SCHEME AND CURRICULUM BOOK

MASTER OF COMPUTER APPLICATIONS

PG DEGREE 2 YEAR PROGRAMME

Engineering and Technology

(w.e.f. Session 2024-2025)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Gurugram University, Gurugram, Haryana

Preface

The overall well-being of a nation depends on the eminence of its human resource. Providing quality education plays a vital role in transforming people into valuable human resource. Well-educated students of today will become innovators and leaders of tomorrow who are going to ensure a constructively competitive but sustainable and peaceful world for everyone. Keeping in the view the demand of the skills based on Computer Applications, the university has introduced a Master in Computer Applications in the Department of Computer Science & Engineering. The curriculum is designed around the framework of Outcome-Based Education (OBE) in which students are at the centre of teaching learning process. The salient features of the curriculum design are as follows:

1. To start with, four Programme Educational Outcomes are defined.
2. The twelve Programme Outcomes (POs) are taken from the Self Appraisal Report format of National Board of Accreditation (NBA) for postgraduate programmes and two Programme Specific Outcomes (PSOs) are outlined to capture the MCAprogramme.
3. An induction programme of three weeks has been introduced to make the admitted students comfortable in their new environment. The induction programme continues in the form of participation in Sports club or Green club or Cultural, Literature and Film Club etc. for the remaining period of the programme. It is mandatory for every student to join in one of these clubs.
4. In addition to the core and elective courses, there is a provision for many courses from Value Added Courses (VAC), Ability Enhancement Courses (AEC), Skill Enhancement Courses (SEC), Multidisciplinary Courses (MDC). The non-credit mandatory courses are included to make students aware about constitution of India, issues related to environmental and sustainable development, and Indian traditional wisdom.
5. For every course, 4 to 6 Course Outcomes (COs) are defined which are concrete and measurable.
6. Guidelines for preparing sessional examination question papers and assignments have been framed for measuring the attainment levels of COs.
7. The internal and external evaluation criteria for various courses has been succinctly described.
8. The Course Outcomes (COs) are mapped to Programme Outcomes (POs) by defining a CO:PO articulation matrix for every course.
9. The methodology for computing the attainment levels for the Course Outcomes and

Programme Outcomes is laid out.

10. The new curriculum has a focus on the problem solving and learning capabilities of the students. There are many laboratory courses which give students a hands-on experience in problem solving. Further, provisions for industry internship/training and project works make students ready to accept challenges and do research to solve difficult engineering problems.
11. Overall, the curriculum is made keeping in the view the continuous cycle of improvement in teaching learning process.

Contents

Chapter 1: General Information

Vision

Gurugram University aspires to be a front runner in global education; role model for institutional excellence, trans-cultural quality learning, intellectual growth, contemporary research, capacity building and nurturing socially and morally responsible disciples through a learner- centric approach. The university seeks to ensure a journey from studentship to epitome of discipleship by working on academic, professional, technical, industry and life skills of its students.

Mission

1. **To become a socially conscious centre of knowledge and advancement equipped to take up the challenges of the global change as well as committed to empower its teachers for the development of the students.**
2. **To move up through international alliances and collaborative initiatives to achieve global excellence.**
3. **To create rigorous academic and research environment for creation of knowledge and its perpetual advancement.**
4. **To attract and build people in a rewarding and inspiring environment by fostering freedom, empowerment, creativity, scientific zeal and innovation.**

DEPARTMENT OF ENGINEERING & TECHNOLGY
COMPUTER SCIENCE AND ENGINEERING

VISION

To advance in the evolving domains of Computer Science and Engineering by imparting knowledge, fostering relevant practices, and instilling human values to empower students as capable contributors in innovative applications of advanced computing.

MISSION

- **Foster strong foundational and technical skills in Computer Science through effective teaching methodologies.**
- **Cultivate ethical values, creativity, and entrepreneurial spirit among students to inspire them to establish startups.**
- **Encourage students to prioritize sustainable solutions that enhance quality of life and societal welfare.**
- **Strengthen research in computing by fostering collaborations between academia and industry.**
- **Promote lifelong learning of emerging technologies to encourage students to pursue higher studies and continuous professional development.**

ABOUT THE PROGRAMME

The Department of Engineering and Technology at Gurugram University in Gurugram, Haryana, India, is an academic department that focuses on the study and research of computer science and engineering& computer application disciplines. Gurugram University was established in 2017. The Department offers undergraduateprogrammes,and postgraduate programmesin computer science and engineering& computer application. These programmes aim to provide students with a strong foundation in computer applications related areas.

The department offers a wide range of courses that cover various aspects of computer applications, such as data structures, operating systems, computer networks, databases, artificial intelligence, machine learning, and more. The curriculum is designed to equip students with the necessary knowledge and skills to pursue careers in the IT industry, research and development, or further studies in the field.

Moreover, the department has well-qualified faculty members who are actively engaged in research and teaching. They have expertise in different areas of computer science and engineering to guide students in their academic pursuits and research projects.

In addition to academic programmes, the department also organizes workshops, seminars, and conferences to facilitate knowledge sharing and promote collaboration among students, faculty, and industry professionals.

NOTE:

The scheme will be applicable from Academic Session 2024-25 onwards.

