

**Semester wise Structure and  
Curriculum for**

**PG Course in  
Master in Computer Applications  
Integrated (MCA)  
(Engineering and Technology)**

**Gurugram University, Gurugram**

# GENERAL COURSE STRUCTURE AND CREDIT DISTRIBUTION

## CREDIT DISTRIBUTION

### POSTGRADUATE PROGRAMME

Scheme of Programme Master of Computer Applications (MCA) Integrated  
(Scheme PG A1: Postgraduate Programmes (Course work only))

#### Semester-1

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Fundamentals of Computer Programming	242/MCA/CC101	3	-	2	4	25	50	5	20	100
	Computer Organization and Architecture	242/MCA/CC102	3	-	2	4	25	50	5	20	100
<b>MIC/Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO101	2	-	4	4	15	35	15	35	100
<b>Multidisciplinary Courses (MDC)</b>											
	One from pool	242/MCA/MD101	2	1	-	3	15	35	5	20	75
<b>Ability Enhancement Course (AEC)</b>											
	One from pool	242/MCA/AE101	2	0	0	2	15	35	-	-	50
<b>Skill Enhancement Course (SEC)</b>											
	One from pool	242/MCA/SE101	2	-	2	3	15	35	5	20	75
<b>Value Addition Course (VAC)</b>											
	One from pool	242/MCA/VA101	2	-	-	2	15	35	-	-	50
<b>Total Credits</b>						<b>22</b>	<b>Total Marks</b>		<b>550</b>		

#### Semester-2

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Data Structure and Algorithm	242/MCA/DSC201	3	-	2	4	25	50	5	20	100
	Operating System	242/MCA/DSC202	3	-	2	4	25	50	5	20	100
<b>MIC/Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO201	2	-	2	4	15	35	15	35	100
<b>Multidisciplinary Courses (MDC)</b>											
	One from pool	242/MCA/MD201	2	1	-	3	25	50	-	-	75
<b>Ability Enhancement Course (AEC)</b>											
	One from pool	242/MCA/AEC201	2	-	-	2	15	35	-	-	50
<b>Skill Enhancement Course (SEC)</b>											
	One from pool	242/MCA/SE201	2	-	1	3	15	35	5	20	75
<b>Value Addition Course (VAC)</b>											
	One from pool	242/MCA/VA201	2	-	-	2	15	35	-	-	50
<b>Total Credits</b>						<b>22</b>	<b>Total Marks</b>		<b>550</b>		

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## Semester-3

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Data Base Management System	242/MCA/DSC301	3		2	4	25	50	5	20	100
	Foundation of Web technology	242/MCA/DSC302	3		2	4	25	50	5	20	100
<b>MIC/Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO301	3	-	2	4	25	50	5	20	100
<b>Multidisciplinary Courses (MDC)</b>											
	One from pool	242/MCA/MD301	3	-	-	3	25	50	-	-	75
<b>Ability Enhancement Course (AEC)</b>											
	One from pool	242/MCA/AE301	2	-	-	2	15	35	-	-	50
<b>Skill Enhancement Course (SEC)</b>											
	One from pool	242/MCA/SE301	3	-	0	3	25	50	-	-	75
<b>Value Addition Course (VAC)</b>											
	One from pool	242/MCA/VA301	2	-	-	2	15	35	-	-	50
<b>Total Credits</b>						<b>22</b>	<b>Total Marks</b>		<b>550</b>		

## Semester-4

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Object oriented programming using Python	242/MCA/DSC401	3		2	4	25	50	5	20	100
	Analysis and Design of Algorithms	242/MCA/DSC402	3		2	4	25	50	5	20	100
	Data Communication and Networking	242/MCA/DSC403	3		2	4	25	50	5	20	100
	Multi Media Technology	242/MCA/DSC404	3		2	4	25	50	5	20	100
<b>Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO401	3	-	2	4	25	50	05	20	100
<b>Ability Enhancement Course (AEC)</b>											
	One from pool	242/MCA/AEC401	2	-	-	2	15	35	-	-	50
<b>Value Addition Course (VAC)</b>											
	One from pool	242/MCA/VA401	2	-	-	2	15	35	-	-	50
<b>Total Credits</b>						<b>24</b>	<b>Total Marks</b>		<b>600</b>		

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## Semester-5

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Software Engineering	242/MCA/DSC501	3	-	2	4	25	50	5	20	100
	Artificial Intelligence	242/MCA/DSC502	3	-	2	4	25	50	5	20	100
	Mathematical foundation of Computer Science	242/MCA/DSC503	3	1	-	4	30	70	-	-	100
	Java programming	242/MCA/DSC504	3	-	2	4	25	50	5	20	100
<b>Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO501	2	-	4	4	15	35	15	35	100
<b>Skill Enhancement Course (SEC) / Summer Internship Report</b>											
	One from pool	242/MCA/SE501	-	-	8	4	-	-	30	70	100
<b>Total Credits</b>						<b>24</b>	<b>Total Marks</b>			<b>600</b>	

