		
CO5									**2**	**1**		
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1		**1**	
CO2		**1**	
CO3		**1**	
CO4		**2**	**1**
CO5		**2**	**1**

Course delivery methods

1. Lecture

2. Power-Point Presentation

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Video **3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Internet of Things (Integrated)

Course Code	20MCA263	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce the Internet of Things (IoT), basics and fundamentals.
2. To present the techniques of interfacing the modules and with IoT systems.
3. To impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.
4. To recognize the cause for various innovations with IoT.
5. To identify the potential research areas of IoT.

Pre-requisite:

1. Basics of Programming
2. Basics of Cloud and Networking

Unit – I 09 Hours

Introduction to IoT:
Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals-Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.
List of Experiments:

Unit – II 09 Hours

Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, L/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.
List of Experiments:

1. LED / Buzzer
2. Push Button / Digital sensor (IR/LDR)
3. DHT11
4. OLED with DHT11

Unit – III 09 Hours

IoT Application Development :Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices **List of Experiments:** 1. Uploading and retrieving sensed data to and from Things Speak cloud

2. Publish and subscribe to MQTT

Unit – IV

09 Hours Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, formal risk analysis structures octave and fair **List of Experiments:**

1. MySQL

Unit – V **09 Hours**

IoT Case Studies:

loT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

Course Outcome (COs) Bloom's

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

		Level
1.	**Apply** IoT architecture for a given problem	L 3
2.	**Assess** different elements of IoT	L4
3.	**Identify and demonstrate** Interface I/O devices, sensors & communication modules.	L4
4.	**Analyze and Apply** device discovery and cloud services for IoT applications for Remotely monitoring data and controlling devices.	L4
5.	**Design and Develop** real life IoT based projects	L6

Sl. no	Program Outcome of this course (POs	PO No.
1	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
2	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**

3	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**1**										
CO2		**1**										
CO3		**2**			**2**							
CO4		**2**			**2**							
CO5		**2**			**2**							**1**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3		**2**	
CO4		**2**	
CO5		**2**	**1**

Course delivery methods	Assessment methods
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**
3. Video	**3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	

	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Advanced Computer Networks (Theory)

Course Code	**20MCA264**	**Credits**	03
Course type	GE	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To explore Communication Networks, Network Services and layered Architecture.
2. To emphasize the different Internet protocols.
3. To introduce to networked architecture and its services 4. To provide understanding of the ATM and Wireless Networks.
5. To explore the scope and usage of IOT.

Pre-requisites:

1. Computer Networks and Communication (20MCA13)
2. Computational Data Analytics (20MCA15)

Unit-I **09 Hours**

Overview and Network Services

Networking principles, Future networks, Applications, Traffic characterization and quality of service, Network services, High performance networks, Network Elements, Basic Network Mechanisms,

Unit-II **09 Hours**

Layered Architectures

Layered Architecture, Open data network model, Network architectures, Network bottlenecks. Packet-Switched Networks: OSI and IP models, Ethernet (IEEE 802.3), Token Ring (IEEE 802.5), FDDI, DQDB

Unit-III **09 Hours**

The Internet and TCP/IP Networks

The Internet, Overview of Internet Protocols, Internet Protocol, TCP and UDP, Internet success and limitation, Performance of TCP/IP Networks.

Unit-IV **09 Hours**

Circuit-Switched Networks and Asynchronous Transfer Mode

SONET, Dense Wave-Division Multiplexing, Fiber to the Home. Main features of ATM, Addressing, signaling and Routing, ATM header structure, ATM Adaptation Layer.

Unit-V **09 Hours**

Wireless Networks and Introduction to Internet of Things

The Wireless Channel, Link Level Design, Channel Access, Network Design, Wireless Networks Today, Future Systems and Standards. Internet of Things Common Definition, IoT Strategic Research and Innovation Directions, IoT Smart-X Applications, Internet of Things and related future internet technologies, Network and Communication.

Text Books

1. High-Performance Communication Networks by Walrand and Pravin Varaiya: Morgan Kauffman/ Elsivier, 2nd Edition-2000.
2. High-Speed Networks and Internet: Performance and Quality of service by William Stallings, Pearson Edu., 2001.
3. High Performance TCP/IP: Networking Concepts, Issues, and Solutions, Mahbub Hassan and Raj Jain, IST Edition, 2009 PHI Learning
4. TCP/IP Illustrated (Volume I, Volume II and Volume III), W. Richard Stevens, AddisonWesley.
5. Ovidiu Vermesan, Peter Friess, IoT from Research and Innovation to Market Development, River Publisher 2014.

Course Outcome (COs)

At the end of the course, the student will be able to — Bloom's Level

1. **Analyze** and **classify** the communication networks principles and future networks. L 4
2. **Summarize** the network services and layered architectures. L 3
3. **Analyze** the Internet and different protocols. L 4
4. **Assess** the circuit switched networks and ATM. L 5
5. **Appraise** the wireless networks and concept of IoT and its applications. L 5

Sl. No.	Program Outcome of this course (POs)	PO No.

1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2.	Post graduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
3.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating	**3**
	innovative career paths to be an entrepreneur, and a zest for higher studies.	

Mapping through Direct Assessment: Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												2
CO2	2											2
CO3	2											2
CO4				2								2
CO5				2								2
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	PSO2	PSO3
CO1	2		
CO2	2		
CO3		2	
CO4		2	
CO5		2	

Course delivery methods **Assessment methods**

1. **Lecture** 1. **Internal Assessment Test**
2. **Power-Point Presentation** 2. **Quiz**
3. **Video** 3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Software Testing (Theory)

Course Code	20MCA265	**Credits**	03
Course type	GE	**CIE Marks**	50 Marks
Hours/week:	3 – 0 – 0	**SEE Marks**	50 Marks
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To provide basics of software testing and graph theory concepts for testers.
2. To explore the concepts of boundary value, equivalence class and decision table based testing.
3. To explore path testing, data flow testing and decision table based testing methodologies.
4. To impart the concepts of integration testing and system testing.
5. To elaborate Object-Oriented Testing and also different case studies on testing concepts.

Pre-requisite:

1. Object Oriented Software Engineering (20MCA14).

Unit – I **09 Hours**

Basics of Software Testing

Basic Definitions, Test Cases, preparing a Test Plan, Insights from a Venn Diagram, Identifying Test Cases, Fault Taxonomies, Levels of Testing; Examples: The Triangle Problem, The NextDate Function, The Commission Problem;

Graph Theory for Testers: Graphs, Directed graph, graphs for testing.

Unit – II **09 Hours**

Boundary value testing

Normal, Robust Boundary value testing, Examples, Random testing; **Equivalence class testing,** Traditional and Improved Equivalence class testing, Equivalence class test cases examples- triangle problem, NextDate function; **Decision table based Testing:** Decision Table Techniques, Decision Table Test cases for triangle problem.

Unit – III **09 Hours**

Path Testing

Program Graphs, DD Paths, Basis path testing; **Data flow testing**: Define/Use Testing, Slice-Based Testing, program slicing tools; **Life Cycle–Based Testing:** Traditional Waterfall Testing, Testing in Iterative Life Cycles, Agile Testing

Unit – IV **09 Hours**

Integration Testing

Decomposition-Based Integration, Path-Based Integration, Example: integration NextDate; **System Testing:** Threads, Basis Concepts for Requirements Specification, Model-Based Threads, Use Case–Based Threads, Non-functional System Testing.

Unit – V **09 Hours**

Object-Oriented Testing

Issues in testing Object-Oriented software, Example on ooNextDate, Object-Oriented unit testing, Object-Oriented integration testing, Object-Oriented system testing.

Case Studies

1. Test case design and implementation for real world problem using Decision table testing with Eclipse
2. Test case design and implementation for real world problem using Boundary value analysis with Eclipse
3. Testing of websites using Selenium

Text Books

1. Software Testing, A Craftsman's Approach, Paul C. Jorgensen, 4th Edition, First Indian Reprint, 2014, Auerbach Publications, ISBN-13:9781466560680
2. Adithya P.Mathur " Foundations of Software Testing – Fundamental Algorithms and Techniques", Pearson Education India, 2011

Course Outcome (COs)

At the end of the course, the student will be able to — Bloom's Level

1. Demonstrate the fundamentals of software testing. L 3
2. Apply the concepts of black box testing techniques in different testing scenarios. L3
3. Analyze the concepts of path, data-flow and life-cycle based testing techniques L4
4. Inspect the concepts of integration and system testing techniques. L4
5. Analyze the concepts of Object-Oriented Testing and Apply testing techniques L4 to different case studies.

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**
2	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.	**9**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**

2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1						
CO2						1						
CO3						2			1			
CO4						2			1			
CO5						2			1			
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			
CO5			

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Elective Group-2

Digital Marketing (Integrated)

Course Code	20MCA271	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To provide overview of digital marketing
2 To impart knowledge of marketing mix and SEM
3 To explore different trends in digital marketing
4 To impart knowledge about marketing through social media channels
5 To develop skills of making marketing strategies for influencing marketing

Pre-requisite:

- N/A

Unit – I **09 Hours**

Introduction to digital marketing

Definitions – what is digital marketing and multi-channel marketing, introduction to key features of digital marketing strategy, Applications and benefits of Digital Marketing, Alternative digital business models, Different forms of online presence, Applying the 7Ss, RACE (Reach Act (interact)ConvertEngage. Digital Marketing communications. Digital media channels and its benefits

List of Experiments:

1. Marketing using Blog
2. Content marketing using website

Unit – II **09 Hours**

Internet marketing, marketing mix and Search Engine Advertising

Internet Marketing and Digital Marketing Mix – Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix, Impact of digital channels on IMC; Search Engine Advertising: - Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation Display marketing: - Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing. **List of Experiments: NIL**

Unit – III **09 Hours**

Search Engine Optimization, Mobile Marketing and SEO trends

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising– - Introduction and need for SEO, How to use internet & search engines; search engine and its working pattern, On-page and off-page optimization, SEO Tactics - Introduction to SEM Web Analytics: - Google Analytics & Google AdWords; data collection for web analytics, multichannel attribution, Universal analytics, Tracking code Trends in digital advertising **List of Experiments:**

1. Search Engine Marketing (crawler based)
2. Search Engine Optimization tactics

Unit – IV **09 Hours**

Social Media Channels and Social Marketing

Social Media Channels: Introduction, Key terms and concepts, Traditional media vs Social media. Social media channels: Social networking. Content creation, Bookmarking & aggregating and Location & social media. Tracking social media campaigns. Social media marketing: Rules of engagement. Advantages and challenges. Social Media Strategy: Introduction, Key terms and concepts. Using social media to solve business challenges. Step-by-step guide to creating a social media strategy. Documents and processes. Dealing with opportunities and threats. Step-by-step guide for recovering from an online brand attack. Social media risks and challenges **List of Experiments:** 1. Influencer marketing using social media tools

Unit – V **09 Hours**

Social Media Marketing

Social Media Marketing – Role of Influencer Marketing, Tools & Plan– Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting Twitter Marketing: - Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics **List of Experiments:**

1. Social Media Marketing

Text Books

1. Seema Gupta “Digital Marketing” Mc-Graw Hill 1st Edition – 2017
2. Ian Dodson “The Art of Digital Marketing” Wiley Latest Edition
3 Dave Chaffey Fiona Ellis-Chadwick “Digital Marketing, statergy, implementation and practice, Pearson, sixth edition

Course Outcome (COs) Bloom’s

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

Level

1. **Identify** importance of digital marketing in today’s era L3
2. **Analyze** internet marketing and marketing mix L4 3. **Make use** of Search Engine Marketing L3
4. **Identify** different social media channels L3

5. **Discover** different marketing strategies for influencing marketing L4

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional	**9**
2	Postgraduates will develop confidence for self-education and ability for lifelong learning.	**10**

Program Specific Outcome of this course (PSOs)		PSO No.
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1									**1**			
CO2									**1**			
CO3									**2**	**1**		
CO4									**1**	**1**		
CO5									**1**	**1**		
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1		**1**	
CO2		**1**	

CO3		**2**	
CO4		**1**	**1**
CO5		**2**	

Course delivery methods

1. **Lecture**
2. **Power-Point Presentation**
3. **Video**

Assessment methods

1. **Internal Assessment Test**
2. **Quiz**
3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks

	Conduct of experiment(s), result and conclusion	20 marks
	One marks question	10 marks
	Viva-voce	10 marks
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**	
3.	Viva-voce is conducted for individual student.	
Total SEE: 50(T) +25(L) = 75 marks		
Minimum score for passing this course : 40% in each component compulsory		
Not eligible in any one of the component will be considered as NOT eligible for the Course		

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Software Project Management (Theory)

Course Code	**20MCA272**	**Credits**	03
Course type	GE	**CIE Marks**	50 Marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 Marks
Total Hours:	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce an overview of Software Project Management, Project Planning and Evaluation. And to identify the different industry preferred project management tools.
2. To impart the knowledge of using critical path and precedence networks, activity on arrow networks to model ideal activity plan.
   To introduce the notion of Risk Management and Resource Allocation.
   To explore the requirements for the continual monitoring of projects and contract management.
   To impart the factors that influence people's behavior in a project environment and to provide the knowledge of different types of team structures and styles of leadership needed in different situations.
3. 4.
5.

Pre-requisites :

- N/A

Unit – I **09 Hours**

Software Project Management, Evaluation techniques and Management

Introduction to software project management, project evaluation and programme management, an overview of project planning.

A case Study: List the different industry preferred project management tools.

Unit – II **09 Hours**

Activity Planning

The objectives of activity planning, when to plan, project schedules, projects and activities, sequencing and scheduling activities, network planning models, formulating a network model, adding the time dimension, the forward pass, the backward pass, identifying the critical path, activity float, shortening the project duration, identifying critical activities, activity on arrow networks. A Case study on: Introduction to project management tools like jira and success factor software.

Unit – III **09 Hours**

Risk Management

Risks, categories of risks, a framework for dealing with risks, risk identification, risk assessment, risk planning, risk management, evaluating risks to the schedule, applying the pert technique.**Resource Allocation-** The nature of resources, identifying resource requirements, scheduling resources, creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedule, scheduling sequence.

Unit – IV **09 Hours**

Monitoring And Control

Creating The Framework, collecting the data, review, project termination review, visualizing progress, cost monitoring, earned value analysis, prioritizing monitoring, getting the project back to target. **Managing contracts-** types of contract, stages in contract placement, and typical terms of a contract, contract management, and acceptance.

Unit – V **09 Hours**

Managing People In Software Environments

Understanding behavior, organizational behavior-a background, selecting the right person for the job, instruction in the best methods, motivation, the oldham-hackman job characteristics model, stress, health and safety. **Working In Teams**- becoming a team, decision making, organization and team structures, coordination dependencies, dispersed and virtual teams, communication genres, communication plans, leadership.

Text Books:

1. Bob Hughes, Mike Cotterell, Rajib Mall, Software Project Management, McGraw Hill Education, 5th Edition.
2. Walker Royce, Software Project Management- A Unified Framework, Addison-Wesley, 1998, Edition 10

Course Outcome (COs) Bloom's

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

		Level
1.	**Utilize** the basic concepts of Software Project Management, Project Planning and Evaluation.	L 3
2.		**Buil**

d activity on node and activity on arrow networks. L 3

3. **Outline** the factors related to risk management, Identify the resources required L 3 for a project and Build work plan and resource schedule.

4. Identify the requirements for the continual monitoring of projects and also **Analyze** different types of contracts and plan the evaluation of a proposal or L 4 product.