MCA PROGRAMME

PROGRAMME EDUCATION OBJECTIVES

PEO1	To develop the ability to plan, analyze, design, code, test, implement and maintain the software product for real time systems.
PEO2	To excel in problem solving and programming skills in computing fields of IT industries.
PEO3	To encourage students capability to set up their own enterprise in various sectors of Computer Applications.
PEO4	To prepare the students to pursue higher studies in computing and related fields and to work in the fields of teaching and research.

PROGRAMME OUTCOMES

PO1	**Computational Knowledge:**Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.
PO2	**Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO3	**Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Computing Problems:** 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.
PO5	**Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PO6	**Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PO7	**Life-long Learning:** Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO8	**Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO9	**Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	**Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO11	**Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	**Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAMME SPECIFIC OUTCOMES

PSO1	Understand and apply the computing techniques with mathematics and industrial concepts for solving the real time industrial problems
PSO2	Analyze, design, develop, test and maintain the software applications with latest computing tools and technologies

Chapter 2: Scheme of MCA Syllabus

GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

MANDATORY INDUCTION PROGRAMME (3-WEEKS DURATION)

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. A 3-week long induction programmefor the PG students entering the institution, right at the start, has to be planned. Normal classes will start only after the induction programmeis over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

TentativeactivitieswhichcanbeplannedinthisInductionProgrammeareas follows:

1. Physical Activity
2. Creative Arts
3. Universal Human Values
4. Literary
5. Proficiency Modules
6. Lectures by Eminent People
7. Visits to Local Area
8. Familiarization to Dept./Branch &Innovations

Semester wise Structure and Curriculum for

PG Course in Master in Computer Applications(MCA)

Gurugram University, Gurugram

GENERAL COURSE STRUCTURE AND CREDIT DISTRIBUTION

CREDIT DISTRIBUTION

POSTGRADUATE PROGRAMME

Scheme of Programme Master of Computer Applications (MCA)

(Scheme PG A1: PostgraduateProgrammes(Course work only))

Semester 1

Course Code	Course Title	Course ID	L (Hrs)	T (Hrs)	P (Hrs)	L Credits	T Credits	P Credits	Credits	MARKS TI	MARKS TE	MARKS PI	MARKS PE	MARKS Total
	Core Course(s)													
CC-A01	Computer Fundamentals and Programming in C	241/MCA/CC101	3	-	2	3	-	1	4	25	50	5	20	100
CC-A02	System Software and Operating Systems	241/MCA/CC102	3	-	2	3	-	1	4	25	50	5	20	100
CC-A03	Artificial Intelligence and Applications	241/MCA/CC103	3	-	2	3	-	1	4	25	50	5	20	100
	Discipline Specific Elective Courses													
DSE-01	Web Designing fundamentals	241/MCA/DS101	2	-	2	2	-	1	3	15	35	5	20	75
	Multidisciplinary Course(s)													
MDC-01	One from the pool	241/MCA/MD101	3	-	-	3	-	-	3	25	50	-	-	75
	Ability Enhancement Course(s)													
AEC-01	One from the pool	241/MCA/AE101	2	-	-	2	-	-	2	15	35	-	-	50
	Value-added Course(s)													
VAC-01	One from the pool	241/MCA/VA101	2	-	-	2	-	-	2	15	35	-	-	50
Total Credits									**22**					**550**

Semester 2

Course Code	Course Title	Course ID	L (Hrs)	T (Hrs)	P (Hrs)	L Credits	T Credits	P Credits	Credits	MARKS TI	MARKS TE	MARKS PI	MARKS PE	MARKS Total
Core Course(s)														
CC-A04	Database management and management	241/MCA/CC201	3	-	2	3	-	1	4	25	50	5	20	100
CC-A05	Data Structures and Algorithms	241/MCA/CC202	3	-	2	3	-	1	4	25	50	5	20	100
CC-A06	Object oriented programming using Java	241/MCA/CC203	3	-	2	3	-	1	4	25	50	5	20	100
Discipline Specific Elective Courses														
DSE-02	Security in Computing	241/MCA/DS201	3	-	-	3	-	-	3	25	50	-	-	75
Multidisciplinary Course(s)														
MDC-02	One from the pool	241/MCA/MD201	3	-	-	3	-	-	3	25	50	-	-	75
Ability Enhancement Course(s)														
AEC-02	One from the pool	241/MCA/AE201	2	-	-	2	-	-	2	15	35	-	-	50
Skill Enhancement Course(s)														
SEC-01	One from the pool	241/MCA/SE201	1	-	2	1	-	1	2	5	20	5	20	50
Total Credits									**22**					**550**

Semester 3

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
Core Course(s)														
CC-A07	Software Engineering	241/MCA/CC301	3	-	2	3	-	1	4	25	50	5	20	100
CC-A08	Computer System Architecture	241/MCA/CC302	3	1	-	3	1	-	4	30	70	-	-	100
CC-A09	Data Communications and Computer Networks	241/MCA/CC303	3	-	2	3	-	1	4	25	50	5	20	100
Discipline Specific Elective Courses														
DSE-03	Full stack programming-1	241/MCA/DS301	2	-	2	2	-	1	3	15	35	5	20	75
Multidisciplinary Course(s)														
MDC-03	One from the pool	241/MCA/MD301	3	-	-	3	-	-	3	25	50	-	-	75
Skill Enhancement Course(s)														
SEC-02	One from the pool	241/MCA/SE301	1	-	2	1	-	1	2	5	20	5	20	50
Value-added Course(s)														
VAC-02	One from the pool	241/MCA/VA301	2	-	-	2	-	-	2	15	35	-	-	50
Seminar														
Seminar		241/MCA/SM301	2	-	-	2	-	-	2	-	-	-	-	50
Project/Internship/Field Activity#														
		241/MCA/PR301	-	-	8	-	-	4	4	-	-	-	-	100
Total Credits									**28**					**700**

#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.