## Semester-6

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Compiler Design	242/MCA/DSC601	3		2	4	25	50	5	20	100
	Computer Graphics	242/MCA/DSC602	3		2	4	25	50	5	20	100
	Shell Programming using Linux	242/MCA/DSC603	3		2	4	25	50	5	20	100
	Information Retrieval Systems	242/MCA/DSC604	3		2	4	25	50	5	20	100
<b>Vocational Courses (VOC)</b>											
	One from pool	242/MCA/VO601	2	-	4	4	15	35	15	35	100
<b>Skill Enhancement Course (SEC)</b>											
	One from pool	242/MCA/SE601	1	-	2	2	5	20	5	20	50
<b>Total Credits</b>						<b>22</b>	<b>Total Marks</b>			<b>550</b>	

## Semester-7

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Cryptography and Network Security	242/MCA/DSC701	3	-	2	4	25	50	5	20	100
	Software testing and Quality Assurance	242/MCA/DSC702	3	-	2	4	25	50	5	20	100
	Digital Image processing	242/MCA/DSC703	3	-	2	4	25	50	5	20	100
	Fundamentals of Machine Learning	242/MCA/DSC704	3	-	2	4	25	50	5	20	100
	Big Data Analytics	242/MCA/DSC705	3	-	2	4	25	50	5	20	100
<b>Vocational Course (VOC)</b>											
	One from Pool	242/MCA/VO701	2	-	4	4	15	35	15	35	100
<b>Total Credits</b>						<b>24</b>	<b>Total Marks</b>			<b>600</b>	

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## Semester-8

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Software Project Management	242/MCA/DSC801	3	-	2	4	25	50	5	20	100
	Mobile Computing	242/MCA/DSC802	3	1	-	4	30	70	-	-	100
	Pattern Recognition	242/MCA/DSC803	3	1	-	4	30	70	-	-	100
	Foundation of Data Science	242/MCA/DSC804	3	-	2	4	25	50	5	20	100
	Soft Computing	242/MCA/DSC805	3	-	2	4	25	50	5	20	100
<b>Vocational Course (VOC)</b>											
	One from Pool	242/MCA/VO801	3	1	-	4	30	70	-	-	100
<b>Total Credits</b>						<b>24</b>	<b>Total Marks</b>		<b>600</b>		

## Semester-9

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Distributed Systems	242/MCA/DSC901	3	1	-	4	30	70	-	-	100
	Data Warehouse and Mining	242/MCA/DSC902	3	1	-	4	30	70	-	-	100
	Block Chain technology	242/MCA/DSC903	3	1	-	4	30	70	-	-	100
	Internet of Things and its application	242/MCA/DSC904	3	-	2	4	25	50	5	20	100
<b>Skill Enhancement Course (SEC)</b>											
	One from Pool	242/MCA/SE901	2	-	-	2	15	35	-	-	50
<b>Value Addition Course (VAC)</b>											
	Seminar	242/MCA/VA901	2	-	-	2	-	-	-	-	50
<b>Total Credits</b>						<b>20</b>	<b>Total Marks</b>		<b>500</b>		

## Semester-10

Course Code	Course Title	Course ID	L	T	P	Credits	TI	TE	PI	PE	Total
<b>Discipline Specific Courses (DSC)</b>											
	Social Network Analysis	242/MCA/DSC1001	3		2	4	25	50	5	20	100
<b>Skill Enhancement Course (SEC)/ Project Report</b>											
						12			90	210	300
<b>Discipline Specific Elective Course(s)</b>											
	Deep Learning	242/MCA/DSC1002	3		2	4	25	50	5	20	100
<b>Total Credits</b>						<b>20</b>	<b>Total Marks</b>		<b>500</b>		

#Four credits of internship earned by a student during summer internship after 2nd semester will be counted in 3rd semester of a student who pursue 2-year PG Programme without taking exit option.

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**Multidisciplinary Course from the department for pool of the Courses in the University**

**(These courses are to be offered to students of different discipline/Subject).**

**Semester-1**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-1	Digital Electronics	242/MCA/MD101	2	1	-	2	1	-	3	15	35	5	20	75

**Semester-2**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-2	Mathematics	242/MCA/MD201	2	1	-	2	1	-	3	25	50	-	-	75

**Semester-3**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-3	Probability and Statistics	242/MCA/MD301	3	-	-	3	-	-	3	25	50	-	-	75

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## Skill Enhancement Course from the department for pool of the Courses in the University

(These courses are offered by each department for students of other departments/same department and is designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work.)

### Semester-1

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-1	Problem solving and python programming	242/MCA/SE101	2	-	2	2	-	1	3	15	35	5	20	75

### Semester-2

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-2	Numerical Ability and Enhancemen: Skills	242/MCA/SE201	2	-	2	2	-	1	3	15	35	5	20	75

### Semester-3

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-3	Basic Statistics Tool	242/MCA/SE301	2	-	2	2	-	1	3	15	35	5	20	75

### Semester-5

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-4	Summer Internship Report-I	242/MCA/SE501	-	-	8	-	-	4	4	-	-	30	70	100

### Semester-6

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-5	Presentation Skills and Personality	242/MCA/SE601	1	-	2	1	-	1	2	5	20	5	20	50

### Semester-9

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-6	Cloud Computing Essentials	242/MCA/SE901	2	-	-	2	-	-	2	15	35			50

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**Ability Enhancement Course from the department for pool of the Courses in the University**

(These courses are offered by department of Indian and Foreign Languages for students of other departments/same department and leads to enhancement in the ability of learn Regional and foreign languages)

**Semester-1**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
AEC-1	English Language & Communication Level 1	242/MCA/AE101	2	0	0	2	0	0	2	15	35	-	-	50