5. **Choose** the factors that influence people's behavior in a project management and the characteristics of the various team structures and coordination needs of a L 3 project.

Sl. No.	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	4
2.	Postgraduates will develop confidence for self-education and ability for life-long learning.	10

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer	**1**
	programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1				**2**								
CO2				**2**								
CO3				**2**								
CO4				**2**								
CO5										**2**		
Mention the lvels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**		

CO3		**2**	
CO4		**2**	
CO5			**2**

Course delivery methods	**Assessment methods**
1. **Lecture**	1. **Lecture**
2. **Power-Point Presentation**	2. **Power-Point Presentation**
3. **Videos**	3. **Videos**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

*****

Information Network Security (Theory)

Course Code	20MCA273	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To establish the foundation for understanding the broader field of information security.
2. To explore the business drivers behind the design process of information security analysis and the various threats facing organizations.
3. To understand several key laws that shape the field of information security.
4. To provide an understanding on a number of widely accepted security models and frameworks.
5. To describe the conduction of a fundamental information security assessment for describing procedures for identifying and prioritizing threats.

Pre-requisite:

1. Computer Networks and communications (20MCA13).

Unit – I **09 Hours**

Introduction to Information Security

The history of information security, what is security? components of an information system, security in systems life cycle, security professionals and the organization, communities of interest, information security: is it an art or science.

Unit – II **09 Hours**

The need for security

Introduction, threats and attacks, compromises to intellectual property, deviations in quality of service, espionage and trespass, forces of nature, human error or failure, information extortion, sabotage or vandalism, software attacks, technical hardware failure or errors, technical software failure or errors.

Unit – III **09 Hours**

Security Technology: Firewalls, VPNs and Intrusion detection

Introduction, Access control, Firewalls, Protecting remote connections, intrusion detection and prevention systems.

Unit – IV **09 Hours**

Cryptography

Introduction, foundations of Cryptology, cipher methods, cryptographic algorithms, cryptographic tools, protocols for secure communication.

Unit – V **09 Hours**

Legal, Ethical and Professional Issues, Planning for security and risk management

Introduction, Law and Ethics in Information Security. Introduction to security planning, information security planning and governance, information security policy, standards and practices. Introduction to risk management, An overview of risk management, risk identification, risk assessment, risk control.

Text Books

1. Michael E. Whitman and Herbert J. Mattord, Principles of Information Security, Cengage learning, Fifth edition.
2. Harold Tipton and Micki Krause, Information Security Management Handbook, Auerbach Publications, Fifth Edition

Course Outcome (COs)

At the end of the course, the student will be able to Bloom's Level

1. **Identify** the components of an information system and the approaches to information security. L 3
2. **Justify** the need for security. L 5
3. **Analyze** the various security technologies. L 4
4. **Inspect** the various methods of cryptography. L 4 5. **Analyze** the ethical, legal and professional issues in information security and L 4 **Examine** the security policy, standards and practices.

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	**7**
3	Postgraduates will develop confidence for self-education and ability for lifelong learning.	**10**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**											
CO2	**1**											

CO3	**2**											
CO4	**1**											
CO5							**2**			**1**		
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3	**1**		
CO4	**1**		
CO5			**1**

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Distributed Systems (Theory)

Course Code	20MCA274	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To provide the foundations of distributed systems.
2 To emphasize on the issues related to clock Synchronization and the need for global state in distributed systems.
3 To explore the distributed mutual exclusion and deadlock detection algorithms.
4 To impart the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.
5 To provide the characteristics of peer-to-peer and distributed shared memory systems.

Pre-requisite:

1. Operating Systems(20MCA24)

Unit - I **9 Hours**

INTRODUCTION

Introduction: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges. A model of distributed computations: A distributed program, a model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications.

Unit- II **9 Hours**

MESSAGE ORDERING & SNAPSHOTS

Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels

Unit - III **9 Hours**

DISTRIBUTED MUTEX & DEADLOCK

Distributed mutual exclusion algorithms: Introduction, preliminaries, Lamport‘s algorithm, RicartAgrawala algorithm, Maekawa‘s algorithm. Deadlock detection in distributed systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp‘s classification.

Unit - IV **9 Hours**

RECOVERY & CONSENSUS

Check pointing and rollback recovery: Introduction, Background and definitions, Issues in failure recovery, Checkpoint-based recovery, Log-based rollback recovery, coordinated check pointing

algorithm. Consensus and agreement algorithms: Problem definition, Overview of results, Agreement in a failure, free system, Agreement in synchronous systems with failures.

Unit - V **9 Hours**

P2P & DISTRIBUTED SHARED MEMORY

Peer-to-peer computing and overlay graphs: Introduction, Data indexing and overlays, Chord, Content addressable networks, Tapestry. Distributed shared memory: Abstraction and advantages, Memory consistency models, Shared memory Mutual Exclusion.

Text Books

1. Kshemkalyani, Ajay D., and Mukesh Singhal. Distributed computing: principles, algorithms, and systems. Cambridge University Press, 2011
2. George Coulouris, Jean Dollimore and Tim Kindberg, ―Distributed Systems Concepts and Design‖, Fifth Edition, Pearson Education, 2012
3. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007
4. Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGrawHill, Inc., 1994
5. Liu M.L., ―Distributed Computing, Principles and Applications‖, Pearson Education, 2004

Course Outcome (COs)

At the end of the course, the student will be able to — Bloom's Level

1. **Interpret** the foundations and issues of distributed systems. L 3
2. **Categorize** the various synchronization issues and global state for distributed L4 systems
3. **Examine** the Mutual Exclusion and Deadlock detection algorithms in distributed L4 systems
4. **Assess** the agreement protocols and fault tolerance mechanisms in distributed L5 systems.
5. **Illustrate** the features of peer-to-peer and distributed shared memory systems L3

Sl. no	Program Outcome of this course (POs	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications and management.	**1**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**

3	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**		**1**									
CO2	**1**		**1**									
CO3	**2**		**2**									
CO4	**2**		**2**									
CO5	**2**		**2**									
CO6	**2**											**1**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**2**	**1**	
CO3	**2**	**1**	
CO4	**2**	**2**	
CO5	**2**	**2**	**2**
CO6	**2**	**2**	**2**

Course delivery methods	Assessment methods
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**
3. Video	**3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
➢ Writing two IA test is compulsory. ➢ **Minimum marks required to qualify for SEE : 20 out of 50**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Advanced Python

Course Code	20MCA275	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce the structure and core concepts of Django framework
2. To provide knowledge about development of Django Models and Views
3. To explore features of Django Admin and databases features
4. To introduce Django templates and forms
5. To explore the advanced features of Django and Forms

Pre-requisite:

1. **Python Programming (20MCA11)**

Unit – I **9 Hours**

Revisiting the world wide web Technologies and Introduction to Django

The Web Framework, the MVC Design Pattern, Django's History. Coding Style-The Importance of Making Your Code Readable, PEP 8, The 79-Character Limit, The Word on Imports, Explicit Relative Imports, Avoid Using Import *, Other Python Naming Collisions, Django Coding Style, Consider the Django Coding Style Guidelines, Use Underscores in URL Pattern Names Rather Than Dashes, Use Underscores in Template Block Names Rather Than Dashes, Choose JS, HTML, and CSS Style Guides, JavaScript Style Guides, HTML and CSS Style Guides, Never Code to the IDE (Or Text Editor).Django's Structure-A Heretic's Eye, Django is a Loosely Coupled Framework, A Django View is Not a Controller, Django Project Structure, Creating Your Own Django Apps, URLconfs—Django's Navigator, A Final Note on Writing Django.

Unit – II **9 Hours**

Django's Models and Views

Supported Databases, Defining Models in Python, Your First Model, Basic Data Access, Creating Database Records, Retrieving Records, Retrieve All Records, Retrieve a Single Record, Retrieve Multiple Records, Ordering Data, Slicing Data, Updating Records, Deleting Records, Creating Relationships, Working with related Objects, Accessing Foreign Key Values, Accessing Many-to Many Values. Django's Views - Your first view, configuring the URLs, Your Second View-Dynamic content, Your Third view-Dynamic URLs.

Unit – III **9 Hours**

Django Admin, Working with Data bases

Accessing the Django Admin Site, Registering Models With the Admin, Making Fields Optional, Customizing the Venue Change List, Customizing the Events Change List and Form, Update the Event Model, Modify the Event Change List and Edit Form, Grouping Information with Fieldsets, Managing Users in the Admin, Changing Passwords. Working with Data bases - Database management commands, Managing Migrations, Connecting to other database engines

Unit – IV **9 Hours**

Django's Templates, Django's Forms

Template Design Philosophy, Django Template System Basics. Template includes. Django's Forms - Creating a Contact Form, Add Contact Form URL to Site App, Add Navigation to Site Template, Create the Contact Form Template, Create the Contact Form View, Add Styles to the Contact Form, Emailing the Form Data, Model Forms, Create the Venue Form, Add the Venue View, Create the Venue Form Template, Link to the Add Venue Form, Overriding Form Methods.

Unit – V **9 Hours**

Advanced Templates and Forms

Setting up the Demo Files, Django's default template tags and filters, Custom tags and filters, Context, Request Context and Context Processors, Code listings. Advanced Forms - Customizing forms, The Messages Framework, Django formsets, handling multiple forms

Text Books

1. Nigel George, "Mastering Django", 1st Edition, GNW Independent Publishing, Hamilton NSW Austrelia, 2020.

2. Django Official Documentation https://docs.djangoproject.com/en/3.0/

3. Daniel Roy Greenfield and Audrey Roy Greenfield, "Two Scoops of Django 1.11", Daniel Roy Greenfeld, Audrey Roy Greenfeld, and Two Scoops Press, Fourth Edition, 2017.

Course Outcome (COs) Bloom's Level

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

1. **Utilize** the basic knowledge of web components, web applications and Django framework L 3
2. **Identify** the key features of models and views L 3
3. **Apply** Django's admin and database operations L 3
4. **Make use of** Django's templates and forms. L 3
5. **Experiment with** advanced features of templates and forms L 3

	Program Outcome of this course (POs)	PO No.
1.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
2.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software	**1**
	design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment: Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
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CO-PO Mapping (planned)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1									
CO2		1	1									
CO3		2	3									
CO4		2	3									
CO5		2	2									
CO6		2	3									
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	PSO2	PSO3
CO1	2		
CO2	2	1	
CO3	2	1	
CO4	2	2	
CO5	2	2	2
CO6	2	2	2

Course delivery methods

1. **Lecture**
2. **Power-Point Presentation**
3. **Video**

Assessment methods

1. **Internal Assessment Test**
2. **Quiz**
3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass:**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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ESTD. 1939

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GOGTE INSTITUTE OF TECHNOLOGY
"JNANA GANGA" UDYAMBAG, BELAGAVI-590008,
KARNATAKA, INDIA.
Approved by AICTE & UGC
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Visvesvaraya Technological University, Belagavi
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ESTD. 1979

2020-21 Scheme

Department: MCA

Programme: MCA

1rd to 4th Semester Scheme of Teaching and Examination

3rd and 4th Semester Syllabus

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INSTITUTION VISION

Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity and entrepreneurial skills.

MISSION

To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

QUALITY POLICY

- Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment.
- Fostering cultural, ethical, moral and social values in the human resources of the institution.
- Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

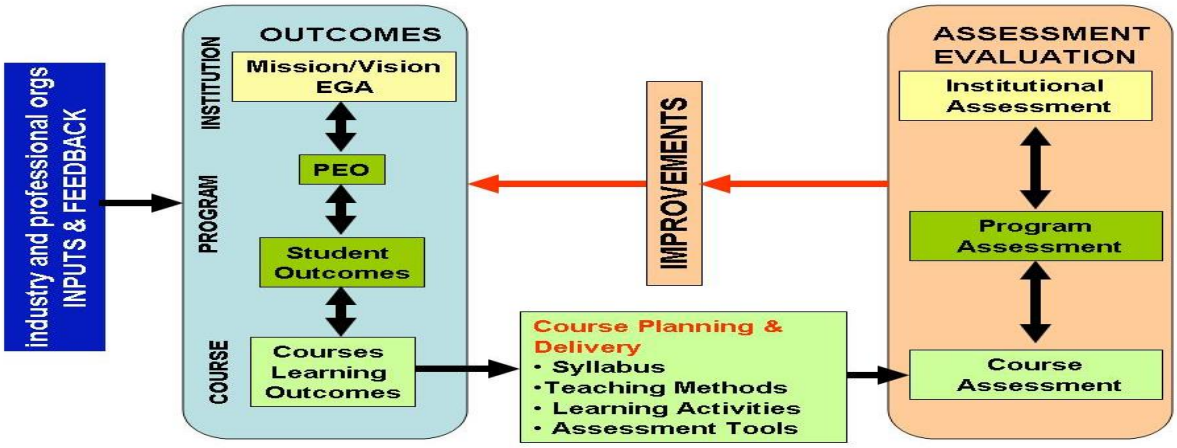
DEPARTMENT VISION

The department of Master of Computer Applications shall strive to stand out as par excellence in generating and grooming, technically competent and skilled intellectual professionals to meet the challenges of the modern computing industry.

MISSION

To train the graduates to become IT professionals having strong fundamental knowledge in the field of computer application with ethical values to meet increasing global challenges of ever evolving technologies.

OUTCOME BASED EDUCATION (OBE)



PROGRAM OUTCOMES (POs) :	
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.
2.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.
3.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.
4.	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.
5	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.
6	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.
7	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.
8	Postgraduates will be able to communicate effectively in both verbal and written form.
9.	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.
10.	Postgraduates will develop confidence for self-education and ability for life-long learning.
11.	Postgraduates can participate and succeed in competitive examinations.
12.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Real Life Problem Solving: Postgraduates of the programme will develop solutions to the real world problems by developing computer applications using the knowledge of mathematics, computer science and engineering in the diverse field of Information Technology.

PEO2: High-Quality Computer Professionals: The postgraduates shall practice and grow as computer professionals by conducting research, design, develop, test and maintain projects in varied fields of computer science and engineering using the state-of-the-art tools and technologies.

PEO3: Leadership Skills: The postgraduates will exhibit their leadership skills with ethics, integrity, competency and social responsibility.

PEO4: Lifelong Learning: The postgraduates shall always stand out of the crowd by enhancing their abilities in their profession through lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.

PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

PROGRAM SPECIFIC CRITERIA (PSCs):

PSC 1: Apply the knowledge of mathematics, computing and management through critical thinking in addressing the real time problems.

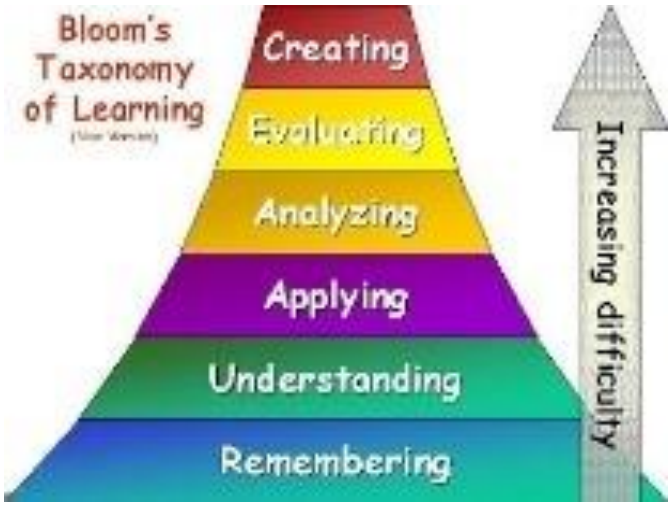
PSC 2: To design, analyze, model and realize physical systems, components or processes using modern software tools and technologies.