Semester 4

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
Core Course(s)														
CC-A10	Soft Computing	241/MCA/CC401	3	-	2	3	-	1	4	25	50	5	20	100
CC-A11	Data Science and visualization	241/MCA/CC402	3	-	2	3	-	1	4	25	50	5	20	100
Discipline Specific Elective Courses														
DSE-04	Full stack programming-2	241/MCA/DS401	2	-	2	2	-	1	3	15	35	5	20	75
Multidisciplinary Course(s)														
MDC-04	One from the pool	241/MCA/MD401	3	-	-	3	-	-	3	25	50	-	-	75
Ability Enhancement Course(s)														
AEC-03	One from the pool	241/MCA/AE401	2	-	-	2	-	-	2	15	35	-	-	50
Community Engagement/Field Work/Survey/Seminar/Project														
Seminar		241/MCA/SM401	-	-	12	-	-	6	6	-	-	-	-	150
Total Credits									**22**					**550**

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	241/MCA/MD101	3	-	-	3	-	-	3	25	50	-	-	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	Discrete Mathematics OR Modelling and Simulation	241/MCA/MD201 241/MCA/MD202	3	-	-	3	-	-	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 OR Fundamentals of electrical and electronics science	241/MCA/MD301 241/MCA/MD302	3	-	-	3	-	-	3	25	50	-	-	75

Semester 4

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-4	Cloud, edge and fog computing OR Internet of Things	241/MCA/MD401	3	-	-	3	-	-	3	25	50	-	-	75

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 2

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 using python programming	241/MCA/SE201	1	-	2	1	-	1	2	5	20	5	20	50

Semester 3

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
SEC-2	Mobile Application Development	241/MCA/SE301	1	-	2	1	-	1	2	5	20	5	20	50

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 learnRegional 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		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
AEC-2	English Language & Communication Level 2		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 Level 3		2	-	-	2	-	-	2	15	35	-	-	50

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 department.)

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	Environmental studies		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-2	Human Values and Community Outreach		2	-	-	2	-	-	2	15	35	-	-	50

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 ominant)	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

Chapter 3: Detailed Syllabus

Semester 1

Course code	CC-A01			
Category	Core Course			
Course title	Computer Fundamentals and Programming in C			
Course ID	241/MCA/CC101			
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 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: Learn the functional units and classify types of computers, their applications and effects.

CO2: Understand system softwares and their working.

CO3: Understand the logic building used in programming.

CO4: Design and develop algorithms for solving various real-life problems.

CO5: Design and develop programs using C.

UNIT-I

Computer Fundamentals: Concept of data and information. Components of Computer. InputandOutputDevice,Components ofCPU,MemoryandStorageDevices,Classification of Computers, Advantages and Limitations of Computer, Applications of Computer, Social concerns of Computer Technology: Positive and Negative Impacts, Computer Crimes, Viruses and their remedial solutions.

Computer Software: System and Application Software, Overview of Operating System Programming Languages Machine. Assembly. High Level Language, 4GL. Language Translator, Linker and Loader.

UNIT-II

Problem Solving: Problem Identification.Analysis, Algorithms, Flowcharts.Pseudo codes. Decision Tables.Program Coding. Program Testingand Execution.

CProgrammingFundamentals: Keywords,VariablesandConstants,StructureofaC program.

UNIT-Ill

Operators & Expressions: Arithmetic, Unary, Logical. Bit-wise, Assignment& Conditional Operators.
Decision Making: Decision making using if...else. Else If Ladder; Switch, break. Continue and Goto statements.

UNIT-IV

Loops: Loopingusingwhile,do...while,for statements.Nestedloops.

Functions: Defining & Accessing User defined functions. Library Functions, Function Prototype, Passing Arguments, Passing array argument. Recursion, Use of Library Functions. Macro vs.Functions, Pointers in C.

Textbooks&ReferenceBooks:

1. Gill NasibSingh:Computing FundamentalsandProgramming in C, KhannaBooks Publishing Co., New Delhi.
2. E. Balaguruswamy: Programming in C.Tata McGraw Hill.
3. RajenderSinghChhillar:ApplicationofITtoBusiness,RameshPublishers,Jaipur.

Computer Fundamentals and Programming in C LAB

List of Experiments

1. Write a C program to compute roots of quadratic equation $ax^2+bx+c=0$, where a, b, and c are three coefficients of a quadratic equation are inputs.

2. Design and develop an algorithm to find the reverse of an integer number.

3. Design and develop an algorithm to check whether given number is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: 2019, Reverse: 9102, Not a Palindrome.

4. Design and develop a c program to implement simple calculator using switch case statement.

5. Develop, implement and execute a C program to search a Number in a list using linear searching Technique.

6. Develop an algorithm, implement and execute a C program that reads N integer numbers and arrange them in ascending order using Bubble Sort.