**Semester-2**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
AEC-2	English Language & Communication Skill II	242/MCA/AE201	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-3**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
AEC-3	English Language & Communication Skill III	242/MCA/AE301	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-4**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
AEC-4	English Language & Communication Skill IV	242/MCA/AE401	2	-	-	2	-	-	2	15	35	-	-	50

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**Value Added Course from the department for pool of the Courses in the University**

**(All the departments will offer value added course for the students of same or different departments.)**

**Semester-1**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VAC-1	Human Values and Community Outreach	242/MCA/VA101	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-2**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VAC-2	Environmental studies	242/MCA/VA201	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-3**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VAC-3	Indian Knowledge System	242/MCA/VA301	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-4**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VAC-3	Indian Constitution	242/MCA/VA401	2	-	-	2	-	-	2	15	35	-	-	50

**Semester-9**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VAC	Seminar	242/MCA/VA901	2	-	-	2	-	-	2	-	-	-	-	50

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**MIC/Vocational Courses (VOC) from the department for pool of the Courses in the University**

**(All the departments will offer vocational courses for the students of same or different departments.)**

**Semester-1**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-1	Front desk Management	242/MCA/VO101	2	-	2	2	-	1	3	15	35	5	20	75

**Semester-2**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-2	Animation and Graphic Design	242/MCA/VO201	2	-	4	2	-	2	4	15	35	15	35	100

**Semester-3**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-3	Computer Hardware and Maintenance	242/MCA/VO301	2	-	4	2	-	2	4	15	35	15	35	100

**Semester-4**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-4	Digital Marketing	242/MCA/VO401	2	-	4	2	-	2	4	15	35	15	35	100

**Semester-5**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-5	Mobile Application Development	242/MCA/VO501	2	-	4	2	-	2	4	15	35	15	35	100

**Semester-6**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-6	Data Handling and Visualization	242/MCA/VO601	2	-	4	2	-	2	4	15	35	15	35	100

**Semester-7**

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-7	Programming using ‘R’	242/MCA/VO701	2	-	4	2	-	2	4	15	35	15	35	100

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## Semester-8

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
VOC-8	Digital Forensic	242/MCA/VO801	3	1	-	3	1	-	4	30	70	-	-	100

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Nature of Work	Course Credits	Contact hours per week	Contact hours per semester (15 weeks)
Lecture	01	01	15
Tutorial per paper	01	01	15
Practical, Seminar, Internship, field practice/project, or community engagement, etc.	01	02	30

**Note:** Tutorial batch size (UG programme: 20-25, PG Programme: 12-15)

The distribution of credits among the lectures/tutorial/practicum will be as follows:

Courses	Total Credits	L (Credits)	T (Credits)	P (Credits)	MARKS			
					TI	TE	PI	PE
Only Theory	4	3 (3 hrs)	1	-	30	70	-	-
	3	2 (2 hrs)	1	-	25	50	-	-
	2	1	1	-	15	35	-	-
Theory and Practicum	4	3 (3 hrs)	-	1 (2 hrs)	25	50	5	20
	4 (Where pract. is dominant)	2 (2 hrs)	-	2 (4 hrs)	15	35	15	35
	3	2 (2 hrs)	-	1 (2 hrs)	15	35	5	20
	2	1	-	1 (2 hrs)	5	20	5	20
When Practicum is separate course	2	-	-	2 (4 hrs)	-	-	15	35
	3	-	-	3 (6 hrs)	-	-	25	50
	4	-	-	4 (8 hrs)	-	-	30	70
AEC/VAC	2	2 (2 hrs)			15	35	-	-
SEC	3	2 (2 hrs)		1 (2 hrs)	15	35	5	20
	2	1		1 (2 hrs)	5	20	5	20
DSEC	4	3 (3 hrs)		1 (2 hrs)	25	50	5	20
Minor/VOC	4	2 (2 hrs)		2 (4 hrs)	15	35	15	35
Internship	4	--	--	4 (8 hrs)			30	70

L= Lecture; T= Tutorial, P= Practicum; Ti= Theory Internal Assessment; TE= Theory End Semester Examination; PI= Practicum Internal; PE= Practicum End Semester examination

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## **Chapter 3: Detailed Syllabus**



# **Semester-3**

Course code				
Category	Discipline Specific Courses			
Course title	<b>Data Base Management System</b>			
Scheme and Credits	L	T	P	Credits
	3		2	4
TI	25			
TE	50			
PI	5			
PE	20			
Duration of Exam	3 Hrs.			

NOTE: "The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit."

### COURSE OUTCOMES

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
3. To understand and use data manipulation language to query, update, and manage a database.
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

### UNIT – I

Basic Concepts – Data, Information, Records and files. Traditional file –based Systems-File Based Approach-Limitations of File Based Approach, Database Approach-Characteristics of Database Approach, advantages and disadvantages of database system, components of database system, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, DBMS users, Advantages and Disadvantages of DBMS, DBMS languages. Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users.

### UNIT – II

Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances. Data Independence – Logical and Physical Data Independence. Classification of Database Management System, Centralized and Client Server architecture to DBMS.

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Data Models: Records- based Data Models, Object-based Data Models, Physical Data Models and Conceptual Modeling.

### **UNIT – III**

Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams, abstraction and integration. Basic Concepts of Hierarchical and Network Data Model, Relational Data Model: - Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations.