PSC 3: Prepare students to work professionally in multidisciplinary environments.

BLOOM'S TAXONOMY OF LEARNING OBJECTIVES

Bloom's Taxonomy in its various forms represents the process of learning. It was developed in 1956 by Benjamin Bloom and modified during the 1990's by a new group of cognitive psychologists, led by Lorin Anderson (a former student of Bloom's) to make it relevant to the 21stcentury. The **revised taxonomy** given below emphasizes what a learner "Can Do".

Lower order thinking skills(LOTS)		
L1	Remembering	Retrieve relevant knowledge from memory.
L2	Understanding	Construct meaning from instructional material including oral, written and graphic communication.
L3	Applying	Carry out or use a procedure in a given situation – using learned knowledge.
Higher order thinking skills(HOTS)		
L4	Analyzing	Break down knowledge into its components and determine the relationships of the components to one another and then how they relate to an overall structure or task.
L5	Evaluating	Make judgments based on criteria and standards, using previously learned knowledge.
L6	Creating	Combining or reorganizing elements to form a coherent or functional whole or into a new pattern, structure or idea.



Scheme of Teaching and Examination -1st to 4thSemesterMCA

As per the guidelines of UGC CBCS the courses can be classified into:

(i) Core Courses (PC): This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study. These courses will have 4 credits per course.

(ii) Foundation Courses: The Foundation Courses are of two kinds:

Compulsory Foundation: These courses are the courses based upon the content that leads to Knowledge enhancement. These courses provide opportunities to improve technological knowledge before entering industry as well as preparing students for higher degrees in technological subjects. They are mandatory for all disciplines. These courses will have 4 credits per course.

Foundation Electives: These are value based courses aimed at man making education. The course is related to **Humanities and Social Science Courses (HS).**

(iii) Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills.

(iv) Mandatory Non-Credit Courses (MNC): These courses are mandatory for students joining MCA Program and students have to successfully complete these courses before the completion of degree.

2020-21 Scheme of Teaching and Examination- 1st to 4th Semester M.C.A.

Total credits for M.C.A. Program: 100

	Semester	Credits per Sem	Total credits
1st year	1	28	56
	2	28	
2nd year	3	28	44
	4	16	
	Total	**100**	**100**

Curriculum framework:

Sl. No.	Course		Credits
1	Professional Core	PC	63
2	Professional Elective	GE	12
3	Compulsory Foundation	CF	8
4	Seminar	SC	01
5	Internship	CC	02
6	Project	CC	14
	Total		100

Credit definition:

Lecture (L): One Hour /week – 1 credit
Tutorial (T): Two hour /week – 1 credit
Practical (P): Two hours /week – 1 credit;

I Semester														
Sl. No.	**Course Code**	**Course Title& Category**		**Contact Hours**	**Contact Hours/ week**	**Credit Allocation**			**Total credit**	**Marks**				
										CIE		**SEE**		**TOTAL**
				L – T - P		**L**	**T**	**P**		**Theory**	**Lab**	**Theory**	**Lab**	
1.	20MCA11	Python Programming	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA12	Database Management Systems	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
3.	20MCA13	Computer Networks and Communication	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
4.	20MCA14	Object Oriented Software Engineering	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
5.	20MCA15	Computational Data Analytics	CF	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
6.	20MCA16	Digital Systems & Computer Organization	PC	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
		Total			32				28	300	100	300	100	800

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course
CF: Compulsory Foundation **I**: Integrated course **MNC:** Mandatory Non-Credit Course

***Course as per University Guidelines**

S.No.	**Course Code**	**Course Title & Category**		**Contact Hours**	**Contact Hours/Week**	**Credit Allocation**			**Total Credit**	**Marks**				
										CIE		**SEE**		**Total**
				L – T – P		**L**	**T**	**P**		**Theory**	**Lab**	**Theory**	**Lab**	
1	20MCA17	Basics of Programming Languages (I) (Bridge Course)	CF	2 – 0 – 2	2 – 0 – 2	2	-	2	MNC	50	25	50	25	150

II Semester														
Sl.No.	**Course Code**	**Course Title & Category**		**Contact Hours**	**Contact Hours /week**	**Credit Allocation**			**Total credits**	**Marks**				
				L -T- P		**L**	**T**	**P**		**CIE**		**SEE**		**TOTAL**
										Theory	**Lab**	**Theory**	**Lab**	
1.	20MCA21	Data Structures	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA22	Programming using Java& J2EE	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
3.	20MCA23	Web Design and Development	PC	4 – 0 –2	6	4	0	1	5	50	25	50	25	150
4.	20MCA24	Operating Systems	CF	4 – 0 – 0	4	4	0	0	4	50	N/A	50	N/A	100
5.	20MCA25	Research Methodology & Intellectual Property Right	PC	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
6.	20MCA26x	Elective – 1	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
7.	20MCA27x	Elective – 2	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
8.	20MCA28	Professional Communication & Ethics	CF	2 – 0 – 0	2	-	-	-	MNC	50	N/A	N/A	N/A	50
9.	20MCA29	Employability Skill	CF	3 – 0 – 0	3	-	-	-	MNC	50	N/A	N/A	N/A	50
		Total			36				28	450	75	350	75	950

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course
CF: Compulsory Foundation **GE:** Generic Elective **I**: Integrated course

Elective Groups

Note: Students are advised to select any one subject from the following elective groups for Elective-1 and Elective-2 respectively.

Elective Group-1

Sl.No.	Course Code	Course Title
1	20MCA261	Cyber Security and Cyber Law
2	20MCA262	Management and Entrepreneurship for IT Industry
3	20MCA263	Internet of Things *
4	20MCA264	Advanced Computer Networks
5	20MCA265	Software Testing

Elective Group-2

Sl.No.	Course Code	Course Title
1	20MCA271	Digital Marketing
2	20MCA272	Software Project Management
3	20MCA273	Information Network Security
4	20MCA274	Distributed Systems
5	20MCA275	Advanced Python

NOTE: The courses with the '*' mark indicate that the courses will be project based learning. For these courses the Semester End Examination will be a project.

Certification Course:

- One certification is compulsory and need to be completed before start of 4th semester.
- Choose certifications, which have industrial acceptance.
- Students must submit the certificate with valid score of the certifications they have completed to the department during 4^{th} semester. **This is mandatory for the award of the credits and degree.**
- These certifications are evaluated by a panel formed at college level during 4^{th} semester for the award of 1 credit.

III Semester														
S.No.	**Course Code**	**Course Title & Category**		**Contact Hours**	**Contact Hours/ Week**	**Credit Allocation**			**Total credit**	**Marks**				
				L- T- P		**L**	**T**	**P**		**CIE**		**SEE**		**TOTAL**
										Theory	**Lab**	**Theory**	**Lab**	
1.	20MCA31	Design & Analysis of Algorithms	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
2.	20MCA32	Big Data Paradigm	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
3.	20MCA33	C# Programming with .NET	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
4.	20MCA34	Machine Learning	PC	4 – 0 – 2	6	4	0	1	5	50	25	50	25	150
5.	20MCA35x	Elective – 3	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
6.	20MCA36x	Elective – 4	GE	3 – 0 – 0	3	3	0	0	3	50	N/A	50	N/A	100
7.	20MCA37	Mini Project	CC	0–0 – 2	2	0	0	2	2	N/A	50	N/A	50	100
				Total	32				28	300	150	300	150	900

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **L:** Lecture **T:** Tutorial **P:** Practical **CC:** Professional Course
GE: Generic Elective **I:** Integrated course

NOTE: Recommended to publish paper on Mini project work in any reputed journals like IEEE/ Springer/Elsevier (Science Direct)/Scopus/DBLP indexed conference etc.

Elective Groups

Note: Students are advised to select any one subject from the following elective groups for Elective-3 and Elective-4 respectively

Elective Group- 3

Sl. No.	Course Code	Course Title
1	20MCA351	Recommender System
2	20MCA352	'R' Programming*
3	20MCA353	Cloud Computing
4	20MCA354	Advanced Database Management Systems
5	20MCA355	Information Storage Networks

Elective Group- 4

Sl. No.	Course Code	Course Title
1	20MCA361	NoSQL
2	20MCA362	Full Stack development*
3	20MCA363	Artificial Intelligence
4	20MCA364	Block Chain Technology
5	20MCA365	Information Retrieval

NOTE: - The courses with the '*' mark indicate that the courses will be project based learning. For these courses the Semester End Examination will be a project

IV Semester									
Sl. No.	**Course Code**	**Course Title& Category**		**Contact Hours/ Week**	**Credits**	**Marks**			**Total Marks**
						CIE	**SEE**		
							Demonstration, Presentation and Viva	**Dissertation**	
1	20MCA41	Industry Internship	CC	N/A	2	50	--	--	50
2	20MCA42	Project Work	CC	FT	12	50	100	50	200
3	20MCA43	Technical Seminar	SC	1	1	50	-	-	50
4	20MCA44	Certification (Cambridge / Technical Certification)	PC	1	1	--	--	--	--
		Total		**--**	**16**	**150**	**150**	**50**	**350**

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3rd Semester Master of Computer Applications (M.C.A.)
Syllabus (2020-21 Scheme)

Design & Analysis of Algorithms (Integrated)

Course Code	20MCA31	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs Practical =12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To make understand the concepts to provide a solid background in the design and analysis of the major classes of algorithms
2. To elaborate design of algorithms, manipulate algorithms, understand algorithms, analyze algorithms, compare algorithms, and appreciate the working of an efficient algorithm
3. To impart the knowledge of algorithmic power and how the limitation can be coped up by using design techniques like backtracking and branch-and-bound, and finally conclude with a discussion of few approximation algorithms
4. To explore analytical skills and problem-solving skills.

Pre-requisite:

1. Computational Data Analytics (20MCA15)
2. Data Structures (20MCA21).

Unit – I 10 Hours

Introduction, Analysis of algorithmic efficiency

Notion of Algorithm, Fundamentals of algorithmic problem solving, important problem types, fundamental data structures, Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical Analysis of Non-Recursive and Recursive Algorithms, Examples

List of Experiments:

1. Experiments based on recursive and non-recursive concepts.

Unit –II 11 Hours

Brute Force, Divide and Conquer

Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching, Exhaustive Search for Travelling Salesman Problem, Knapsack Problem and Assignment Problem. Introduction to divide and conquer technique, Merge Sort, Quick Sort, Binary Search, multiplication of large integers.

List of Experiments:

1. Experiments based on Brute Force concepts

2. Experiments based on Divide and Conquer concepts

Unit –III 10 Hours

Decrease and Conquer, Space and Time Tradeoffs

Insertion sort, Depth First Search, Breadth First Search, Topological Sorting, sorting by counting, Input Enhancement in string matching,

List of Experiments:

1. Experiments based on Decrease and Conquer concepts

2. Experiments based on Space and Time Tradeoffs concepts like string matching etc.

Unit – IV **11 Hours**

Dynamic Programming, Greedy Method

Warshall's Algorithm, Floyd's Algorithm, 0/1 Knapsack, Greedy Knapsack Problem, Prim's Algorithm, Kruskal's Algorithm, Dijikstra's Algorithm, Huffman Trees.

List of Experiments:

1. Experiments based on Decrease and Conquer concepts

Unit – V **10 Hours**

Coping with Limitations of Algorithmic Power

Lower-Bound Arguments, Decision Trees, P, NP, and NP-Complete Problems. Backtracking: n - Queens's problem, Hamiltonian Circuit Problem, Subset – Sum Problem. Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesperson Problem.

List of Experiments:

1. Experiments based on Backtracking

2. Experiments based on Branch and Bound technique

Text Books

1. Anany Levitin: "Introduction to the Design & Analysis of Algorithms", 2nd Edition, Pearson Education, 2007.
2. Thomas H. Cormen, Charles E Leiserson, Ronald R. Livest, Clifford Stein, "Introduction to Algorithms",2nd Edition, McGraw-Hill, 2001
3. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press, 2007.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Analyze** the algorithm efficiency using general framework.	L4
2.	**Make use of** general method to solve problems like Knapsack and Job sequencing with Deadlines	L3
3.	**Apply** different strategies for searching and sorting the elements in given list	L4
4.	**Solve** by applying different strategies like Dynamic Programming and Greedy Techniques to solve graphical problems	L3
5.	**Demonstrate** the mathematical analysis of recursive algorithms and non-recursive algorithms with relevant examples.	L4
6.	**Develop and Demonstrate** the concepts of all techniques of algorithms	L5

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
3	Postgraduates will demonstrate an ability to design and conduct experiments,	**3**

	analyze and interpret data	
4	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
5	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**
6	Postgraduates can participate and succeed in competitive examinations	**11**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment:

Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**2**			**2**						**2**	
CO2		**2**			**1**						**1**	
CO3		**2**			**1**						**1**	
CO4		**2**			**1**						**1**	
CO5		**2**			**2**						**1**	
CO6		**2**			**3**						**1**	
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**3**	**2**	
CO2	**2**	**2**	
CO3	**2**	**2**	
CO4	**2**	**2**	
CO5	**2**	**2**	
CO6	**2**	**2**	

Course delivery methods	Assessment methods
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**
3. Video	**3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours' duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours' duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Big Data Paradigm (Integrated)

Course Code	20MCA32	Credits	05
Course type	PC	CIE Marks	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	SEE Marks	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs Practical =12 Hrs; Total = 52Hrs	SEE Duration	3 Hours for 100 Marks

Course learning objectives

1. To emphasize on big data dimensions and its applications with case studies.
2. To explore Hadoop framework and architecture
3. To emphasize the importance of Map Reduce framework
4. To explore big data tools and technologies: Pig and Hive
5. To introduce visualization techniques on data to analyze and provide business insights using tableau.

Pre-requisites:

1. Programming using Java and J2EE (20MCA22)

Unit – I **10 Hours**

Overview of Big data

What is Big data? Structuring Big data, Elements of Big data, Advantages of Big data, Use of Big Data in Social Networking, Use of Big Data in Preventing Fraudulent Activities; Use of Big Data in Retail Industry.

Unit – II **10 Hours**

Hadoop Ecosystem

Understanding Hadoop Ecosystem, Hadoop Distributed File System: HDFS Architecture, Concept of Blocks in HDFS Architecture, Name Nodes and Data Nodes, The Command-Line Interface, Using HDFS Files, Hadoop-Specific File System Types, HDFS Commands, The org.apache.hadoop.io package, HDFS High availability, Features of HDFS.

List of Experiments:

1. **Hadoop environment setup**
2. **Hadoop file management tasks**
3. **HDFS Commands**

Unit – III **11 Hours**

Understanding Map Reduce and YARN

The Map Reduce Framework: Exploring the Features of Map Reduce, Working of Map Reduce, Exploring Map and Reduce Functions, Uses of Map Reduce.

YARN Architecture: Background; Advantages of YARN

List of Experiments:

1. Map Reduce process implementation programs

Unit – IV **10 Hours**

Introducing Hive and Analysing Data with Pig

Getting started with Hive, Hive Services, Data types in Hive, Built-in Functions in Hive. **Hive DDL.** Introduction to Pig: The Pig Architecture, Benefits of Pig, **Working with operators in Pig.**

List of Experiments:

1. Hive process implementation

2. HIVE built-in function implementation.

3. Hive DDL statements

4. Analysis using Operators in Pig

Unit – V **11 Hours**

Data Visualization

Introduction, Techniques used for visual Data Representation, Types of Data Visualization, Applications of Data Visualization, Visualizing Big Data Tools used, Visualization, Tableau Products Data Visualization with Tableau: Introduction to Tableau software, Tableau Workspace, Data Analytics in Tableau Public, Using visual controls in Tableau Public.