7. Design and develop a C program to read and print a matrix and check whether a given Matrix is a sparse Matrix or not.

8. Write a C program to implements the following string manipulation functions till the use wishes to continue (infinite loop): (i) strcpy() (ii) srrlen() (iii) strrev () (iv) strcmp() (v) strcat().

9. Design and develop a C function RightRotate (x, n) that takes two integers x and n as input and returns value of the integer x rotated to the right by n positions. Assume the integers are unsigned.

10. Draw the flowchart and write a recursive C function to find the factorial of a number, n!, define by fact(n)=1, if n=0. Otherwise fact (n) =n*fact (n-1). Using this function, write a C program to compute the binomial coefficient nCr. Tabulate the results for different values of n and r with suitable messages

11. a. Write a C program to maintain a record of n student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Assume appropriate data type for each field. Input & Print the members of the structure

b. Write a C program to take 2 structures HH:MM: SS as T1 & T2 & display the time difference as structure as T3.

12. Write a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.

Course code	CC-A02			
Category	Core Course			
Course title	System Software and Operating Systems			
Course ID	241/MCA/CC102			
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 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: Explain the basic concepts of system software and operating system.

CO2: Understanding the process management policies and scheduling algorithms.

CO3: Design the various memory management techniques.

CO4: Understand file system concepts.

CO5: Evaluate deadlock detection and prevention mechanism.

UNIT I

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Multithreading.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, SRTF, RR Scheduling.

UNIT II

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems:

Reader's & Writer Problem, Dinning Philosopher Problem etc.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT III

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Optimal Page Replacement and Least Recently used (LRU).

UNIT IV

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. Case study on UNIX and WINDOWS Operating System.

Case Studies: Comparative study of WINDOW, UNIX & LINUX system.

TEXT AND REFERENCE BOOKS:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
5. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
6. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

System Software and Operating Systems LAB

List of Experiments

1. Basics of UNIX
2. UNIX commands
3. Implementation of FCFS and SJF CPU scheduling algorithms

4. Implementation of Round Robin and Priority CPU Scheduling
5. Implementation of Producer-Consumer problem using semaphores
6. Implementation of Dining Philosphers Problem
7. Implementation of FIFO Page Replacement Algorithms
8. Implementation of LRU Page Replacement Algorithms
9. Implementation of Sequential File Allocation Strategies
10. Implementation of Indexed File Allocation Strategies

Course code	CC-A03			
Category	Core Course			
Course title	Artificial Intelligence and Applications			
Course ID	241/MCA/CC103			
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 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 Basics about Artificial Intelligence and Expert Systems.

CO2 - Understand the Programming Logics in Artificial Intelligence.

CO3 - Understand Various search methods in Artificial Intelligence.

CO4 - Understand the Image processing and analysis.

CO5 - Understand the latest developments in Knowledge systems and Tools.

UNIT I

Introduction: History, Definition of AI, Emulation of human cognitive process, knowledge search trade off, stored knowledge, semantic nets. An abstract view of modelling, elementary knowledge. Computational logic, analysis of compound statements using simple logic connectives, predicate logic, knowledge organization and manipulation, knowledge acquisition.

UNIT II

PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE LISP and other programming languages- introduction to LISP, syntax and numerical function, LISP and PROLOG distinction, input output and local variables, Interaction and recursion, property list and arrays alternative languages, formalized symbolic logics properties of WFRS, non-deductive inference methods. Inconsistencies and uncertainties Truth maintenance systems, default reasoning and closed world assumption, Model and temporary logic.

UNIT III

SEARCH METHODS AND KNOWLEDGE REPRESENTATION Fuzzy logic - concepts, Introduction to Fuzzy logic with examples, probabilistic reasoning, Bayesian probabilistic inference, Dempstor Shafer theory, possible world representation, AdHoc methods. Structure knowledge: Graph, frames and related structures, Object oriented representation- object classes, message and methods, simulation examples using OOPS programs, OOP languages. Search and control strategies - Concepts, search problems, uniformed or Blined search, searching AND – OR graphs.

UNIT IV

KNOWLEDGE ORGANISATION AND COMMUNICATION IN EXPERT SYSTEMS Matching techniques- Need for matching, matching problem, partial matching, Fuzzy matching, RETE matching algorithm. Knowledge organization- Indexing and retrieval techniques, integration of knowledge in memory organization systems, Perception, communication and Expert systems. Overview of Linguistics, Basic passim techniques, semantic analysis and representation structures, natural language generation and system.

TEXT / REFERENCE BOOKS

1. Russel (Stuart), 'Artificial Intelligence- Modern approach, Pearson Education series in AI', 3rd Edition, 2009. 2. Dan W Patterson, 'Introduction to Artificial intelligence and Expert systems', Prentice Hall of India Pvt. Ltd, 2001

3. Eugene Charniak, Drew Mc Dermot, 'Introduction to Artificial intelligence', Addison Wesley Longman Inc.,2009

4. George. F, William. A. Stubblefield, 'Artificial intelligence and the design of expert systems', The Benjamin Cummins Publishing Co., Inc 2nd Edition, 1992.