### **UNIT – IV**

Relational algebra, Relational calculus, Relational database design: Functional dependencies, Modification anomalies, 1st to 3rd NFs, BCNF, 4th and 5th NFs, computing closures of set FDs, SQL: Data types, Basic Queries in SQL, Insert, Delete and Update Statements, Views, Query processing: General strategies of query processing, query optimization, query processor, concept of security, concurrency and recovery.

### **REFERENCE BOOKS**

1. Elmasri & Navathe; “Fundamentals of Database Systems”, 5th edition, Pearson Education.
2. Thomas Connolly Carolyn Begg, “Database Systems”, 3/e, Pearson Education
3. C. J. Date, “An Introduction to Database Systems”, 8th edition, Addison Wesley N. Delhi

### **Data Base Management System Lab**

#### **List of Experiments**

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, synonyms, Sequences, indexes, and save points.
4. Creating an employee database to set various constraints.
5. Creating relationships between the databases. iv. Study of PL/SQL block.
6. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
7. Write a PL/SQL block that handles all types of exceptions.
8. Creation of Procedures
9. Creation of database triggers and functions
10. Mini project (Application Development using Oracle/ MySQL)
  - a. Inventory Control System
  - b. Material Requirement Processing.
  - c. Hospital Management System.
  - d. Railway Reservation System.
  - e. Personal Information System.
  - f. Web-Based User Identification System.
  - g. Time Table Management System.
  - h. Hotel Management

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Course code				
Category	Discipline Specific Courses			
Course title	<b>Foundation of Web technology</b>			
Scheme and Credits	L	T	P	Credits
	3		2	4
TI	25			
TE	50			
PI	5			
PE	20			
Duration of Exam	3 HRS			

NOTE: "The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit."

### COURSE OUTCOMES

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

1. Design web pages using HTML5 and CSS.
2. Understand objects and data validation in JavaScript.
3. Build Dynamic web site using server-side PHP Programming and Database connectivity.
4. Create web applications with Ajax.

#### Unit I:

Internet Basics 25 25 Basic concepts, Communication on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP Address, Brief Overview of TCP/IP and its Services, Transmission Control Protocol, Web Server, Web Client, Domain Registration, Gateways. HTML: Introduction to Hypertext Markup Language, Common tags, Anchors, Backgrounds, Images, Webpage structure, Hyper linking, Lists, Character Formatting, Color Control, Images, Tables, Frames, Multimedia, Cascading style sheet, Application with layers.

#### Unit II:

JavaScript and XML Client-side Forms, JavaScript, Incorporating JavaScript in HTML, JavaScript expressions, Control flow and functions, String and Arrays, JavaScript objects, JavaScript Forms: Managing frames in JavaScript, Cookies, history, location. XML, XSL and other markup languages, CGI Scripting with Perl.

#### Unit III:

PHP Basic concepts strings, functions and OOPs, File handling, Working with database and AJAX.

#### Unit IV:

Servlets & JSP Introduction to Servlets and JSP basics. Implementation of Sessions, Cookies, Filter, Listener, and Wrapper, Expression language-EL, JSP Standard Tag Library-JSTL, MySQL, JDBC, Connection pooling.

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## REFERENCE BOOKS

1. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education, 2007.
2. S. Holzner, Php: The Complete Reference, TMH, 2007.
3. Kriss Jamsa, Konrad King, HTML & Web Design, TMH Publications, 2002.
4. Jason Hunter, William Crawford, Servlet Programming, O'REILY, 2010.
5. Tom Negrino and Dori Smith, JavaScript for the World Wide Web, 3E, 2011.
6. Joel Murach, Andrea Steelman, Murach's Java Servlets and JSP, Murach's, 2E, 2008.
7. Robert Hoekman Jr., Java Servlet & JSP Cookbook, Schorr Pub, 2004.
8. Santosh Kumar K, JDBC, Servlets, And Jsp Black Book, Kogent Solutions Inc., 2008.

## Foundation of Web technology Lab

### List of Experiments

1. Design the following static web pages required for an online book store web site.

HOME PAGE: The static home page must contain three frames.

LOGIN PAGE

CATALOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table.

REGISTRATION PAGE.

2. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
3. Write an HTML page including any required JavaScript that takes a number from text field in the range of 0 to 999 and shows it in words. It should not accept four and above digits, alphabets and special characters.
3. Develop and demonstrate PHP Script for the following problems: a) Write a PHP Script to find out the Sum of the Individual Digits. b) Write a PHP Script to check whether the given number is Palindrome or not
4. Create an XML document that contains 10 users' information. Write a Java Program, which takes User Id as input and returns the user details by taking the user information from XML document using DOM parser or SAX parser
5. Implement the web applications with Database using (a) PHP, (b) Servlets and (c) JSP.
6. Modify the above PHP program to use an xml instead of database
7. Write a program to design a simple calculator using (a) JavaScript (b) PHP (c) Servlet and (d) JSP.

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Course code				
Category	VOC			
Course title	<b>Computer Hardware and Maintenance</b>			
Scheme and Credits	L	T	P	Credits
	3		2	4
TI	25			
TE	50			
PI	05			
PE	20			
Duration of Exam	3 Hrs.			

NOTE: "The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no. 2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit."