List of Experiments:

1. Visualization in Tableau Public

Text Books

1. DT Editorial Services Big Data – Black Book Dreamtech Press, Edition – 2015, ISBN -978-93-5119-931-1.
2. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, Understanding Big Data – Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012
3. P. J. Sadalage and M. Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Addison-Wesley Professional, 2012.
4. Tom White, Hadoop: The Definitive Guid, Third Edition, O'Reilly, 2012

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the importance of Big Data, its characteristics and use of Big Data in different fields or sectors.	L 3
2.	**Analyze** the components of ecosystem of Hadoop and HDFS architecture.	L 4
3.	**Apply** map reduce framework in analyzing the data and relate to YARN	L 3
4.	**Explain** the tools in analyzing the data and managing Big Data	L 2
5.	**Analyze** the data using the visualization technique like tableau.	L 4
6.	**Build and Analyze** data with Hadoop ecosystem	L 4

Program Outcome of this course (POs)		PO No.
1.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
2.	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**
3.	Postgraduates will demonstrate skills to use modern software tools and	**6**

	technology to build and test applications.	

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**1**									
CO2			**1**		**2**	**2**						
CO3			**2**		**2**	**2**						
CO4			**2**		**2**							
CO5			**1**		**1**	**1**						
CO6			**2**		**2**	**2**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**	**1**	
CO2	**2**		**2**
CO3	**2**		**2**
CO4	**1**		**1**
CO5	**1**		**1**
CO6	**2**	**1**	**2**

Course delivery methods	Assessment methods
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**
3. Video	**3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	
Lab	10	10	5	25	
Total CIE: 50 (T) +25(L) = 75 marks					
Minimum score to be eligible to SEE for this course : 40% in each component					
Not eligible in any one of the component will be considered as NOT eligible for the Course					

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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C# Programming with .NET (Integrated)

Course Code	20MCA33	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week:	4 – 0 – 2	**SEE Marks**	50 (T) + 25(L)
Total Hours	Lecture = 40 Hrs; Tutorial = Hrs Practical =12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce .NET platform's core aspects with applications development approach.
2. To focus on real time usage of Object-Oriented features using C# programming language.
3. To emphasize on ADO.NET services to achieve data communication with linear and non-linear database systems.
4. To introduce ASP.NET services for developing dynamic web applications.

Pre-requisite:

- NIL

Unit – I **12 Hours**

Introduction to .NET Framework and C# 5.0

Benefits of .NET framework, architecture of .NET framework. C# preprocessor directives, simple console application, identifiers, keywords, data types, variables and constants. Expressions and operators, Checked and unchecked statements.

List of Experiments:

1. Checked and unchecked statements.

Unit – II **10 Hours**

Object Oriented Programming using C#

Namespaces, the system namespace, classes and objects, constructors and destructors, static classes and static class members, properties, indexers, structs. Encapsulation, inheritance, polymorphism, abstraction, interfaces.

List of Experiments:

1. C# indexers
2. C# properties

3. Partial classes.

Unit – III **10 Hours**

Data Access with ADO.NET

Understanding ADO.NET, typed vs untyped dataset, data reader, creating connection string, creating connection to a database SQL, OLEDB's and ODBC, creating SQL command object, working with data adapter. Using data reader to work with database.

List of Experiments:

1. Developing windows applications using ADO.NET. (Databases, datasets, connection types, data reader etc.).

Unit – IV **10 Hours**

Web Development using ASP.NET

Specifying a location for a web application, file types in ASP.NET4.5, exploring ASP.NET4.5 web pages, code render blocks, ASP.NET4.5 page directive, web forms: standard controls – the label control, the button control, the textbox control, the literal control, the placeholder control, the hidden filed control, the file upload control, the image control, the image button control, the list box control, the drop down list control, the check box control, the radio button control, the table control.

List of Experiments:

1. Development of web applications using ASP.NET and also different web forms: standard controls and databases.

Unit – V **10 Hours**

Validation Control and Master Pages

Unobtrusive validation in ASP.NET web forms, the base validator class, the required file validator control, the range validator control, the regular expression validator control, the compare validator control, the custom validator control. Understanding the need for master pages and themes, understanding Master page, creating master pages, configuring master pages, loading master pages dynamically.

List of Experiments:

1. Development of web applications using ASP.NET web forms and Master pages along different validation controls.

Text Books

1. .NET4.5 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiely-Dream Tech Press
2. Anne Boehm, Joel Murach, Murach's ASP.NET 4 web programming with C# 2010, Mike Murach & Associates Inc.; 4th edition

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Illustrate** the various components of .NET framework	L2
2.	**Apply** object oriented features using C# for developing applications.	L3
3.	Choose to build widows applications using windows presentation foundation.	L3
4.	**Analyze** the ADO.NET service providers to choose appropriate database and establish database connectivity.	L4
5.	**Assess** various concepts of ASP.NET and choose as per requirement specification	L5
6.	**Build** dynamic and rich applications with consistent look and authentic validations using validation control and master pages.	L6

Sl. No	Program Outcomes (POs)	PO No.
1	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
2	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
3	Postgraduates will demonstrate an ability to analyze and build computer	**5**

	applications for multiple domains.	
4	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1					**1**							
CO2				**2**								
CO3				**1**								
CO4			**1**			**2**						
CO5			**2**	**2**	**1**	**2**						
CO6			**2**	**2**	**2**	**2**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**3**	**1**	
CO2	**2**	**2**	
CO3	**2**	**2**	
CO4		**2**	
CO5	**2**		**2**
CO6	**2**	**2**	**2**

Course delivery methods	Assessment methods
1. Lecture	**1. Internal Assessment Test**
2. Power-Point Presentation	**2. Quiz**
3. Video	**3. Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/ Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					

Lab component:				
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks
Lab	10	10	5	25
Total CIE: 50 (T) +25(L) = 75 marks				
Minimum score to be eligible to SEE for this course : 40% in each component				
Not eligible in any one of the component will be considered as NOT eligible for the Course				

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Machine Learning (Integrated)

Course Code	**20MCA34**	**Credits**	05
Course type	PC	**CIE Marks**	50 (T) + 25(L)
Hours/week: L-T-P	4-0-2	**SEE Marks**	50 (T) + 25(L)
Total Hours:	Lecture = 40 Hrs; Tutorial = Hrs Practical =12 Hrs; Total = 52Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce the concept of machine learning.
2. To illustrate working of various machine learning algorithms like classification, clustering, neural networks and their applications.
3. To explore the implementation of various machine learning techniques to extract hidden information from large data repository

Pre-requisites :

1. Computational Data Analytics (20MCA15)

Unit – I 12 Hours

Introduction , Concept Learning and Data Mining

Well-Posed Learning Problems, Perspective and Issues in Machine Learning. Concept learning task, Concept learning as Search, Find-S algorithm

Introduction, Types of Attributes, Data Mining Tasks, Data Preprocessing, Measures of Similarity and Dissimilarity

List of Experiments:

1. Regression
2. Measure of Similarity and Dissimilarity

Unit – II 10 Hours

Decision Tree Learning and alternative Techniques

Basics, General Approach to Solve Classification problem, Decision Tree Induction, Model Over fitting, Evaluating the Performance of Classifier, Rule-Based Classifier

List of Experiments:

1. Decision tree algorithm using ID3/C4.5

Unit – III 10 Hours

Clustering Techniques

Overview, Types of Cluster Analysis Methods, K-means, Agglomerative Hierarchical Clustering, DBSCAN , Cluster Evaluation

List of Experiments:

1. K –means clustering

Unit – IV 10 Hours

Bayesian Learning and Instance Based Learning

Introduction, Bayes theorem, Using Bayes Theorem for Classification, Naive Bayes classifier, Bayesian Belief Networks

Introduction, Nearest Neighbor Classifiers

List of Experiments:

1. K-NN algorithm

2. Naive Bayes algorithm

Unit – V **10 Hours**

Artificial Neural Networks

Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptrons , Multilayer Networks and the Back Propagation Algorithm

List of Experiments:

1.Neural networks

Text Books

1. Tom M. Mitchell, Machine Learning**,** Indian Edition 2013, McGraw Hill Education
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumsar: Introduction to Data Mining, Pearson, LPE,2014
3. Ethem Alpaydın, Introduction to Machine Learning, Second Edition, MIT press.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the problems for machine learning and select either supervised, unsupervised learning or **Make use of** similarity and dissimilarity measures.	**L3**
2.	**Apply** the decision tree machine learning algorithms for classification in real world domains.	**L3**
3.	**Make use of** different clustering techniques to form clusters from data set.	**L3**
4.	**Utilize** Bayesian classifier and **k**-Nearest neighbor algorithms.	**L3**
5.	**Make use of** Artificial neural network technique to learn the model for solving real world problems.	**L3**
6	**Build** application using machine learning algorithms for prediction and knowledge discovery from large data repository	**L6**

	Program Outcome of this course (POs)	**PO No.**
1.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
2.	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**
3.	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions	**12**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**2**									
CO2			**2**		**2**							
CO3			**1**		**2**							
CO4			**1**		**2**							
CO5					**1**							**1**
CO6			**1**		**2**							
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**2**	**2**	
CO3	**2**	**2**	
CO4	**2**	**1**	
CO5	**2**	**1**	
CO6	**2**	**2**	

Course delivery methods

1. **Lecture**
2. **Power-Point Presentation**
3. **Video**

Assessment methods

1. **Internal Assessment Test**
2. **Quiz**
3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project/	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
■ 100 marks will be reduced to 50 marks for the calculation of SGPA and CGPA.					
Lab component:					
Components	Conduct of the lab	Journal submission	Lab Test	Total Marks	

Lab	10	10	5	25
Total CIE: 50 (T) +25(L) = 75 marks				
Minimum score to be eligible to SEE for this course : 40% in each component				
Not eligible in any one of the component will be considered as NOT eligible for the Course				

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Theory Component:			
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.		
Lab component:			
1.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
2.	It will be conducted for 50 marks having 3 hours/2 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**		
3.	Viva-voce is conducted for individual student.		
Total SEE: 50(T) +25(L) = 75 marks			
Minimum score for passing this course : 40% in each component compulsory			
Not eligible in any one of the component will be considered as NOT eligible for the Course			

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Elective Group-3

Recommender System (Theory)

Course Code	20MCA351	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hr; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce the concept of a recommender system and to introduce the methods of predicting the ratings of user-item combinations on the basis of their neighborhoods.
2. To provide knowledge of machine learning methods in the context of predictive models and to make recommendations based on the descriptive attributes of items through content-based recommender systems
3. To explore features of knowledge-based recommender systems
4. To explore the possibility of developing more effective recommender systems by using hybridization and ensemble based techniques.
5. To explore different models used for evaluating recommender systems

Pre-requisite:

- Computational Data Analytics (20MCA15)

Unit – I 9 Hours

Introduction to Recommender Systems and Neighborhood-Based Collaborative Filtering

Introduction, Goals of Recommender Systems, Basic Models of Recommender Systems, Domain-Specific Challenges in Recommender Systems; Key Properties of Ratings Matrices, Predicting Ratings with Neighborhood-Based Methods

Unit –II 10 Hours

Model-Based Collaborative Filtering and Content-Based Recommender Systems

Introduction to model-based collaborative filtering, Decision and Regression Trees, Rule-Based Collaborative Filtering; Introduction to content-based recommender systems, Basic Components of Content-Based Systems, Preprocessing and Feature Extraction, Learning User Profiles and Filtering

Unit – III 8 Hours

Knowledge-Based Recommender Systems

Introduction, Constraint-Based Recommender Systems, Case-Based Recommenders, Persistent Personalization in Knowledge-Based Systems

Unit – IV 9 Hours

Ensemble-Based and Hybrid Recommender Systems

Introduction, Ensemble Methods from the Classification Perspective, Weighted Hybrids, Switching Hybrids, Cascade Hybrids, Feature Augmentation Hybrids, Meta-Level Hybrids, Feature Combination Hybrids, Mixed Hybrids

Unit – V 9 Hours

Evaluating Recommender Systems

Introduction, Evaluation Paradigms, General Goals of Evaluation Design, Design Issues in Offline Recommender Evaluation, Accuracy Metrics in Offline Evaluation, Limitations of Evaluation

Measures

Text Books

1. Charu C. Aggarwal, "Recommender Systems", Springer International Publishing Switzerland 2016, ISBN 978-3-319-29659-3 (eBook)
2. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1st ed.
3. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, Springer(2011), 1st ed.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Interpret** a recommender systems and **Make use of** Neighborhood-Based methods for building recommender systems	L3
2.	**Assess** the model-based collaborative filtering and content based approach of developing recommender systems	L5
3.	**Inspect** various methods of developing knowledge-based recommender systems	L4
4.	**Utilize** hybrid and ensemble-based techniques to build recommender systems	L3
5.	**Analyze** different methods of evaluating recommender systems.	L4

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
3	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2	Successful Career and Entrepreneurship: The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.

3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**		**2**									**1**
CO2	**2**		**2**									**1**
CO3	**2**		**2**									**2**
CO4	**2**		**2**									**2**
CO5	**2**		**2**									**2**

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**3**		
CO2	**3**		
CO3	**3**		**1**
CO4	**3**		**1**
CO5	**2**		**1**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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'R' Programming (Theory)

Course Code	20MCA352	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To emphasize to learn R. Programming language.
2. To Explore Graphics, modelling, write functions and use R in an efficient way.
3. To Fit some basic types of statistical models and use R in their own research work.
4. To Perform data analytics, data visualisation using R
5. To emphasize students to become data analyst.

Pre-requisite:

1. Computational Data Analytics (20MCA15)

Unit – I **9 Hours**

Introduction

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

Unit – II **9 Hours**

R Programming Structures

R Programming Structures, Control Statements, Loops, - Looping Over Non vector Sets-If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation- Extended Example: A Binary Search Tree.

Unit – III **9 Hours**

Doing Math and Simulation in R

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files.

Unit – IV **9 Hours**

Graphics

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files.

Unit – V **9 Hours**

Probability Distributions

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance. Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Spines- Decision- Random Forests

Text Books

1. The Art of R Programming, Norman Matloff, Cengage Learning / No starch press, 2011
2. Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013
3. R Cookbook, Paul Teetor, Oreilly, 2011.
4. R in Action, Rob Kabacoff, Manning, Third Edition
5. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.
6. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the importance and various data structures of R Programming for data analytics and decision making.	L3
2.	**Identify the** basic structures, loops and functions of R as a programming language.	L3
3.	**Experiment with** built-in functions for math operations used in statistical distributions.	L3
4.	**Analyze** the R's base or traditional graphics package to start working with graphics in R.	L4
5.	**Determine** to handle all the necessities of statistics, including drawing random numbers and calculating distribution values means, variances, maxmima and minima, correlation.	L5
6.	**Build** scripts for analysing data for applications.	L4, L6

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
2	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**
3	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver quality applications for business success.	**2**
3.	**Successful Career and Entrepreneurship:** The ability to employ modern	**3**

	computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**1**			**2**						
CO2			**2**			**1**						
CO3			**1**			**2**						**1**
CO4			**2**			**1**						**1**
CO5			**2**			**1**						**2**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		**1**
CO2		**1**	**1**
CO3	**1**		**2**
CO4	**2**	**1**	
CO5	**2**	**2**	

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	**Addition of two IA tests**	**Project Evaluation Phase I**	**Project Evaluation Phase II**	**Total Marks**
Maximum Marks: 50	**15 + 15 = 30**	**10**	**10**	**50**

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Project Viva-Voce:			
1.	Problem definition and objectives	15	100 marks
	Data Analysis based on the objectives	20	
	Plotting and Visualization	20	
	Presentation	10	
	Modifications	20	
	Project Dissertation	15	
2.	It will be conducted for 100 marks having 3 hours duration. **It will be reduced to 50 marks for the calculation of SGPA and CGPA.**		
Total SEE: 50(T) = 50 marks			
Minimum marks required in SEE to pass: 40 out of 100			

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Cloud Computing (Theory)

Course Code	20MCA353	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To impart fundamental concepts in the area of cloud computing.
2. To give an insight in to knowledge applications of cloud computing.
3. To explore the cloud computing paradigm.
4. To introduce the features of cloud security.