5. Robert J Schalkoff, 'Artificial intelligence An Engineering Approach', McGraw Hil International Edition, 1990

Artificial Intelligence and Applications LAB

List of Experiments

1. Study of Prolog and LISP.
2. Write simple fact for the statements using PROLOG.
3. Write predicates for simple problems such as conversion of temperature from Fahrenheit to centigrade or vice-versa, calculating area of rectangle, square and circle, etc.
4. Write program to solve the Monkey Banana problem.
5. Write program in Prolog for medical diagnosis.
6. Write program to solve mathematical problem such as calculate factorial, generate Fibonacci series,

etc.

7. Write program to solve 4-Queen / 8-Queen problem.
8. Write program to solve traveling salesman problem.
9. Write program to solve water jug problem.
10. Write program to solve tic-tac-toe problem.
11. Write program to implement uninformed searching algorithms.
12. Write program to implement informed searching algorithms.

Course code	DSE-01			
Category	Disciplinary Specific			
Course title	Web Designing Fundamentals			
Course ID	241/MCA/DS101			
Scheme and Credits	L	T	P	Credits
	2	-	2	3
Theory Internal	15			
Theory External	35			
Practical Internal	05			
Practical External	20			
Total	75			
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 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 Basics of Internet and www.

CO2 – Understand the HTML elements.

CO3 - Construct a web site that conforms to the web standards of today.

CO4 - Develop and publish a website.

UNIT–I

Introduction to Internet and World Wide Web; Evolution and History of World Wide Web; Basic features; Web Browsers; Web Servers; Hypertext Transfer Protocol, Overview of TCP/IP and its services; URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools;

UNIT–II

Web Publishing: Hosting your Site; Internet Service Provider; Web terminologies, Phases of Planning and designing your Web Site; Steps for developing your Site; Choosing the contents; Home Page; Domain Names, Front page views, Adding pictures, Links, Backgrounds, Relating Front Page to DHTML.

Creating a Website and the Markup Languages (HTML, DHTML)

UNIT–III

Web Development: Introduction to HTML; Hypertext and HTML; HTML Document Features; HTML command Tags; Creating Links; Headers; Text styles; Text Structuring; Text colors and Background; Formatting text; Page layouts;

UNIT –IV

Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes; DHTML: Dynamic HTML, Features of DHTML, CSSP (cascading style sheet positioning) and JSSS (JavaScript assisted style sheet), Layers of netscape, The ID attributes, DHTML events.

TEXT / REFERENCE BOOKS

1. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.
2. Ramesh Bangia, "Multimedia and Web Technology", Firewall Media.
3. Thomas A. Powell, "Web Design: The Complete Reference", 4/e, Tata McGraw- Hill
4. Wendy Willard, "HTML Beginners Guide", Tata McGraw-Hill.
5. Deitel and Goldberg, "Internet and World Wide Web, How to Program", PHI.

Web Designing Fundamentals LAB

List of Experiments

1. Prepare a survey document of ten website which you like and dislike with various reasons. (Prerequisite)
2. Introduction to basic HTML elements
3. Use table tag to format web page. Also create the Time Table of your class using table tag.
4. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
5. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.
6. Design a web page and embed various multimedia features in the page.
7. Design signup form to validate username, password, and phone numbers etc using Java script.
8. Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
9. Write a JavaScript program to convert temperatures to and from celsius, Fahrenheit.
10. Submission of Website with Report.

Course code	MDC-1			
Category	Multidisciplinary Course			
Course title	Digital Electronics			
Course ID	241/MCA/MD101			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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: Outline the general concepts and terminology related to logic gates, logic families, combinational and sequential circuits.

CO2: Discuss the basic analog/digital components and their interconnections in logic families and circuits.

CO3: Apply different methods/techniques to design various digital circuits.

CO4: Analyse day to day problems and industrial problems for their solutions using digital circuits.

CO5: Contrast different types of digital circuits and their designing methods.

UNIT - I

Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating- point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode

UNIT - II

Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

UNIT - III

Digital Logic: Introduction to digital signals, Basic Gates – AND, OR, NOT, Universal Gates and their implementation – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

UNIT - IV

Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Parallel binary adder/subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

TEXT / REFERENCE BOOKS

1. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organisation, University Science Press (Laxmi Publications), New Delhi.
2. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
3. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.
4. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
5. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

AEC-01 Syllabus

VAC-01 Syllabus

Semester 2

Course code	CC-A04			
Category	Core Course			
Course title	**Data Base Management System**			
Course ID	241/MCA/CC201			
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 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: Express the basic concepts of DBMS and RDBMS.

CO2: Apply normalization theory to the normalization of a database

CO3: Apply the concept of Transaction Management & Recovery techniques in RDBMS.

CO4: Analyze various concurrency control and recovery techniques.

UNIT-I

DatabaseSystemConceptsandArchitecture: Traditional FileProcessingSystem vsDBMS, Characteristics & Advantages of DBMS, Three-Schema Architecture and Data Independence;DataModels,Schemas,andInstances;Database Languages andInterfaces; Classification of DBMS.

Data Modelling: Overview of Entity-RelationshipDiagram, Relational Model -Constraints, RelationalDatabaseSchemas,Relational AlgebraandRelationalCalculus;CoddRules.

UNIT-II

NormalizationforRelationalDatabases: FunctionalDependenciesandNormalization; **SQL:** SQL as 4GL, SQL Components:DDL, DML, DQL, DCL, TCL; Data Definition and Data

Types;Constraints,Queries,Insert,Delete,andUpdateStatements;Views,Stored Proceduresand Functions;Database Triggers, SQL Injection.