### COURSE OUTCOMES

1. It will understand the basics of computer systems along with peripherals.
2. It will be able to do troubleshooting of different computer related issues.
3. It will learn to determine and installing appropriate security measures.
4. Students will be able provide the technical support on-site.
5. Students will be able to troubleshoot software and hardware problems related to internet applications.

### UNIT-I

INTRODUCTION TO PERIPHERAL DEVICES: General block diagram of a peripheral device, different types of peripheral devices used in modern computers and their purpose.

### UNIT-II

BASIC INPUT & OUTPUT DEVICES: INPUT DEVICES: Block diagram of keyboard, different types of keyboards, operation and working principle of mouse and different mouse. OUTPUT DEVICES: Construction of CRT Monitor. Impact and non-impact printers, operation of LaserJet printer with a block diagram, operation of inkjet printer with a block diagram.

### UNIT-III

BASIC STORAGE DEVICES & SPECIAL PERIPHERAL DEVICES: BASIC STORAGE DEVICES: Construction of floppy disk with a block diagram, construction of a hard disk with a block diagram, precautions to be taken in handling magnetic media. SPECIAL PERIPHERAL DEVICES: Principle and working of a joystick and digitizer, operation of a plotter, various parts of magnetic tape transport

### UNIT-IV

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**BASIC TROUBLE SHOOTING:** Various test equipment's used for PC servicing, reasons for failure of components like resistors, capacitors etc. reasons for failure of a disk drive, reasons for display failure, reason for the keyboard failure, reasons for the printer failure, reasons for the power supply failure, safety precautions to be taken during trouble shooting.

## **REFERENCE BOOKS**

1. **COMPUTER HARDWARE:** Installation, Interfacing, Troubleshooting and Maintenance by K. L. James (Author) publisher, PHI.
2. **IBM PC & Clones:** Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill

## **Computer Hardware and Maintenance Lab**

### **List of Experiments**

1. Front panel indicators & switches and Front side & rear side Connectors.
2. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards.
3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.
4. Install Hard Disk and configure to the Pc's.
5. Install and Configure a DVD Writer and a Blu-ray Disc writer and recording DVD and Blu-ray disk.
6. Printer Installation and Servicing and troubleshoot.
7. Install and configure Scanner, Web cam, Cell phone and bio-metric device with system and troubleshoot the problems.
8. Assemble a system with add on cards and check the working condition of the system and install OS.
9. Install and Configure Dual OS Installation.
10. Assembling and Disassembling of Laptop to identify the parts and to install OS and configure it.

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Course code				
Category	MDC			
Course title	<b>Probability and Statistics</b>			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
TI	25			
TE	50			
PI	--			
PE	--			
Duration of Exam	3 Hrs.			

NOTE: "The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit."

### COURSE OUTCOMES

After successful completion of this course, students will be able to:

CO1. Understand and apply the basic principles of probability, including sample spaces, events, rules of probability, and conditional probability; solve problems using combinatorics and understand the concept of independence.

CO2. Analyze and compute the distribution, expectation, and variance of discrete and continuous random variables; apply the Central Limit Theorem and understand families of standard distributions.

CO3. Utilize computer-based simulations and Monte Carlo methods to model random variables and solve probabilistic problems.

CO4. Apply basic statistical techniques to summarize data; perform parameter estimation, construct confidence intervals, and conduct hypothesis testing, including Bayesian approaches.

### Unit-I

Probability: Sample space, events, and probability, rules of Probability, equally likely outcomes. Combinatorics, Conditional Probability Independence.

### Unit-II

Discrete Random Variables and their Distributions: Distribution of a random variable, Distribution of a random vector, Expectation and variance, Families of discrete distributions, Continuous Distributions: Probability density, Families of continuous distributions, Central Limit Theorem.

### Unit-III

Computer Simulations and Monte Carlo Methods: Simulation of random variables, Solving problems by Monte Carlo methods.

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#### **Unit-IV**

Introduction to Statistics: Population and sample, parameters and statistics, Simple descriptive statistics, Graphical statistics, Statistical Inference, Parameter estimation, Confidence intervals, Unknown standard deviation, Hypothesis testing Bayesian estimation and hypothesis testing.

#### **REFERENCE BOOKS**

1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
2. S. Ross: A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3<sup>rd</sup> Ed., Wiley, 1968.

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Course code				
Category	SEC			
Course title	<b>Basic Statistics Tool</b>			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
TI	25			
TE	50			
PI	--			
PE	--			
Duration of Exam	3 HRS			

NOTE: "The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit."

### COURSE OUTCOMES

After successful completion of this course, students will be able to:

CO1. Understand the concepts of primary and secondary data, classify data, and compute various measures of central tendency and dispersion; interpret skewness and kurtosis using real-life examples

CO2. Apply foundational probability concepts to analyze random experiments, compute probabilities using counting methods, and solve problems involving conditional probability, independence, and key probability theorems including Bayes' theorem.

CO3. Explain and distinguish between discrete and continuous random variables; analyze their distributions using probability mass and density functions, and understand joint, marginal, and conditional distributions of bivariate random variables.

CO4. Compute mathematical expectations, raw and central moments, covariance, and apply moment-based theorems; understand the significance of moment generating, characteristic, and cumulant generating functions.