Pre-requisite:

- NIL

Unit – I 9 Hours

Introduction to Cloud Computing and its Platforms

Introduction ,Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka

Unit – II 9 Hours

Cloud Resource Virtualization

Virtualization, Layering and Virtualization, Virtual machine monitors, Virtual machines, Performance and Security Isolation, Full Virtualization and Paravirtualization, Hardware support for Virtualization, Case Study: Xen, a VMM based on Paravirtualization, The darker side of Virtualization.

Unit – III 9 Hours

Cloud Resource Management and Scheduling

Policies and Mechanisms for Resource Management, Stability of Two-Level Resource Allocation Architecture, Feedback control Based on Dynamic Thresholds, Resource Building: Combinatorial Auctions for Cloud Resources, Scheduling Algorithms for Computing Clouds, Fair Queuing, Resource Management and Dynamic Application Scaling.

Unit – IV 9 Hours

Cloud Computing Applications

Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.

Unit – V 9 Hours

Cloud Security Basics

Cloud security fundamentals: Vulnerability assessment tool for cloud, Privacy and Security in cloud computing security architecture: Architectural Considerations General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Microarchitectures; Identity Management and Access Control, Identity management, Access control, Autonomic Security Cloud computing security challenges: Virtualization security management, virtual threats, VM Security Recommendations, VM-Specific Security techniques.

Text Books

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education edition, 2013
2. Dan C. Marinescu, cloud Computing Theory and Practice, Elsevier Inc., 2013
3. Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley-India.
4. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies, Wiley India Edition.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** fundamental concepts of cloud computing, distributed computing and clustering.	L 3
2.	**Interpret and analyse** the cloud resource virtualization, security isolation, the darker side of virtualization.	L 4
3.	**Apply** and **organize** cloud resource management and scheduling algorithms for computing clouds.	L 3
4.	**Appraise** different cloud applications in various fields.	L 5
5.	**Assess** the importance and challenges of cloud security.	L 5

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
3	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**2**	**2**	**1**								
CO2		**1**	**2**	**1**								
CO3		**1**	**2**	**1**								
CO4		**1**	**2**	**1**								
CO5		**2**	**1**	**1**								
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3	**2**		
CO4	**1**		
CO5	**1**		**2**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

*****

Advanced Database Management System (Theory)

Course Code	20MCA354	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To provide a clear understanding of the architectural and algorithmic aspects of Data Base Management System(DBMS)
2. To emphasize about advanced database with the concepts of storage, indexing, transaction management, structure, relational operators and query optimization.
3. To emphasize on knowledge about evaluation of queries and query optimization.
4. To provide knowledge about physical database design and database tuning.

Pre-requisite:

1. Operating systems (20MCA24).
2. Database management system (20MCA14).

Unit – I 9 Hours

Overview of Storage and Distributed Database Concepts

RAID; Disk space management; Buffer manager; Files of records; Page formats and record formats. Distributed Database Concepts, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design, Overview of Concurrency Control and Recovery in Distributed Databases, Overview of Transaction Management in Distributed Databases, Query Processing and Optimization in Distributed Databases, Distributed Database Architectures.

Unit – II 9 Hours

Tree-Structured and Hash-Based Indexing

Intuition for tree indexes; Indexed sequential access method; B+ trees, Search, Insert, Delete, Duplicates, B+ trees in practice

Hash-Based Indexing: Static hashing, Extendible hashing, linear hashing, comparisons

Unit – III 9 Hours

Overview of Query Evaluation and External Sorting

The system catalog, Introduction to operator evaluation; Algorithm for relational operations; Introduction to query optimization; Alternative plans; A motivating example; What a typical optimizer does.

When Does a DBMS sort data?, A simple two-way merge sort; External merge sort

Unit – IV 9 Hours

Evaluating Relational Operators and A Typical Relational Query Optimizer

The Selection operation; General selection conditions; The Projection operation; The Join Operation; The Set operations; Aggregate operations; The impact of buffering.

Translating SQL queries in to Relational Algebra; Estimating the cost of a plan; Relational algebra equivalences; Enumeration of alternative plans

Unit – V 9 Hours

Physical Database Design and Tuning

Introduction to physical database design; Guidelines for index selection, Basic examples of index selection; Clustering and indexing; Indexes that enable index-only plans, Tools to assist in index selection; Overview of database tuning; Choices in tuning the conceptual schema; Choices in tuning queries and views; Impact of concurrency; DBMS benchmarking; Case Study.

Text Books

1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw-Hill,2003.
2. Elmasri and Navathe:Fundamentals of Database Systems,5th Edition, Pearson Education, 2007.
3. Conolly and Begg: Database Systems,4th Edition, Pearson Education,2002.
4. Database System Concepts Abraham Silberschatz, Henry F. Korth, S. Sudarshan McGraw Hill 6th Edition, 2010

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Summarize** the fundamental of storage, indexing, transaction management concepts and **Assess** Distributed Databases.	L 5
2.	**Analyze and Evaluate** the different indexing structures.	L 5
3.	**Appraise** the concepts of query evaluation and external sorting of data.	L 4
4.	**Evaluate** the relational operators and query plans.	L 5
5.	**Interpret** and **summarize** the large volume data with its design and performance tuning	L 5

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
3	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**6**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**		**1**			**1**						
CO2	**1**		**2**			**1**						
CO3	**1**		**2**			**2**						
CO4	**2**		**2**			**2**						
CO5	**1**		**2**			**1**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**	**1**	
CO2	**1**	**1**	
CO3	**1**	**1**	
CO4	**1**	**1**	
CO5	**1**	**1**	

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Information Storage Networks (Theory)

Course Code	20MCA355	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To comprehend Information Storage characteristics and components.
2. To explain the fundamental constructs of striping, mirroring and parity which form the basis for various RAID levels.
3. To explain Fibre Channel protocols and how SAN components use them to communicate with each other.
4. To emphasize on the various emerging technologies like NAS, iSCSI and FCIP.
5. To provide information on security, backup and recovery

Pre-requisite:

1. Computer Networks and Communication (20MCA13)

Unit – I **09 Hours**

Introduction to Information Storage and Data Center Environment

Information Storage – Data, Types of Data, BigData, Information, Storage, Evolution of Storage Architecture, Data Center Infrastructure -Core Elements of a Data Center, Key Requirements for Data Center Elements, managing a Data Center, Disk Drive Components, Disk Drive Performance, Fundamental Laws Governing Disk Performance, Logical Components of the Host, Application Requirements and Disk Performance.

Unit – II **09 Hours**

Data Protection, Fibre Channel Storage Area Networks

Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares, Overview of Fibre Channel, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Switched Fabric Login Types, Zoning, FC SAN Topologies, Intelligent Storage system.

Unit – III **09 Hours**

IP SAN, Network-Attached Storage

iSCSI, FCIP, General-Purpose Servers versus NAS Devices, Benefits of NAS, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance

Unit – IV **09 Hours**

Securing the Storage Infrastructure

Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Monitoring the Storage Infrastructure.

Unit – V **09 Hours**

Backup and Archive

Backup purpose, Backup considerations, Backup granularity, Recovery considerations, Backup methods, Backup architecture, Backup and restore operations, Backup topologies, Backup in NAs environments, Backup targets, Data deduplication for backup, Backup in virtualized environments,

data archive, Archiving solution architecture.

Text Books

1. G. Somasundaram, Alok Shrivastava, Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, 2nd Edition, EMC Education Services, Wiley Publishing Inc., 2012
2. Robert Spalding, "Storage Networks: The Complete Reference",Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne. 2001.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Summarize** fundamental concepts of Information Storage and Data Center environment.	L 2
2.	**Identify** the fundamental constructs of various RAID, Fibre Channel protocols and SAN components to communicate with each other.	L 3
3.	**Identify** the importance of emerging NAS, iSCSI and FCIP technology.	L 3
4.	**Appraise** the importance and challenges of information on Securing the Storage Infrastructure.	L 5
5.	**Identify** the importance and challenges of information backup and archive	L 3

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
3	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	**7**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**1**					**1**					
CO2	**2**	**2**					**1**					
CO3	**2**	**1**					**1**					
CO4	**1**	**2**					**2**					
CO5	**1**	**1**					**1**					
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		**2**
CO2	**1**		**1**
CO3	**1**		**1**
CO4	**1**		**1**
CO5			**1**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Elective Group - 4

NoSQL (Theory)

Course Code	**20MCA361**	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week: L-T-P	3-0-0	**SEE Marks**	50
Total Hours:	Lecture = 45Hrs; Tutorial = 0 Hrs Total = 45Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce the concepts of data and need of NoSQL.
2. To explore different flavors of NoSQL like MongoDB, HBase, Cassandra.
3. To give an insight in to the designing, storing and accessing the data base using NoSQL
4. To emphasize on developing web application using PHP and NoSQL

Pre-requisites:

1. Database Management System (20MCA12).

Unit – I 9 Hours

Introduction to NoSQL

Definition of NoSQL, History of NoSQL and Different NoSQL products, Exploring MongoDB Java/Ruby/Python, NoSQL Storage Architecture

Unit – II 9 Hours

NoSQL Basics

CRUD operations with MongoDB and HBase, Querying, Modifying and Managing NoSQL Data stores, Indexing and ordering datasets (MongoDB)

Unit – III 9 Hours

Advanced NoSQL

NoSQL in Cloud, Parallel Processing with Map Reduce, Big Data with Hive, choosing NoSQL flavors

Unit – IV 9 Hours

Database Internals and Cassandra

Surveying Database Internals, migrating from RDBMS to NoSQL, the Cassandra Data Model, Reading and Writing Data: Query Basic write properties, basic read properties, and Deleting data

Unit – V 9 Hours

Developing Web Application with NoSQL
Comparing Documents in MongoDB and PHP, MongoDB Classes, Connecting and Disconnecting, Inserting Data, Listing Your Data, Returning a Single Document, Listing All Documents, Modifying Data with PHP, Deleting Data, DBRef, Creating A Blog Application with PHP driver

Text Books

1. Professional NOSQL,Shashank Tiwari, 2011, WROX Press
2. Cassandra: The Definitive Guide, Eben Hewitt, O'Reilly
3. The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, Apress 2010

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the limitations of RDBMs, need of NoSQL for Big Data, different NoSQL products with their storage architecture.	**L3**
2.	**Apply** CRUD operations with MongoDB and HBase, storing, indexing data and accessing data with MongoDB.	**L 3**
3.	**Construct** MapReduce - parallel programming model and make use of NoSQL products on cloud.	**L 3**
4.	**Explain** MongoDB internals and Utilize Cassandra operations.	**L 3**
5.	**Build web** applications using MongoDB with PHP.	**L 3**

	Program Outcome of course (POs)	**PO No.**
1.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data	**3**
2.	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains	**5**
3.	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications	**6**

Program Specific Outcome of this course (PSOs)		**PSO No.**
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**1**									
CO2			**2**		**2**	**2**						
CO3			**1**		**1**							
CO4			**1**									
CO5			**2**		**2**	**2**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**	**2**	
CO3	**2**		
CO4	**1**		
CO5	**1**	**2**	

Course delivery methods

1. **Lecture**
2. **Power-Point Presentation**
3. **Video**

Assessment methods

1. **Internal Assessment Test**
2. **Quiz**
3. **Assignment/Seminar/Project**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

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Full Stack Development (Integrated)

Course Code	20MCA362	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0Hrs Practical = 0Hrs; Total = 45Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1 To introduce MERN and its components
2 To impart the knowledge of creating and integrating API using Express and GraphQL
3 To provide the basics of creating and performing CRUD operations on MongoDB
4 To explore the concept of routing, or handling multiple pages
5 To handle different form inputs in React.

Pre-requisite:

1. Web Design and Development (20MCA23)

Unit – I **9 Hours**

Introduction to React

Introduction: What is MERN? MERN Components, Why MERN? Hello World: Server-Less Hello World, JSX, project Setup, Express, Separate Script File, JSX Transform, Older browsers support, automate. Introduction to ECMAScript 6

Unit – II **9 Hours**

React Components and State

React Components: Virtual Dom, Real Dom, Issue Tracker, React Classes, Composing Components, Passing Data using properties, passing data using children, Dynamic Composition. React State: initial state, Async State Initialization, updating state, lifting state up, event handling, stateless components, designing components.

Unit – III **9 Hours**

Express and GraphQL

Express, REST API, GraphQL, the about API, GraphQL schema file, the list API, List API integration, Custom scalar types, the create API, create API integration, query variables, input validations, displaying errors.

Unit – IV **9 Hours**

MongoDB

MongoDB Basics, MongoDB CRUD operations, MongoDB Node.js Driver, Schema Initialization, Reading from MongoDB, Writing from MongoDB.

Unit – V **9 Hours**

React Router and forms

Simple routing, route parameters, query parameters, links, programmatic navigation, nested routes, browser history router. React forms: controlled components, controlled components in forms, More filters, typed input, edit form, specialized input components, number input, date input, text input, update API, updating an issue, updating a field, delete API, deleting an issue.

Text Books

1. Vasan Subramanian, Pro MERN Stack, Apress 2nd Edition
2. Kirupa Chinnathambi Learning React Pearson Education 2017

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Make use of** MERN, react JSX, script file to develop simple web pages and provide support to older browsers.	L 3
2.	**Build** dynamic web application with React components that are composed using other components and basic HTML elements.	L 3
3.	**Construct** web pages with middleware API's, integrate API's, input validations and displaying of errors.	L 3
4.	**Utilize** MongoDB to store data and perform CRUD operations for real life applications.	L 3
5.	**Make use of** React Forms and Routers for handling user data and navigations in a website.	L 3
6.	**Build** a single-page application (SPA) or multiple logical pages (or views) within the application.	L 6

Sl. No	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
2	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**
3	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**
3.	**PSO3: Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1				**1**	**1**	**1**						
CO2				**1**	**2**	**1**						
CO3					**2**	**2**						
CO4				**2**	**2**	**2**						
CO5				**1**	**1**	**1**						
CO6				**2**	**2**	**2**						
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**2**	**1**	
CO3	**2**		
CO4	**1**	**1**	
CO5	**1**		
CO6			**1**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE)

Scheme of Continuous Internal Evaluation (CIE):

Components	**Addition of two IA tests**	**Project Evaluation Phase I**	**Project Evaluation Phase II**	**Total Marks**
Maximum Marks: 50	**15 + 15 = 30**	**10**	**10**	**50**
Writing two IA test is compulsory. **Minimum marks required to qualify for SEE : 20 out of 50**				

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			
Project Viva-Voce:			
1.	Problem definition and objectives	15	100 marks
	UI Design and development	30	

	Testing	10	
	Presentation	10	
	Modifications	20	
	Project Dissertation	15	
2.	It will be conducted for 100 marks having 3 hours duration. **It will be reduced to 50 marks for the calculation of SGPA and CGPA.**		
Total SEE: 50(T) = 50 marks			
Minimum score for passing this course : 40%			

****

Artificial Intelligence (Theory)

Course Code	20MCA363	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = Hrs; Tutorial = 0 Hrs Practical = 0 Hrs; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To emphasis the basic principles of Artificial Intelligence in various applications
2. To explore different methods of solving problems using Artificial Intelligence.
3. To capture the knowledge of human experts to support decision-making
4. To provide knowledge of AI systems and its variants.