UNIT-Ill

QueryProcessingandOptimization: Translating SQLqueries intoRelational Algebra, Basic Algorithm for Executing Query Operations, Using Heuristic in Query Optimization, Using Selectivity and Cost Estimation in Query Optimization, Semantic Query Optimization.

TransactionProcessing: Introduction,Desirablepropertiesof Transactions,Schedules&Recoverability,SerializationofSchedulers,TransactionSupportinSQL.

BasicsofDatabaseSecurityandAuthorization.

UNIT-IV

Concurrency Control Techniques: Locking techniques for Concurrency Control, Concurrency Control based on Timestamp ordering, MultiversionConcurrency Control Techniques, Validation Currency Control Techniques, Granularity of data items and multiple granularity locking, Using locks for Concurrency Control in Indexes.

DatabaseRecoveryTechniques: BasicConcepts, RecoveryTechniquebasedonDeferred Update, Recovery Technique based on Immediate Update, Shadow Paging, The ARIES recovery algorithm, Database backup and recovery from catastrophic failure.

Textbooks&ReferenceBooks:

1. Elmasri&Navathe:FundamentalsofDatabaseSystems,Sthedition,Pearson Education.
2. C.J.Date:AnIntroduction to DatabaseSystems,8thedition,Addison Wesley N. Delhi.
3. ThomasConnolly,CarolynBegg:DatabaseSystems,PearsonEducation.
4. Anyotherbook(s)coveringthecontentsofthepaperinmoredepth.

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. Mini project (Any 2 Application Development using 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

Course code	CC-A05			
Category	Core Course			
Course title	**Data Structures and Algorithms**			
Course ID	241/MCA/CC202			
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 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: Choose appropriate data structures and algorithms and use it to design solution for a specific problem.

CO2: Execute the operations of hashing to retrieve data from data structure.

CO3: Comprehend and select algorithm design approaches in a problem specific manner.

CO4: Design and analyze programming problem statements.

CO5: Come up with analysis of efficiency and proofs of correctness.

UNIT-I

Introduction: DataTypes:Primitive,CompositeandAbstract DataTypes,DataStructures: Concept,Classification,and Importance; Data Structures v/s Data Types, Linear v/s Non- linear Data Structures.

Arrays: Single and Multidimensional arrays; Address Calculation using Column and Row major ordering; Various operations on Arrays; Vectors; Sparse Matrix; Application of Arrays; Implementation of Arrays in C/C++.

UNIT-II

Stacks and Queues: Representation of stacks and queues using arrays and linked-list. Circularqueues.PriorityQueueandD-Queue.Applications ofstacks:Conversion frominfix to postfix and prefix expressions. Evaluation of postfix expression using stacks; Implementation in C/C++.

Linked list: Singly Linked List; Operations on Linked Lists.Linked Stacks and Queues. PolynoialRepresentation and Manipulation using Linked Lists. Circular Linked Lists. Doubly linked lists; Implementation in C/C++.

UNIT-III

Trees: Concept, Representationand Applications ofTrees,Forest, Binary Tree,Threaded Binary Tree; Binary tree representation of a general tree; Conversion of forest into tree; Binary search tree: Height balanced (AVL) tree, B-trees, B+Tree, B* Tree.

Binary tree traversal methods: Pre-order. In-order. Post-ordered traversal. Recursive Algorithms.

Heap: Heapoperations.Binomialheaps.Fibonacciheaps.Skewheaps,heapset.

UNIT-IV

Graphs: Representation: Adjacency matrix, Adjacency lists;Type ofGraphs;Paths:Euler Graphs, Hamiltonian Paths & Circuits; Cut-sets, Connectivity and Separability, Planar Graphs, Isomorphism, Graph Coloring, Covering and Partitioning.

Graph Algorithms: Breadth-First Search, Depth-First Search; Minimum Spanning Trees: Prim's and Kruskal's algorithms; Shortest-path Algorithms: Dijkstra's and Floyd'salgorithm; Topological sort, Maxflow: Ford-Fulkerson algorithm, max flow -min cut.

Textbooks&ReferenceBooks:

1. HubbardJR:Schaum'soutlineofDataStructureswithC++.TMH.
2. R.Kruse,C.LTonodoandB.Leung:DataStructures andProgram DesigninC, Pearson Education.
3. S.Chottopadhyay,D.Ghoshdastidar&M.Chottopadhyay:DataStructuresTrough'CLanguage. BPB Publication.
4. E.Horowitz,Sahni andD.Mehta:fundamentals ofDataStructuresinC++. GalgotiaPubliction.
5. Y.LangsaiilM.J.AugensteinandA.Ml.Tanenbaum:DataStructuresUsingCandC++, Prentice Hall of India.

Data Structures and Algorithms Lab

List of Experiments

1. Write a program to search an element in a two-dimensional array using linear search.

2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method

3. Write a program to perform following operations on tables using functions only a) Addition b) Subtraction c) Multiplication d) Transpose

4. Using iteration & recursion concepts write the programs for Quick Sort Technique

5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.

6. Write a program for swapping of two numbers using ‘call by value’ and ‘call by reference strategies.

7. Write a program to implement binary search tree. (Insertion and Deletion in Binary search Tree)

8. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list

9. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.