### Unit-I

**Descriptive Statistics:** Concept of primary and secondary data, Classification of data, Measures of central tendency (Arithmetic mean, median, mode, geometric mean and harmonic mean) with simple applications, Absolute and relative measures of dispersion (range, quartile deviation, mean deviation, standard deviation and variance) with simple applications. Importance of moments, central and non-central moments, Measures of skewness based on quartiles and moments, kurtosis based on moments with real life examples.

### Unit-II

**Probability:** Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favourable events with examples, Mathematical, Conditional probability and independence of events,

*Page 1*

Addition and multiplication theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on probability using counting methods and theorems.

### Unit-III

**Random Variables:** Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties, Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables.

### Unit-IV

**Mathematical Expectation:** Mathematical expectation of a function of a random variable, Raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f).

### REFERENCE BOOKS

1. Cohen, J. (1988). Statistical power analysis for the behavioral sciences. 2nd Ed. Hillsdale, NJ, Erlbaum.
2. George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.
3. Tabachnick, B., & Fidell, L. (2019). Using Multivariate Statistics (7th Ed). Boston, MA: Pearson Education Inc.

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# **Semester-4**



Course code				
Category	Discipline Specific Courses (DSC)			
Course title	Object oriented programming using python			
Scheme and Credits	L	T	P	Credits
	3	-	2	4
Theory Internal	25			
Theory External	50			
Practical Internal	05			
Practical External	20			
Total	100			
Duration of Exam	3 hrs			

**Note:** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

#### **Course outcomes:**

CO1: Write simple programs using built-in data types of Python.

CO2 Implement arrays and user defined functions in Python.

CO3 Solve problems spanning multiple disciplines using suitable programming constructs in Python.

CO4. Solve problems spanning multiple disciplines using the concepts of object-oriented programming in Python.

#### **Unit-I**

Introduction to Python: Python - a tool, not a reptile, Introduction to OOPS.

Data Types, Variables, Basic Input-Output Operations, Basic Operators: Python literals, Operators - data manipulation tools, Variables - data-shaped boxes, Boolean Values, Conditional Execution

#### **Unit-II**

Loops, Lists and List Processing, Logical and Bitwise Operations: Making decisions in Python, Python's loops, Logic and bit operations in Python, Lists - collections of data, sorting simple lists - the bubble sort algorithm, Lists in advanced applications.

#### **Unit-III**

Functions, Tuples, Dictionaries, and Data Processing: writing functions in Python, how functions communicate with their environment, Returning a result from a function, Scopes in Python, functions, Tuples and dictionaries.

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## Unit-IV

Modules, Packages, String and List Methods, handling Exceptions and Errors, The anatomy of exception, Characters and strings, Python's nature of strings, String methods, Strings in action. The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features, and Working with Files: Basic concepts of object programming, Properties, Methods, Inheritance, Generators and closures, processing files, Working with real files.

## REFERENCE BOOKS

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
4. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-

## Object oriented programming using python Lab

### List of Experiments

1. Basic building blocks of a Python program (variables, conditional statements, loops, libraries, functions, errors).
2. Data structures (trees, dictionaries, tuples).
3. Object Oriented programming (classes, objects, inheritance, polymorphism, abstract classes).
4. PyQt for creating graphical user interfaces for interactive programs.
5. NumPy (Matrices, vectors, linear algebra).
6. SciPy (Package for numerical computations).
7. Matplotlib (Plotting) 8. Interactive Python (IPython).

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Course code				
Category	Discipline Specific Courses (DSC)			
Course title	Analysis and Design of Algorithms			
Scheme and Credits	L	T	P	Credits
	3	-	2	4
Theory Internal	25			
Theory External	50			
Practical Internal	05			
Practical External	20			
Total	100			
Duration of Exam	3 hrs			

**Note:** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

#### Course outcomes:

CO1: Able to Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.

CO2: Able to explain important algorithmic design paradigms (divide-and-conquer, greedy method, dynamic-programming and Backtracking) and apply when an algorithmic design situation calls for it.

CO3: Able to Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate

CO4: Able to Compare between different data structures and pick an appropriate data structure for a design situation.

CO5: Able to Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.

#### Unit-I

Introduction and basic concepts Complexity measures, worst-case and average-case complexity functions, problem complexity, quick review of basic data structures and algorithm design principles. Sorting and selection: Finding maximum and minimum, k largest elements in order; Sorting by selection, tournament and heap sort methods, lower bound for sorting, other sorting algorithms - radix sort, quick sort, merge sort; Selection of k-th largest element.

#### Unit-II

Searching and set manipulation Searching in static table – binary search, path lengths in binary trees and applications, optimality of binary search in worst cast and average-case, binary search trees, construction of optimal weighted binary search trees; Searching in dynamic table – randomly grown

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binary search trees, AVL and (a,b) trees. Hashing: Basic ingredients, analysis of hashing with chaining and with open addressing. Union-Find problem: Tree representation of a set, weighted union and path compression-analysis and applications.

### Unit-III

Graph problems Graph searching – BFS, DFS, shortest first search, topological sort; connected and biconnected components; Minimum spanning trees – Kruskal's and Prim's algorithms – Johnson's implementation of Prim's algorithm using priority queue data structures. Algebraic problems: Evaluation of polynomials with or without preprocessing. Winograd's and Strassen's matrix multiplication algorithms and applications to related problems, FFT, simple lower bound results.