Pre-requisite:

1. Python Programming (20MCA11)
2. Computational Data Analytics (20MCA15)
3. Data Structures (20MCA21)

Unit – I **08 Hours**

Introduction

AI History and Applications: Defining AI: Acting Humanly (Turing Test Approach), Thinking Humanly (Cognitive Modeling Approach), Thinking Rationally (laws of thought approach), Acting Rationally (Rational Agent Approach); Foundations of Artificial Intelligence; History of AI, AI techniques, Expert Systems.

Unit – II **09 Hours**

Uninformed Search Strategies

Formulation of real world problems, Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening Depth First Search, Bidirectional Search, Comparison of Uninformed search Strategies, Searching with partial information, Sensor-less problems, Contingency problems.

Unit – III **09 Hours**

Informed Search Strategies

Generate& test, Hill Climbing, Best First Search, A* and AO* Algorithm, Constraint satisfaction, Game playing: Minimax Search, Alpha-Beta Cutoffs, Waiting for Quiescence.

Unit – IV **09 Hours**

Knowledge Representation

Knowledge based agents, Wumpus world. Propositional Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining. First order Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining.

Unit – V **10 Hours**

Planning

Planning- Planning problems, Simple planning agent, Planning languages, Blocks world, Goal stack planning, Mean Ends Analysis, Non-linear Planning, Conditional planning, Reactive planning: Implementation of toy problems, Implementation and Analysis of DFS and BFS for an application

Text Books

1. Stuart J. Russell, Peter Norwig , Artificial Intelligence –A Modern approach, 3rd Pearson Education, 2016
2. Parag Kulkarni, Prachi Joshi, Artificial Intelligence –Building Intelligent Systems, 1st ed., PHI learning,2015
3. Denis Rothman, Artificial Intelligence by Example, Packt, 2018

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Understand** the basics of the theory and practice of Artificial Intelligence.	L2
2.	**Recognize** different uninformed search algorithms to well formulate problems and resolve.	L3
3.	**Interpret a**nd Analyze informed search algorithms on well formulated problems	L4
4.	**Articulate** and solve given problem using Propositional and First order logic.	L4
5.	**Apply** AI techniques to real-world problems to develop intelligent systems	L 3

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems	**2**
3	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**2**			**2**							
CO2	**2**	**1**			**2**							
CO3	**2**	**1**			**1**							
CO4	**2**	**1**			**1**							
CO5	**2**	**1**			**1**							
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**	**2**	**-**
CO2	**2**	**1**	**-**
CO3	**2**	**1**	**-**
CO4	**1**	**1**	**-**
CO5	**1**	**1**	**-**

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Quiz

3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

****

Block Chain Technology(Theory)

Course Code	**20MCA364**	**Credits**	3
Course type	GE	**CIE Marks**	50
Hours/week: L-T-P	3-0-0	**SEE Marks**	50
Total Hours:	Lecture = 45 Hrs ; Tutorial = 0 ; Total = 45Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To provide the knowledge of Blockchain Technology, its importance and applications of cryptography in Blockchain.
2. To explore various implementations of Blockchain Technology such as bitcoin, Ethereum.

Pre-requisites : NA

Unit – I **9 Hours**

Introduction to Blockchain Technology

Blockchain defined, Updateable via Consensus, Generic elements of a Blockchain, How Blockchain works, Tiers of Blockchain Technology, Features of Blockchain, Types of Blockchain, Consensus mechanism and types, Consensus in Blockchain, CAP theorem and Blockchain, Benefits of Blockchain.

Unit – II **9 Hours**

Decentralization and Dapp Ecosystem

What is a Decentralized Application, Preliminaries: What is Bitcoin, Features of Decentralized Applications, The History of Decentralized Applications, Defining the Terms. Decentralized data, Decentralized wealth, Decentralized identity, and Decentralized markets for Decentralized Assets.

Unit – III **9 Hours**

Cryptography in and Public Key Cryptography

Cryptographic primitives, Symmetric Cryptography - stream ciphers, Block ciphers, Asymmetric cryptography, public and private keys, RSA, Encryption and Decryption using RSA, Elliptic Curve Cryptography, RSA using OpenSSL, Encryption and Decryption, ECC using OpenSSL, Hash Functions, list of secure hash algorithms, Applications of Hash Functions- Merkle Trees, Patricia Trees, Distributed Hash Table.

Unit – IV **9 Hours**

BitCoin

Introduction, Transactions, Structure, Transactions types, The structure of a block, The genesis block, The bitcoin Wallets and its types, Bitcoin payments, Bitcoin investment and buying and selling bitcoins.

Unit – V **9 Hours**

Ethereum and Hyperledger

Ethereum Bird's Eye view, The Ethereum Network, Components of ethereum ecosystem, Types of Accounts, Transactions and messages, contract creation transaction, Message call transaction, Messages, Calls, Transaction validation and execution, The Transaction sub state, State storage in the Ethereum , Ether cryptocurrency and token, The Ethereum virtual machine, Execution Environment, , Machine state, Iteration function. **Hyperledger project** – Projects under Hyperledger: Fabric, Sawtooth Lake, Iroha, Burrow.

Text Books

1. Bashir, Mastering: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Edition, 2nd Revised edition edition. Birmingham: Packt Publishing, 2018.
2. A. M. Antonopoulos, Mastering bitcoin, First edition. Sebastopol CA: O'Reilly,2015
3. Siraj Raval, Decentralized Applications: Harnessing Bitcoin's Technology, O'Reilly Media, Inc., 2016

Course Outcome (COs)

At the end of the course, the student will be able to	**Bloom's Level**
1. **Explain** the features, types, and benefits of Blockchain along with various consensus mechanisms.	L2
2. **Identify** the relationship of decentralization in the context of Blockchain Technology.	L 3
3. **Analyze** the algorithms related to cryptography with respect to Blockchain Technology.	L4
4. **Compare** different types of wallets available for bitcoin and **Examine** how the bitcoin protocol works and the types of messages exchanged on the network.	L4
5. **Identify** various components, protocols, and algorithms relevant to the Ethereum Blockchain paradigm and applications developed on Ethereum.	L3

	Program Outcome of this course (POs)	**PO No.**
1.	Postgraduates will demonstrate knowledge in mathematics, computer applications and management.	**1**
2.	Postgraduates will be able to communicate effectively in both verbal and written form.	**8**

	Program Specific Outcome of this course (PSOs)	**PSO No.**
1.	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**

Mapping through Direct Assessment:

Rubrics:

Levels	**Target**
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**							**1**				
CO2	**1**							**1**				
CO3	**2**							**2**				
CO4	**1**							**1**				

CO5	**1**							**1**				
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3	**2**		
CO4	**1**		
CO5	**1**		

Course delivery methods

1. Lecture

2. Power-Point Presentation

3. Video

Assessment methods

1. Internal Assessment Test

2. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

*****

Information Retrieval (Theory)

Course Code	20MCA365	**Credits**	03
Course type	GE	**CIE Marks**	50
Hours/week:	3 – 0 – 0	**SEE Marks**	50
Total Hours	Lecture = 45 Hrs; Tutorial = 0 Hr; Total = 45 Hrs	**SEE Duration**	3 Hours for 100 Marks

Course learning objectives

1. To introduce the concepts of Boolean retrieval and ranked retrieval
2. To explore different index construction methods and the method of assigning a score to a (query, document) pair.
3. To introduce the concept of the formal evaluation methodology for evaluating information retrieval system results and the text classification methods.
4. To explore web search basics
5. To understand web crawlers and link analysis for web search

Pre-requisite:

1. Database Management Systems (20MCA12)
2. Computational Data Analytics (20MCA15)

Unit – I 8 Hours

Boolean retrieval, The term vocabulary and postings lists

An example information retrieval problem, A first take at building an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval; Document delineation and character sequence decoding, Determining the vocabulary of terms.

Unit –II 10 Hours

Index construction, Scoring, term weighting and the vector space model

Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes; Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, Variant tf-idf functions.

Unit – III 10 Hours

Evaluation in information retrieval, Text classification and Naive Bayes

Information retrieval system evaluation, Evaluation of unranked retrieval sets, Evaluation of ranked retrieval results; The text classification problem, Naive Bayes text classification, The Bernoulli model, Properties of Naive Bayes, Feature selection.

Unit – IV 7 Hours

Web search basics

Background and history, Web characteristics, Advertising as the economic model, The search user experience, Index size and estimation, Near-duplicates and shingling.

Unit – V 10 Hours

Web crawling and indexes, Link analysis

Overview, Crawling, Distributing indexes, Connectivity servers. The Web as a graph, PageRank, Hubs and Authorities

Text Books

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Sciitz, Introduction to Information Retrieval, cambridge University Press, 2008.
2. Ricardo Baeza-yates and Berthier Ribeiro – Neto, Modern Information Retrieval, AddisonWesley .
3. David A. Grossman, Ophir Frieder, Information Retrieval, Second Edition, Springer

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Make use of** Boolean models, linguistic issues of tokenization and linguistic preprocessing	L3
2.	**Apply** different index construction methods and **compute** a score between a query and each document.	L3
3.	**Apply** the information retrieval evaluation methodology and the text classification methods.	L3
4.	**Interpret** web search basics	L2
5.	**Analyze** web crawlers and **utilize** link analysis for web search	L4

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
3	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target

1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**			**1**								**1**
CO2	**2**			**2**								**1**
CO3	**2**			**2**								**2**
CO4	**3**											**1**
CO5	**1**											**2**

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**3**		
CO2	**2**		
CO3	**2**		**1**
CO4	**1**		**1**
CO5	**2**		**2**

Course delivery methods

1. Lecture
2. Power-Point Presentation
3. Video

Assessment methods

1. Internal Assessment Test
2. Quiz
3. Assignment/Seminar/Project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two OBE	Seminar/ Mini Project / Two Assignments	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50**)	50

- Writing two IA test is compulsory.
- **Minimum marks required to qualify for SEE : 20 out of 50**

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

*****

Mini Project

Course Code	20MCA37	**Credits**	02
Course type	PC	**CIE Marks**	50
Hours/week:	0-0-2	**SEE Marks**	50
Total Hours	Lecture = Hrs; Tutorial = 0 Hrs Practical = 2 Hrs; Total = 24 Hrs	**SEE Duration**	3 Hours for 50 Marks

Course learning objectives

1. To emphasize the importance of literature survey, identification of problem and framing the problem definition.
2. To explore various models for development of the software.
3. To utilize appropriate programming language and tools for implementation.
4. To explore various testing methodologies for validation of the software.
5. To emphasize oral and written communication through presentations and reports.

Pre-requisite: NA

Guidelines

- A team of maximum two students must develop the mini project. During the examination, each student must demonstrate the project individually.

- The team may implement project of their choice by using knowledge of the courses they have studied and using any current technology relevant to their project.

- The team must submit a brief project report (25-30 pages) which include the following:
  First Page – Annexure I
  Certificate – Annexure II
  Index – Annexure III
  1. Introduction
  2. Literature Survey
  3. System Requirements
  4. Software Requirements Specification
  5. System Design
  6. Implementation (Code snippets and screenshots to be included)
  7. Testing (manual and software test cases and results)
  8. Future Enhancements.
  9. Conclusion
  10. Bibliography

Annexure I

Karnatak Law Society's

GOGTE INSTITUTE OF TECHNOLOGY

Udyambag, Belagavi -590008

(Autonomous Institution under Visvesvaraya Technological University, Belagavi)
(APPROVED BY AICTE, NEW DELHI)

DEPARTMENT OF MASTER COMPUTER APPLICATIONS

Project Report on

"<Title of the project>"

A dissertation report submitted in partial fulfilment of the requirements for the award of degree of

Master of Computer Applications

Submitted by

Name 1	**USN**
Name 2	**USN**

Under the Guidance of

<<Name of Guide>>

<<Designation of guide>>,
Department of M.C.A.
K.L.S. Gogte Institute of Technology,
Udyambag Belagavi

Academic Year: 2020 - 21

Annexure II

Karnatak Law Society's

GOGTE INSTITUTE OF TECHNOLOGY

Udyambag, Belagavi -590008

2020 - 21

Department of Master of Computer Applications

CERTIFICATE

*This is to certify that <<**Name 1**>> and <<**Name 2**>> have completed their Mini Project entitled "<**title**>" as a partial fulfilment for the award of the Master of Applications degree, during the academic year 2020-2021 under my supervision.*

Internal Guide
<<Name of Guide>>
<<Designation of guide>>
Department of M.C.A.
K.L.S. Gogte Institute of Technology, Belagavi

Head of Department
<<Name>>,
<<Designation>>
K.L.S. Gogte Institute of Technology, Belagavi

Principal
<<Name>>
K.L.S. Gogte Institute of Technology
Belagavi

Examiner 1 Name	Examiner 1 Signature	Examiner 2 Name	Examiner 2 Signature	Date

Annexure III

TABLE OF CONTENTS

1. INTRODUCTION **1**

2. LITERATURE SURVEY **2**

2.1 EXISTING SYSTEM 2

2.2 PROPOSED SYSTEM 2

3 SYSTEM REQUIREMENTS **so on**

4 SOFTWARE REQUIREMENTS SPECIFICATIONS

5 SYSTEM DESIGN

5.1 DATA FLOW DIAGRAM

5.2 USE CASE DIAGRAM

5.3 ACTIVITY DIAGRAM

5.4 CLASS DIAGRAM

5.5 E-R DIAGRAM

5.6 DATABASE METADATA

6 IMPLEMENTATION

6.1 MODULE-1

6.2 MODULE-2

6.3 AND SO ON (WRITE YOUR PROJECT MODULE NAMES)

7 TESTING

7.1 UNIT TESTING

7.2 FUNCTIONALITY TESTING

7.3 INTEGRATION TESTING

7.4 VARIFICATION AND VALIDATION TESTING

8 FUTURE ENHANCEMENT

9 CONCLUSION

10 BIBLIOGRAPHY

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify**, **analyze** and formulate projects with a comprehensive and systematic approach.	L4
2.	**Make use of** intensive literature survey to prepare a detailed design of the system	L3
3.	**Develop** the software by using modern tools and technologies	L5
4.	**Construct** the test cases for the software using modern testing techniques	L5
5.	**Appraise** the objectives, methodology and results using good oral and written presentation skills.	L5

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
3	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
4	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**
5	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**
6	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	**7**
7	Postgraduates will be able to communicate effectively in both verbal and written form.	**8**
8	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.	**9**
9	Postgraduates will develop confidence for self-education and ability for life-long learning.	**10**
10	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality applications for business success.	**2**
3.	**PSO3: Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**1**										
CO2		**1**		**1**								
CO3		**1**		**1**	**1**	**2**			**1**			
CO4						**1**	**2**					
CO5							**2**	**2**	**1**	**1**		**1**
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3		**2**	**1**
CO4		**1**	
CO5		**1**	

Scheme of Continuous Internal Evaluation (CIE):

Components	Phase-1	Phase-2	Phase-3	Report	Total Marks
Maximum	10	15	15	10	50
	➢ Submission and certification of project report is compulsory to qualify for SEE.				
	➢ **Minimum marks required to qualify for SEE: 20**				

Scheme of Semester End Examination (SEE):			
1.	It will be conducted for 50 marks of 3 hours duration**.**		
2.	**Minimum marks required in SEE to pass: 40 out of 100**		
3.	Demonstration of the Project.	30 marks	50 marks
	Report	10 marks	
	Viva- voce	10 marks	
4.	Viva-voce shall be conducted for individual student and not in a group.		