10. Create a linked list and perform the following operations on it a) add a node b) Delete a node

11. Write a program to simulate the various searching & sorting algorithms and compare their timings for a list of 1000 elements.

12. Write a program to simulate the various graph traversing algorithms.

13. Write a program which simulates the various tree traversal algorithms.

Course code	CC-A06			
Category	Core Course			
Course title	**Object oriented programming using Java**			
Course ID	241/MCA/CC203			
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 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 apply object-oriented programming features and concepts for solving given problem.

CO2: able to use java standard API library to write complex programs.

CO3: able to implement object oriented programming concepts using java

CO4: able to develop interactive programs using applets and swings.

UNIT-I

ObjectOrientedMethodology-1: ParadigmsofProgrammingLanguages,EvolutionofOOMethodology,BasicConceptsofOOApproach,ComparisonofObjectOrientedandProcedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language,ApplicationsofOOPs.

ObjectOrientedMethodology-2:ClassesandObjects,AbstractionandEncapsulation,Inheritance,Method Overriding and Polymorphism.

UNIT-II

JavaLanguageBasics*:*IntroductionToJava,BasicFeatures,JavaVirtualMachineConcepts, Primitive Data Type And Variables, Java Operators, Expressions, Statements andArrays.

Object Oriented Concepts: Class and Objects--Class Fundamentals, Creating objects ,Assigning object reference variables; Introducing Methods, Static methods, Constructors ,Overloading constructors; This Keyword; Using Objects as Parameters, Argument passing,Returningobjects ,Methodoverloading,GarbageCollection, TheFinalize ()Method.

InheritanceandPolymorphism:InheritanceBasics,AccessControl, MultilevelInheritance,MethodOverriding,AbstractClasses,Polymorphism, FinalKeyword.

UNIT-III

Packages : Defining Package, CLASSPATH, Package naming, Accessibility of Packages ,using PackageMembers.

Interfaces: ImplementingInterfaces,InterfaceandAbstractClasses,ExtendsandImplementstogether.

ExceptionsHandling: Exception,HandlingofException,Usingtry-catch,CatchingMultiple Exceptions , Using finally clause , Types of Exceptions, Throwing Exceptions,WritingException Subclasses.

UNIT-IV

Multithreading : Introduction , The Main Thread, Java Thread Model, Thread Priorities,SynchronizationinJava,InterthreadCommunication.

I/O in Java: I/O Basics, Streams and Stream Classes, The Predefined Streams, Readingfrom, and Writing to, Console, Reading and Writing Files, The Transient and VolatileModifiers,UsingInstanceofNativeMethods.

StringsandCharacters:Fundamentals ofCharactersand Strings,The StringClass, StringOperations, Data Conversionusing Value of () Methods, String BufferClassand Methods.

Textbooks&ReferenceBooks:

1. ProgramminginJava,EBalagurusamy.
2. TheCompleteReferenceJAVA,TMHPublication.
3. BeginingJAVA,IvorHorton,WROXPublic.
4. JAVA2UNLEASHED,TechMediaPublications.
5. PatrickNaughtonandHerbertzSchildt,“Java-2TheCompleteReference”,1999, TMH.

Object oriented programming using Java Lab

List of Experiments

1 A) Write a java program to find the Fibonacci series using recursive and non-recursive functions

B) Write a java program to multiply two given matrices.

C) Write a java program for Method overloading and Constructor overloading

2 A) Write a program to demonstrate execution of static blocks, static variables & static methods.

B) Write a program to display the employee details using Scanner class

C) Write a program for sorting a given list of names in ascending order

3 A) Write a program to implement single and Multi-level inheritance

B) Write a program to implement Hierarchical Inheritance.

C) Write a program to implement method overriding.

4 A) Write a program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the given shape.

B) Write a program to implement Interface.

C) Write a program to implement multiple and Hybrid Inheritance

5 A) Write a program to create inner classes

B) Write a program to create user defined package and demonstrate various access modifiers.

C) Write a program to demonstrate the use of super and final keywords.

6 A) Write a program if number is less than 10 and greater than 50 it generate the exception out of range. else it displays the square of number.

B) Write a program with multiple catch Statements.

C) Write a program to implement nested try

7 A) Write a Program to implement simple Thread by extending Thread class and implementing runnable interface.

B) Write a program that implements a multi-thread application that has three threads

C) Write a program to set and print thread priorities

8 Write a program to implement following collections

a) array List

b) Vector

c) Hash table

d) Stack

9 A) Write a program to demonstrate lambda expressions.

B) Write a program for producer and consumer problem using Threads

10 A) Write a program to list all the files in a directory including the files present in all its subdirectories.

B) Write a Program to Read the Content of a File Line by Line

Course code	DSE-02			
Category	Discipline Specific Elective Courses			
Course title	**Security in Computing**			
Course ID	241/MCA/DS201			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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: Demonstrate Understanding of Security Fundamentals

CO2: Identify and Analyze Malicious Threats

CO3: Implement Effective Access Control Measures

CO4: Evaluate Network Security Mechanisms

CO5: Design and Configure Secure Network Infrastructures

UNIT-I

Security Basics: General overview, terminology and definitions, Security models, Security policy issues Introduction to Malware: Introduction to Malicious code, Spyware, Ransomware, Logic Bombs, Virus, Bacteria and Worms, Introduction to Anti-malware technology