### Unit-IV

String processing String searching and Pattern matching, Knuth-Morris-Pratt algorithm and its analysis. NP-completeness: Informal concepts of deterministic and nondeterministic algorithms, P and NP, NP-completeness, statement of Cook's theorem, some standard NP-complete problems, approximation algorithms.

### REFERENCE BOOKS

1. T. H. Cormen, C. L. Leiserson, R. L. Rivest, and C. Stein, Introduction to Algorithms, MIT Press, 2003.
2. J. Kleinberg and E. Tardos, Algorithm Design, Addison-Wesley, 2006.
3. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1991.
4. A. Gibbons, Algorithmic Graph Theory, Cambridge University Press, 1985.
5. Michael T. Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, John Wiley, 2006.
6. R. Sedgewick, Algorithms in C: Part 5, Addison Wesley, 2001.
7. M. H. Alsuwaiyel, Algorithm Design Techniques and Analysis, World Scientific, 1999.
8. Gilles Brassard and Paul Bratley, Algorithmics: theory and practice, Prentice-Hall, 1988.

### Analysis and Design of Algorithms Lab

#### List of Experiments

1. Write a program to implement different sorting techniques.
  - Bubble Sort • Insertion Sort • Selection Sort • Quick Sort • Merge Sort
2. Write a program to find minimum cost spanning tree.
3. Write a program to implement travelling sales person problem.
4. Write a program to find Longest Path in a Directed Acyclic Graph.
5. Write a program for shortest path with exactly k edges in a directed and weighted graph.
6. Write a program find maximum number of edge disjoint paths between two vertices.
7. Implement 0/1 Knapsack problem using Dynamic Programming.
8. Perform various tree traversal algorithms for a given tree.
9. Implement N-Queens Problem

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Course code				
Category	Discipline Specific Courses (DSC)			
Course title	Data Communication and Networking			
Scheme and Credits	L	T	P	Credits
	3	-	2	4
Theory Internal	25			
Theory External	50			
Practical Internal	05			
Practical External	20			
Total	100			
Duration of Exam	3 hrs			

*Note: The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.*

#### **Course outcomes:**

CO1: Student will be able to understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.

CO2: Student will be able to understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device.

CO3: Student will be able to understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.

CO4: Student will understand the working principles of LAN and the concepts behind physical and logical addressing, subnetting and supernetting.

CO5: Student shall understand the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.

CO6: Student shall understand the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.

#### **Unit-I**

Introduction: Introduction of network, topology, Use of computer network, network hardware: LAN, WAN, MAN, Wireless Network, Reference Models: ISO-OSI model, TCP model. Physical layer: Transmission Media-Magnetic Media, Twisted Pair, Coaxial pair, Fiber 24 24 Optics, Line coding and multiplexing.

#### **Unit-II**

Data link layer Data link layer design Issue, Error Detection and correction, Elementary Data link protocol, stop- and-wait ARQ, sliding window, Go-back-n, Selective Repeat ARQ. Related advanced

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algorithms to be studied. Mac sublayer: Multiple Access protocol: ALOHA, Slotted ALOHA, CSMA protocols, Introduction to MAC Protocols: 802.3, 802.4, 802.5, 802.11

### Unit-III

Network layer Network Design Issue, Routing algorithm-introduction, optimality Principle, Shortest Path, Flooding, Distance Vector Routing. Congestion Control Routing: General principle of Congestion control, leaky bucket algorithm, Token Bucket Algorithm. TCP/IP: The TCP/IP architecture, the Internet Protocol, ARP, DHCP and mobile IP, Internet routing protocols: RIP, OSPF, BGP. TCP/IP Implementation related case studies to be studied.

### Unit-IV

Transport layer Transport Services, Element of transport protocols, TCP connection management, TCP transmission policy, TCP congestion control & Timer management. Application layer: DNS, SMTP, POP3, FTP, TELNET, HTTPS. Related advanced protocols should be studied.

### REFERENCE BOOKS

1. William Stallings, Data and Computer Communication, Prentice Hall of India, 2007.
2. Behrouz A. Forouzan, Data Communication and Networking, McGraw-Hill, 2007.
3. Andrew S. Tanenbaum, Computer Networks, Prentice Hall, 2008.
4. Douglas Comer, Internetworking with TCP/IP, Volume 1, Prentice Hall of India, 2006.
5. W. Richard Stevens, TCP/IP Illustrated: The Protocol, Volume 1, Addison-Wesley, 2011.
6. William Stallings, Cryptography and Network Security: Principles and Practice, Prentice Hall of India, 2008.
7. Neal Koblitz, A course in number theory and cryptography, Springer, 2008.
8. R. C. Seacord, Secure Coding in C and C++, Addison-Wesley, 2005.
9. John Viega, Matt Messier), Pravar Chandra, Network Security with OpenSSL, O'Reilly, 2009.

### Data Communication and Networking Lab

#### List of Experiments

1. Study of Parallel data Communication between two computers.
2. Study of Network Topologies – Star, Bus & Ring.
3. Implementation of stop and wait protocol using simulator.
4. Implementation of Sliding window protocol using simulator.
5. Implementation of Go-Back N protocol using simulator.
6. Implementation of Selective Repeat protocol using simulator.
7. Study the performance of the network with CSMA/ CD protocol.
8. Study the performance of the network with CSMA/ CA protocol.
9. Implementation of routing algorithm.
  - a. Distance vector Routing Algorithm
  - b. Link State Routing Algorithm
10. Encryption and Decryption.
11. Study of Ethernets and Fast Ethernets.