******

4th Semester Master of Computer Applications (M.C.A.)
Syllabus (2020-21 Scheme)

Industry Internship

Course Code	20MCA41	**Credits**	02
Course type	PC	**CIE Marks**	50
Hours/week:	--	**SEE Marks**	--
Total Hours	--	**SEE Duration**	--

Course learning objectives

1 To provide introductory practical experience under close supervision of a Professional in the IT Industry

2 To explore work culture and impart knowledge to acquire communication, interpersonal and other critical skills.

Guidelines for Internship

1. The student shall undergo Internship for minimum 6 weeks during vacations.
2. The internship can be carried out in any reputed Public/Private Industry/ R & D organization/ Research Institute/ Educational Institute of repute.
3. Two guides will supervise the internship work, one from the department and another one from industry.
4. The students shall report the progress of the Internship to the guide at regular intervals and seek his/her advice.
5. After the completion of internship, the students shall submit a report with completion certificate from the respective industry.
6. Internship may be carried in any Technology/Tool that may be used in project work or it can be a feasibility study of the undertaken work or it can be existing system study.
7. After completion of Internship students have to give presentation and submit report.

Report and presentation should consist of following information.

CONTENTS OF THE REPORT

1	**Cover Page**
2	**College Certificate**
3	**Certificate from the industry/Organization**
4	**Declaration by the student**
5	**Acknowledgement**
6	**A Brief Executive Summary of the Internship** A one page summary of the company/institution and a short account of the major activities carried out during the internship period.
7	**Table of Contents** Contents of the report with page numbers, list of tables, and list of figures.
8	**Chapter 1. Description of the company/institution** This section should answer the following questions: • What is the full title of the company/institution? Give a brief history of the company, full mailing address and relevant web links. • What is the type of ownership of the company/institution? State the main shareholders and their shares. • What is the sector that the company/institution operates in? Specify the products and services produced and offered to its customers. • Who are regarded as the customers of your internship company/institution (consider the end users, retailers, other manufacturers, employees, etc.)?

	• Provide an organization chart of the company, along with information on the number of employees. • Provide a list of functions performed by the engineers in the internship organization. • Provide information, in brief, about the department in which internship was undertaken.
9	**Chapter 2. Internship activities** This is the main body of your report. You should present the activities performed during the internship period. This needs to be explained in detail including all the assignments taken in Internship
10	**Chapter 3. Internship Outcomes** This section shall address the following: • Skills and qualifications you think that you have gained from the internship. • Kind of responsibilities you have undertaken during the internship period. • How do you think the internship will influence your future career plans? • How do you think the internship activities that you carried out are correlated with your classroom knowledge?
11	**Chapter 4. Conclusions of the report** This section should include: • A summary of key conclusions derived from the internship experience. • Suggestions for improvement in the industry/organization

RULES FOR WRITING THE INTERNSHIP REPORT:

- Do not write theoretical excerpts from textbooks. Describe what you exactly did there and what experiences you have gained throughout your training.
- The internship report should be maximum 10-15 pages.
- Paper- A4 size, executive bond.
- Line spacing -1.5, Margin- 3cm on the left and 2.5 cm on all the other sides
- Font type - Times new Roman, Font size: Chapter Title -14 point (Bold), Main headings- 12 point (Bold) and sub-headings and body – 12 point, normal.
- You can include graphs, pictures, data, drawings, design calculations in your report; however they should not cover more than 1/3 of the page. They should be properly numbered and should have the caption.
- Larger graphs, pictures, data, drawings, design calculations, codes and program should be given as an Appendix.
- Number of copies: **TWO** (Student copy, Department library copy)

Annexure I

Cover page

INTERNSHIP REPORT

A report submitted in partial fulfilment of the requirements for the Award of Degree of

Master of Computer Applications

By

[Student's Full Name]

[USN]

Under Supervision of

External Guide	Internal Guide
[External Guide Name] [Company Name] [Company Address]	[Internal Guide Name] [Designation]

[Duration- From -----To-------]

KLS's GOGTE INSTITUTE OF TECHNOLOGY

Udyambag, Belagavi 590008

(An Autonomous Institution under VTU, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

[Academic Year]

Annexure II

Certificate format

KLS's GOGTE INSTITUTE OF TECHNOLOGY

Udyambag, Belagavi 590008

(An Autonomous Institution under VTU, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

CERTIFICATE

This to certify that the Internship report entitled [Title], submitted to the Department of Master of Computer Application, KLS Gogte Institute of Technology, is a record of bonafide work carried out by [Name], [USN] in partial fulfillment for the award of the degree of Master of Computer Application of the Visvesvaraya Technological University, Belagavi during the year [Academic Year]. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report. The Internship report has been approved as it satisfies the academic requirements prescribed for the said Degree.

Signature of Internal Guide	Signature of External Guide
Signature of HoD	Signature of Principal

SL no.	Name of the Examiner	Date of Viva voce	Signature
1.			
2.			

Course Outcomes

1.	**Develop** analytical skills, including the ability to understand information, interpret data and solve industry problems.	L3
2.	**Select** thoughts and ideas clearly and effectively in written and oral forms as required for particular workplace settings.	L3
3.	**Make use of** the right tool (e.g., strategy, system, technology, etc.) for the right task.	L3
4.	**Analyze** work environment and develop right attitude and team sprit	L4

Program Outcome of this course (POs)		PO No.
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	1.
2.	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	2.
3.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	3.
4.	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	4.
5.	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	5.
6.	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	6.
7.	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	7.
8.	Postgraduates will be able to communicate effectively in both verbal and written form.	8.
9.	Postgraduates will develop confidence for self-education and ability for life-long learning.	10.

PROGRAM SPECIFIC OUTCOMES (PSOs):
1. PSO1: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
2. PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality applications for business success.
3.PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**1**	**2**	**1**	**1**							
CO2	**1**							**2**				
CO3						**2**				**1**		
CO4							**2**					
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**		
CO2	**1**		
CO3		**2**	
CO4			**2**

Evaluation Criteria:

- Internship should be evaluated for 50 Marks as CIE.
- Out of which 30 marks are for the External Guide (Industry) Evaluation and 20 marks are for the Presentation. (Evaluation by the examiner)
- CIE must be conducted by making domain wise experts panels and that panel must evaluate all the Internships as per the respective domains.

Scheme of Continuous Internal Evaluation (CIE):

Components	Internship Evaluation	Internship Presentation	Total Marks
Maximum	30	20	50
	➢ Submission and certification of Internship report is compulsory.		
	➢ **Minimum marks required in CIE to pass: 20 out of 50**		

Internship Evaluation criteria for External Guides (Out of 30 Marks)

Criteria	Marks	CO
Professional Attitude & Responsiveness to instructions	5	4
Oral/Written Communication	5	2
Quality of Work	15	1, 3
Punctuality	5	4
Total	30	

Internship presentation Evaluation by Examiners (Out of 20 Marks)

Criteria	Marks	CO
Work output/performance	8	1,3
Presentation	8	2
Q & A	4	1, 3, 4
Total	20	

******

Project Work

Course Code	20MCA42	**Credits**	12
Course type	PC	**CIE Marks**	50
Hours/week:	--	**SEE Marks**	150
Total Hours	---	**SEE Duration**	3 Hours for 150 Marks

Course learning objectives

1. To explore the industry environment and get acquainted with the tools and technologies used
2. To emphasize the importance of literature survey, identification of problem and framing the problem definition
3. To incorporate various design techniques
4. To utilize industry standard procedures and tools for implementation
5. To explore the validation of software/ application using various testing methodologies
6. To emphasize on oral and written communication through presentations

Pre-requisite: NA

Guidelines

1. Students are required to take up individual project in companies or research work in the Colleges other than the mini project standards already taken up during previous semesters.
2. Project should be real time work, for total of 4 months' duration
3. Project work may be application oriented or research oriented as per student and guide's interest. Therefore, the project reports will vary depending on whether it is application oriented project or research based project
4. Students should submit project offer letter to their respective guides before starting of the project.
5. Seminars / presentation should be given on Synopsis, Software Requirement Specifications, Design and Project Completion levels.Advancement in project development must be presented in front of a panel during phases.
6. If project report is not as per the format and not a real-time project, external examiners will have every right to reject the project.
7. Students are encouraged and appreciated to demonstrate the project / run time behaviour(video) along with power point slides during their viva-voce exams
8. The outcome of the project should be encouraged to present/publish in reviewed Conferences/Journals as papers.
9. The problem statement, literature survey and synopsis of the project must be submitted to the project committee with approval of the internal guide within three weeks from the commencement of 4th semester.
10. Submission and certification of project report is compulsory to qualify for SEE.
11. Failing to meet the above process by candidate may lead to disqualification of the candidate's project work-2 (20MCA42) course and eventually award of the degree.

Guidelines for the Preparation of Project Reports

1. Printing Area: The margins should be: **Left:** 1.25", **Right**: 1.00", **Top and Bottom**-1.00". The text should be justified to occupy the full line width, so that the right margin is not ragged, with words hyphenated as appropriate. Please fill pages so that the length of the text runs to the right margin.

2. The report must be printed on one side only. Please use a high-resolution printer, preferably a laser printer with at least 300 dpi. Project reports must be printed neatly on one side of the paper on a A4

size bond paper. The reports submitted to the department/guide(s) must be hard bounded with dry tone Xerox.

3. Abstract: The abstract should summarize the contents of the report and should contain at least 150 and at most 350 words. It should be set in 12-point font size. There should be two blank (10-point) lines before and after the title **ABSTRACT**.

4. Layout, Typeface, Font Sizes, and Numbering: For the main text, please use 12-point type and 1.5-line spacing. We recommend using **Times New Roman** fonts. Italic type may be used to emphasize words in running text. Bold type and underlining should be avoided.

5. Headings.

The chapter headings should be in capitals and must be separated from the other text by 24point line space. Headings should be in the form where each word is capitalized (i.e., nouns, verbs, and all other words except articles, prepositions, and conjunctions should be set with an initial capital) and should, with the exception of the title, be aligned to the left. The font sizes
are given in Table 1.

Here are some examples of headings: “Criteria to Disprove Context-Freeness of Collage Languages”, “On Correcting the Intrusion of Tracing Non-Deterministic Programs by Software”, “A User-Friendly and Extendable Data Distribution System”, “Multi-flip Networks: Parallelizing GenSAT”, “Self-determinations of Man”.

Table 1 Font sizes of headings. Table captions should always be positioned above the tables. The final sentence of a tablecaption should end without a period

Heading	**Example**	**Font Size and Style**
Title	Chapter 1Introduction	16 Point Bold
First Level Heading	1.1. Preamble	14 Point Bold
Second Level Heading	2.3.1. Mandatory or Regulatory Signs	12 Point Bold
Third Level Heading	Stop and Giveaway signs	12 Point Bold
Fourth Level	Heading *Creation of database*	12 Point Bold Italicized

Figures and Photographs

Check that in line drawings, lines are not interrupted and have constant width. Grids and details within the figures must be clearly readable and may not be written one on top of the other. The lettering in figures should have a height of 2 mm (10-point type). Figures should be scaled up or down accordingly.

Figures should be numbered and should have a caption which should always be positioned under the figures, in contrast to the caption belonging to a table, which should always appear above the table. Please center the captions between the margins and set them in 9-point type (Fig. 1 shows an example). The distance between text and figure should be about 12 point spacing, the distance between figure and caption about 6 point spacing.

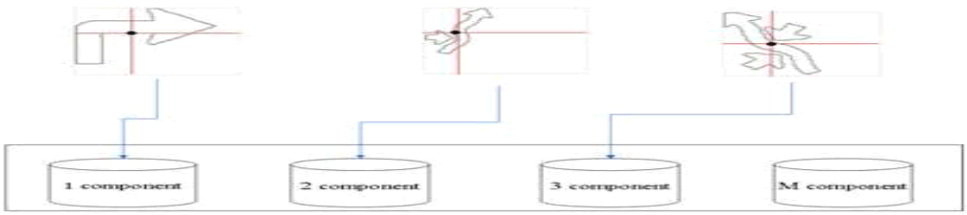

Fig 1.1. The last sentence of a figure caption should generally end without a period

6. Formulas

Displayed equations or formulas are centered and set on a separate line (with an extra line or half line space above and below). Displayed expressions should be numbered for reference. The numbers

should be consecutive within each section or within the contribution, with numbers enclosed in parentheses and set on the right margin.
For example, A correlation matrix is computed using equation (5), Here, and is the feature vectors of query examples and is the dimension of feature.

7. Program Code
Program listings or program commands or algorithms in the text are normally set in typewriter font, e.g., CMTT10 or Courier.
Example of an Algorithm is
Algorithm-1: Database Creation (Mean and Standard Deviation based approach)
Fig 1.1. The last sentence of a figure caption should generally end without a period.

Input: Static images of potential traffic sign
Output: Database created.
Methodology:
For each input image do
Step1: Preprocess the image as explained in section 4.3.1
Step2: Calculate the number of components in a sign as explained in section 4.3.1.
Step3: calculate a feature vector as mentioned in section 4.3.2.1.
Step4: Store the feature vector computed in step 3 in the corresponding database, based on number of components present in the sign. For End.
Algorithm End.

8. Footnotes/ Header
Footnotes/Header should appear at the bottom of the normal text area, with a line of about 5 cm in Word set immediately below/above the text.

Header sample: (Project title is left aligned and page number is right aligned)
<<Project Title>><<Page Number>>

Sample Footer:
<College Name> Department of MCA 2019-2020

9. The list of references is headed "References" and is assigned a number with square brackets in the decimal system of headings. The list should be set in small print and placed at the end of the dissertation, in front of the appendix, if any exists. Please do not insert a page break before the list of references if the page is not completely filled. An example is given at the end of this information sheet in the following format : <Name of Authors>,<Title of the paper>,<Conference name/Journal Name>,<Journal Series and volume (for journals)>,<page numbers>,<year of Publication>.An example for conference in journal are as follows:

- [1] J. L. Alqueres and J. C. Praca, "The Brazilian power system and the challenge of the Amazon transmission," in Proc. 1991 IEEE Power Engineering Society Transmission and Distribution Conf., pp. 315-320
- [2] J. F. Fuller, E. F. Fuchs, and K. J. Roesler, "Influence of harmonics on power distribution system protection," IEEE Trans. Power Delivery, vol. 3, pp. 549-557, Apr. 1988.

10. Any references mentioned should be referred in the content of the report by using the relevant reference number inside square bracket.
11. Page Numbering

Reports must be printed with page numbers on the top right corner.

12. The total number of reports to be prepared are three

· One copy to the concerned guide
· One copy for college
· One copy to candidate
· Two CD's having soft copy of Project report (for department purpose)

13. Before taking the **final printout**, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated.

14. Every copy of the report must contain (See formats towards the end of this document)

1. Outer title page (off white) with a plastic cover
2. Inner title page (White)
3. Certificate in the format enclosed, only certificate will be signed by following:
   - Principal
   - HOD
   - Internal guide and External guide (if project is carried out in company)
   - Guide and/or Co-guide (if project is carried out in college)

15. The **organization of the report** should be as follows

1. Inner title page – Annexure I
2. Certificate – Annexure II
3. Project Completion certificate from Company / College
4. Declaration (by student) – Annexure III
5. Acknowledgement – Annexure IV
6. Abstract
7. Table of Contents – Annexure V
8. List of table and figures
9. Main body of project

Care should be taken to avoid spelling and typing errors. The student should note that report (write-up) should include the important component in the overall evaluation of the project. Sample content (more suitable for Application oriented projects) is attached and number of pages may be 40-70, which can be modified as per guide's instructions depending on the project under development. The respective guides can decide how the content of the project report must be organized if the project is research oriented, as a specific format cannot be defined for various domains of research problems.

Note 1 :
Proper attention has to be given to the technical contents as well as to the organization of the report and clarity of the expression.

Note 2 :
All the students should submit the report for each phase to the internal guides one week before the scheduled phase dates.

Annexure – I

KARNATAK LAW SOCIETY'S
GOGTE INSTITUTE OF TECHNOLOGY
UDYAMBAG, BELAGAVI-590008
(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
(APPROVED BY AICTE, NEW DELHI)

Department of Master of Computer Applications

Project Report on
<<Project Title>>
Submitted in partial fulfillment of the requirement for the award of the degree of Master of Computer Applications

Submitted by
<<Student Name>>

USN : <<USN>>

Internal Guide
<<Name>>
<<Designation>>
Department of M.C.A.,
K.L.S. Gogte Institute of Technology,
Belagavi

External Guide
<<Name of external guide>>
<<Designation>>
<<Company Name>>
<<City>>

<<(202X-202X)>>

Annexure - II

KARNATAK LAW SOCIETY'S
GOGTE INSTITUTE OF TECHNOLOGY
UDYAMBAG, BELAGAVI-590008
(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
(APPROVED BY AICTE, NEW DELHI)

Department of Master of Computer Applications

CERTIFICATE

This is to certify that the project report entitled **<<Project Title>>**, submitted to the Department of Master of Computer Application, KLS Gogte Institute of Technology, is a record of the bonafide work carried out by Mr./Ms. **<<Name>>**, USN **<<USN>>** in partial fulfillment for the award of the degree of **Master of Computer Applications** of the Visvesvaraya Technological University, Belagavi during the academic year <<202X – 202X>>. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report. The project report has been approved as it satisfies the academic requirements prescribed for the said degree.

Internal Guide	External Guide	HoD	Principal
<<Name>> <<Designation>>, Department of M.C.A., K.L.S. Gogte Institute of Technology, Belagavi.	<<Name>> <<Desig>> <<Company>> <<Place>>	<<Name>> <<Designation>>, Department of M.C.A., K.L.S. Gogte Institute of Technology, Belagavi	<<Name>> K.L.S. Gogte Institute of Technology, Belagavi.

Date:

Final Viva-Voce

	Name of the examiners	Date of Viva -voce	Signature
1.			
2.			

Annexure – III

DECLARATION BY THE STUDENT

I <<Name of student>> , hereby declare that the project report entitled <<Project Title>> submitted by me to K.L.S. Gogte Institute of Technology, Belagavi in the partial fulfilment of the degree of **Master of Computer Applications** is a record of the project carried out at <<Name of the company>>. This report is for the academic purpose.

I further declare that this report has not been submitted and will not be submitted, either in part or full, to any other institute or university for the award of any diploma or degree.

Name of the Student	USN	Signature

Place:

Date:

Annexure – IV

ACKNOWLEDGEMENT

Culmination of project is that stage which makes the transformation a mere theoretical idea into a visible reality. My project acknowledges guidelines, supervision and a lot of inspiration. It is time now to acknowledge my obligations to all who have extended their co-operation all along my study tenure of project work.

I am thankful to Principal <<**Name**>> for having provided us the academic environment in contributing to the success of academic project.

I am deeply grateful to <<**Name**>> our beloved Head of the Department, for having provided us the academic environment which nurtured my practical skills contributing to the success of my project.

I am thankful to <<**Name of guide**>> worthy guide, for her support, cooperation and presence provided to me during the course of the project. My diction falls short of words to gratify the faculty members of our department for being the source of inspiration.

I would like to express my heartfelt gratitude towards my external guide <<Guide's name>> who guided me during the course of the project with <<his/her>> suggestions, cooperation and periodic encouragement for completion of the project.

Lastly, with unquantifiable affection and reference I wish to express my sincere feeling to my parents and friends in the form of words which are restricted in expression and quantum.

<Student Name>

Annexure - V

TABLE OF CONTENTS

1.	**INTRODUCTION**	**1**
2.	**LITERATURE SURVEY**	**2**
	2.1 EXISTING SYSTEM	2
	2.2 PROPOSED SYSTEM	
	2.3 FEASIBILITY STUDY	
	2.4 TOOLS AND TECHNOLOGIES USED	
3	**SYSTEM REQUIREMENTS**	**so on**
4	**SOFTWARE REQUIREMENTS SPECIFICATIONS**	
5	**SYSTEM DESIGN**	
	5.1 DATA FLOW DIAGRAM	
	5.2 USE CASE DIAGRAM	
	5.3 ACTIVITY DIAGRAM	
	5.4 CLASS DIAGRAM	
	5.5 E-R DIAGRAM	
	5.6 DATABASE METADATA	
6	**IMPLEMENTATION**	
	6.1 MODULE-1	
	6.2 MODULE-2	
	6.3 AND SO ON (WRITE YOUR PROJECT MODULE NAMES)	
7	**TESTING**	
	7.1 UNIT TESTING	
	7.2 FUNCTIONALITY TESTING	
	7.3 INTEGRATION TESTING	
	7.4 VARIFICATION AND VALIDATION TESTING	
8	**FUTURE ENHANCEMENT**	
9	**CONCLUSION**	
10	**BIBLIOGRAPHY**	

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the relevant information using various sources and evaluate the information to know the need and scope of solutions which can be combined into a project work.	L4
2.	**Make use of** intensive literature survey, software development knowledge, and various required functionalities to prepare a detailed design of the system with properly outlined modules.	L3
3.	**Choose** efficient tools for designing effective and executable project modules.	
4.	**Develop** the software using modern tools/ technologies/ frameworks as per industry standards	L5
5.	**Construct** the test cases for the software using modern testing techniques and validate the software.	L5
6.	**Defend** the project using good oral and written presentation skills	L5

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	**1**
2	Postgraduates will demonstrate an ability to identify, formulate and solve engineering problems.	**2**
3	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data.	**3**
4	Postgraduates will demonstrate an ability to design a system, component or process as per needs and specifications.	**4**
5	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains.	**5**
6	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications.	**6**
7	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	**7**
8	Postgraduates will be able to communicate effectively in both verbal and written form.	**8**
9	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.	**9**
10	Postgraduates will develop confidence for self-education and ability for life-long learning.	**10**
11	Postgraduates can participate and succeed in competitive examinations.	**11**
12	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

Program Specific Outcome of this course (PSOs)		PSO No.
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality applications for business success.	**2**
3.	**PSO3: Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**1**										
CO2		**1**	**2**	**2**	**2**							
CO3				**2**	**2**	**2**						
CO4				**2**	**2**	**2**				**1**		
CO5				**2**	**2**	**2**				**1**		
CO6							**1**	**1**				
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**1**		
CO3		**2**	
CO4		**2**	**1**
CO5		**2**	
CO6		**2**	

Scheme of Continuous Internal Evaluation (CIE)

Theory Component:					
Components	Phase-1	Phase-2	Phase-3	Report	Total Marks
Internal Guide	10	15	15	10	50
Components	Ability to apply knowledge	Initiative taken during project work	Involvement	Co-operation in the team	Total Marks
External guide	10	10	20	10	50
Average of Internal and External guide evaluation = 50					
Minimum marks required to qualify for SEE : 20 out of 50					

Scheme of Semester End Examination (SEE)

Scheme of Semester End Examination (SEE):			Marks
1.	Demonstration		
	Project Problem definition and Objective	15	100 Marks
	Presentation of Literature review	10	
	UI Design and Development / Data pre-processing	15	
	Implementation and Testing	20	
	Presentation of results, discussion of results and Conclusion	15	
	Presentation skills	15	
	Viva	10	
2.	Dissertation Report Evaluation		
	Relevance of the subject in present context	5	50 Marks
	Novelty	5	
	Critical understanding of the topic and Literature review	5	
	Clarity and completeness of problem formulation/ experiment design	10	
	Result presentation and discussion	10	
	Conclusion and scope of future work	5	
	Overall Presentation of thesis	10	
	Grand Total		**150 Marks**

****

Technical Seminar

Course Code	20MCA43	**Credits**	02
Course type	SC	**CIE Marks**	50
Hours/week:	NA	**SEE Marks**	--
Total Hours	--	**SEE Duration**	--

Course learning objectives

1. To encourage the students to study advanced engineering developments
2. To develop technical writing skills
3. To prepare and present technical reports.
4. To motivate the students to use various teaching aids such as overhead projectors, power point presentation and demonstrative models.
5. To train students to face audience and present their ideas so that they develop self esteem and courage which are essential traits for an IT Professional.

Guidelines

1. This course is mandatory for all students pursuing MCA degree.
2. One or (maximum) two students can be allotted a seminar topic.
3. The topics should be finalized by the students through consultation with their respective guides.
4. The topics decided for technical seminars are expected to be research topics so that it may lead to publications in reputed conferences / journals.
5. Within first month from starting of 3rd Semester session, the Seminar titles must be finalized.
6. Before the end of 3rd semester, phase I assessment must be conducted with submission of literature review.
7. Phase II and Phase III must be conducted in 4th Semester with analysis and conclusion respectively. Phase III is the final phase where all the changes are expected to be incorporated as per suggestion in previous two phases.
8. A panel of examiners will evaluate each phase and the panel will have full authority to judge the quality of work.
9. Student should submit the final technical seminar report as per the following format: The first two pages should have cover page and certificate page respectively. The format of these two pages are provided in the Annexure-1 and Annexure-2. The content of the report should start from third page and should strictly follow the IEEE format (For IEEE format students are advised to visit https://www.coep.org.in/page_assets/491/IEEE_Template_4.pdf). The content part should consist of at least 8-10 pages.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Interpret** the changes in the technologies relevant to the topic selected based on literature review	L5
2.	**Discuss** the technology and **interpret** the impact on the society, environment and domain.	L6
3.	**Design** and **develop** the material in organized manner	L6
4.	**Compile** report of the study and present to the audience, following the ethics.	L6

5. **Develop** ability to face the placement interviews L6

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	**7**
2	Postgraduates will be able to communicate effectively in both verbal and written form.	**8**
3	Postgraduates will develop confidence for self-education and ability for lifelong learning	**10**
4	Postgraduates will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**12**

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	**PSO1: Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	**1**
2.	**PSO2: Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality application for business success.	**2**
3.	**PSO3: Successful Career and Entrepreneurship:** The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	**3**

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
2	Medium (M): If 60% of marks are scored by 50% to 70% of the students.
3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1							**1**	**1**		**1**		**1**
CO2							**1**	**1**		**2**		**1**
CO3							**1**	**2**		**1**		**1**
CO4							**2**	**2**				
CO5							**1**	**2**				
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**1**		
CO2	**2**		**1**
CO3	**2**		**1**
CO4	**1**		
CO5			**1**

Scheme of Continuous Internal Evaluation (CIE):

Topic relevance	**Content**	**Presentation**	**Adherence to IEEE format**	**Impact factor/significance of conference / journal**
5	20	10	5	10 (Distribution of this mark is given at the 'Note' below this table)
Note: Minimum duration for presentation is 12 minutes + 3 minutes QA The CIE marks for Seminar is 50 and the minimum marks to pass is 25.				

NOTE: For CIE (publication) component, the marks distribution is as follows:

(Guides have to maintain record for the same for the students under them)

- For publication in reputed journal (like IEEE/Scopus/SCI indexed journals etc.) – **10 marks.**
- If presented/communicated in reputed conferences (like IEEE/Springer/ACM etc.)**- 08 marks**
- If communicated to any other journal/conference – **05 marks.**
- If not published or presented in any conferences (in the discretion of guides) – **02 marks.**

Annexure- 1

KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

Department of Master of Computer Applications

Technical Seminar Report

on

<<TITLE>>

Submitted in partial fulfillment of the requirement for the award of the degree of Master of Computer Applications

Submitted by

<<Name of the student USN>>

Internal Guide

<<Mr./Mrs./Dr. Name>>

<<Designation>>

Department of M.C.A.,

K.L.S. Gogte Institute of Technology, Belagavi

GOGTE INSTITUTE OF TECHNOLOGY
UDYAMBAG, BELAGAVI-590008
(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
(APPROVED BY AICTE, NEW DELHI)

Department of Master of Computer Applications

CERTIFICATE

This is to certify that the technical seminar report entitled……., submitted to the Department of Master of Computer Application, KLS Gogte Institute of Technology, by Mr./Ms. ……, USN …….. can be considered as a bona fide work in partial fulfillment for the award of the degree of Master of Computer Application of the Visvesvaraya Technological University, Belagavi during the year 2020 – 2021. It is certified that all corrections/suggestions indicated in phase presentation have been incorporated in the report. The project report has been approved as it satisfies the academic requirements prescribed for the said Degree.

Internal Guide	**HOD**	**Principal**
Name	**Name**	**Name**
Desig.	**Desgination**	**KLS GIT, Belagavi**
Dept. of MCA,	**Dept. of MCA**	
KLS GIT Belagavi	**KLS GIT, Belagavi**	

Date:

Final phase presentation of Technical Seminar

	Name of the examiners	**Date**	**Signature**
1.			
2.			

******

Certification

Course Code	20MCA44	**Credits**	01
Course type	PC	**CIE Marks**	NA
Hours/week:	NA	**SEE Marks**	NA
Total Hours	--	**SEE Duration**	--

Course learning objectives

1. To impart fundamental concepts in the area of recent trends
2. To explore the features of recent trends paradigm.

Recommended Course Platform

1. NPTEL, Coursera
2. College Approved Courses
3. College Designed Courses

Guidelines for Certification Courses:

1. The student should take up certification from t
2. he college approved list.
3. The certification course should be of min 30 Hrs.
4. The certification course should be assessed with Grade or Marks.
5. The student should take up the course which is not listed in the syllabus.
6. After the course completion the student has to submit the copy of certificate to the mentor.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Familiarize and study the variety of courses which will add professional value to their learning	L3

Sl. no	Program Outcome of this course (POs)	PO No.
1	Postgraduates will demonstrate skills to use modern software tools and technology to build and test applications	6
2	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.	9
3	Postgraduates will develop confidence for self-education and ability for life-long learning.	10

	Program Specific Outcome of this course (PSOs)	PSO No.
1.	PSO1: Professional Skills: The ability to understand, analyze and develop	1

	computer programs in the areas related to algorithms, system software, simulation, software design, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.	
2.	PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality applications for business success.	2
3.	PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, technologies, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	3

Mapping through Direct Assessment:

Rubrics:

Levels	Target
1	Low (L): If 60% of marks are scored by less than 50% of the students.
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3	High (H): If 60% of marks are scored by 70% of the students.

CO-PO Mapping (planned)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						**2**			**3**	**1**		
Mention the levels: 1, 2, 3												

	CO-PSO Mapping(planned)		
	PSO1	**PSO2**	**PSO3**
CO1	**2**	**2**	**1**

Scheme of Continuous Internal Evaluation (CIE): NA

Components	Certificate Grading					
Marks	24- 25	21 - 23	19-20	16 - 18	13-15	10 - 12
Grade	S	A	B	C	D	E

- **Minimum marks required to qualify for SEE : NA**

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