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Course code				
Category	Discipline Specific Courses (DSC)			
Course title	Multi Media Technology			
Scheme and Credits	L	T	P	Credits
	3	-	2	4
Theory Internal	25			
Theory External	50			
Practical Internal	05			
Practical External	20			
Total	100			
Duration of Exam	3 hrs			

**Note:** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

#### **Course outcomes:**

CO1: It will provide an understanding of the fundamental elements in multimedia.

CO2: It will emphasise on learning the representations, perceptions and applications of multimedia.

CO3: To develop the skills for developing multimedia projects.

CO4: Understand the technologies behind multimedia applications

CO5: Summarize the key concepts in current multimedia technology.

CO6: Create quality multimedia software titles.

#### **UNIT-I**

Multimedia System Overview Introduction to Multimedia System, Multimedia Files: Image and sound file formats, features of software to read and write such files, Basics of digital audio, Basics of digital imaging, Multimedia compression technologies and standards - VCD, DVD - MPEG-1/2/4/21.

#### **UNIT-II**

Multimedia Authentication Multimedia Authentication: Pattern, Speaker and Behavior Recognition - Speaker Recognition – Face Recognition.

#### **UNIT-III**

Multimedia Forensics: Digital Forensics taxonomy, goals/requirements - Forensic Data Acquisition - Digital Forensics Tools -Forensics Analysis and Validation - File and Network Forensics – Techniques - Application forensics- Email, Graphics and Multimedia Forensics.

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## UNIT-IV

Multimedia Fingerprinting: Multimedia Fingerprinting: Trace Traitors, Multimedia fingerprinting for tracing traitor, Steganalysis, Non-intrusive forensics, Standardization and Integration, Standardization on media security, Secured Multimedia and Multimedia Security Applications Secured Multimedia: Digital Rights Management Systems, and Technical Trends - Multimedia encryption - Digital Watermarking - Security Attacks. Multimedia Security Applications: Media Sensor Network - Voice over IP (VoIP) Security – DTH – Video Conference

## REFERENCE BOOKS

1. Wenjun Zeng, Heather Yu and Ching – Yung Lin, “Multimedia Security technologies for Digital rights Management”, Elsevier Inc 2006.
2. Chun-Shien Lu, “Multimedia Security: Steganography and Digital Watermarking techniques for Protection of Intellectual Property”, Springer Inc 2007.

## Multi Media Technology Lab

### List of Experiments

1. Write a program to justify a text entered by the user on both left- and right-hand side. For example, the test "An architect may have a graphics program to draw an entire building but be interested in only ground floor", can be justified in 30 columns. An architect may have a graphics programs draw an entire building but interested in only ground floor.
2. Study the notes of a piano and stimulate them using the keyboard and store them in file.
3. Write a program to read a paragraph and store it to a file name suggested by the author.
4. Devise a routine to produce the animation effect of a square transforming to a triangle and then to a circle.
5. Write a program to show a bitmap image on your computer screen.
6. Create a web page for a clothing company which contains all the details of that company and at- least five links to other web pages.
7. Write a program by which we can split mpeg video into smaller pieces for the purpose of sending it over the web or by small capacity floppy diskettes and then joining them at the destination.
8. Write a program to simulate the game of pool table.
9. Write a program to simulate the game mine-sweeper.
10. Write a program to play "wave" or "midi" format sound files

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Course code				
Category	Vocational Course (VOC)			
Course title	Digital Marketing			
Scheme and Credits	L	T	P	Credits
	3	-	2	4
Theory Internal	25			
Theory External	50			
Practical Internal	05			
Practical External	20			
Total	100			
Duration of Exam	3 hrs			

**Note:** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

#### **Course outcomes:**

CO1: Understand the concept of digital marketing and its real-world iterations.

CO2: Articulate innovative insights of digital marketing enabling a competitive edge.

CO3: Understand how to create and run digital media-based campaigns.

CO4: Identify and utilise various tools such as social media etc.

#### **Unit-I**

Introduction to Digital Marketing Evolution of Digital Marketing from traditional to modern era, Role of Internet; Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.

#### **Unit-II**

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.

#### **Unit-III**

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,

*Puay*

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

#### **Unit-IV**

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.

#### **REFERENCE BOOKS**

1. Dave Chaffey & Fiona Ellis-Chadwick, Digital Marketing: Strategy, Implementation and Practice Publisher: Pearson Education, 7th Edition (2019)
2. Damian Ryan, Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Publisher: Kogan Page, 5th Edition (2020)
3. Philip Kotler, Hermawan Kartajaya & Iwan Setiawan Marketing 5.0: Technology for Humanity Publisher: Wiley, 1st Edition (2021)

#### **Digital Marketing Lab**

##### **List of Experiments**

1. Digital Marketing Implementation in Business Scenario.
2. Create the Digital Marketing Webpage.
3. Conducting the Search Engine Optimization and Search Engine Marketing.
4. Using Google Analytics to analyze website performance.
5. Creating Promotional banner through Canva.
6. Facebook Promotion using banners.
7. Creating YouTube Channel for Marketing.
8. Twitter Marketing.
9. Instagram Marketing.
10. Email Marketing Additional 11 Digital Marketing Final Analysis and Report.