UNIT-II

Threats to Network Communications and Basic Cryptography:Threats to Network Communications, Interception: Eavesdropping and Wiretapping, Modification, Fabrication: Data Corruption, Interruption: Loss of Service, Port Scanning, Introduction to cryptography and classical cryptosystem, Steganography vs Cryptography

Authentication:Identification Versus Authentication, Authentication Based on Something You Know, Something You Are, Something You Have, Federated Identity Management, Multifactor Authentication, Secure Authentication, Password policies

UNIT-III

Access Control:Access Policies, Implementing Access Control, Procedure-Oriented Access Control, Role-Based Access Control, Captchas

Intrusion Detection and Response:Goals for Intrusion Detection Systems, Types of IDSs – Anomaly Based and Signature Based

UNIT-IV

Firewalls:What Is a Firewall?, Design of Firewalls, Types of Firewalls, Personal Firewalls, Comparison of Firewall Types, Network Address Translation (NAT),Example Firewall Configurations

Legal and Ethical Issues: Protecting Programs and Data - Copyrights, Patents, Trade

Secrets, Information and the Law - Information as an Object, Legal Issues Relating to Information, Protection for Computer Artifacts, Ethical Issues in Computer Security,

Introduction to Cyber Crimes and Cyber Laws and IT Act 2000.

Textbooks&ReferenceBooks:

1. Security in Computing (5th edition), Pfleeger, Pfleeger and Margulies, Pearson.
2. Computer Security: Art and Science by Matt Bishop, Addison-Wesley Educational Publishers Inc
1. Computer Security Fundamentals, (4th Edition), Chuck Easttum, Pearson Ed.
2. Foundations of Computer Security, David Salomon, Springer
3. Introduction to Modern Cryptography (2nd edition), Katz and Lindell, Chapman & Hall/CRC
4. Elements of Computer Security, David Salomon, Springer
5. Cryptography Theory and Practice (3rd edition), Stinson, Chapman & Hall/CRC

Course code	MDC-2			
Category	Multidisciplinary courses			
Course title	Discrete Mathematics			
Course ID	241/MCA/MD201			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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: Solve mathematical problems based on concepts of set theory, relations, functions and lattices.

CO2: Express logical sentences in terms of quantifiers and logical connectives.

CO3: Apply basic counting techniques to solve permutation and combination problems.

CO4: Solve recurrence relations.

CO5: Develop the given problem as graph networks and solve it with techniques of graph theory.

UNIT I

Set Theory: Introduction to set theory, Venn diagrams, Set operations, Algebra of sets, Duality, Finite and infinite sets, Counting principles, Power sets, Partitions, and Multi sets.

Relations: Cartesian product, Representation of relations, Types of relation, Binary relation, Equivalence relations, Partitions, Partial ordering relations, POSET, Hasse diagram, Lattices and its types.

Functions: Definition, Types of functions, Bijective functions, Composition of functions, Inverse functions, recursively defined functions, Finite and infinite sets, Countable and uncountable sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Logic And Propositional Calculus: Introduction, Propositions and compound propositions, Logical operations, Propositions and truth tables, Tautologies, Contradictions, Logical equivalence, Algebra of propositions, Conditional and Bi-conditional statements, The use of Quantifiers.

UNIT II

Basic Counting Techniques: Pigeon-hole principle, Permutation and Combination, the Division algorithm: Prime Numbers, The GCD: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

Recursion And Recurrence Relation: Polynomials and their evaluation, Sequences, Introduction to AP, GP and AG Series, Partial Fractions, Recurrence Relation, Linear Recurrence Relations with constant Coefficients, Linear Homogeneous Recurrence Relations with Constant Coefficients, Particular Solution- Homogeneous Linear Difference Equations, Non-Homogeneous Linear Difference Equations, Total Solution, solving recurrence relation using generating functions.

UNIT III

Definitions and examples of Algebraic Structures with one Binary Operation: Semi Groups, Monoids, Groups, Semigroups, Subgroups, Abelian groups, Cosets, Normal Subgroup, Cyclic groups, Congruence Relation and Quotient Structures, Permutation Groups, Lagrange's Theorem, Homomorphism, Isomorphism, Automorphism.

Definitions and examples of Algebraic Structures with two Binary Operation: Rings, Integral Domain, Fields; Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT IV

GRAPHS THEORY: Introduction to graphs and their properties, Degree, Connectivity, Path, Cycle, Directed and undirected graphs, Subgraph, Bipartite Graphs, Regular Graphs, Connected Graphs, Multigraph and Weighted graph, Homomorphic and Isomorphic graphs, cut points and bridges, Paths and circuits, shortest path algorithm for weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, Planar Graphs, Euler's formulae, Graph Colouring.

Textbooks&ReferenceBooks:

1. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, 6th Edition, Tata McGraw Hill, 2011.
2. Satinder Bal Gupta: *A Text Book of Discrete Mathematics and Structures*, University Science Press, Delhi.
3. C. L. Liu and D. P. Mohapatra, *Elements of Discrete Mathematics A Computer Oriented Approach*, Tata McGraw Hill, 3rd Edition, 2008.
4. J.P. Trembley and R. Manohar, *Discrete Mathematical Structures with Applications to Computer*

Science, Tata McGraw Hill – 13th reprint, 2012.

5. Richard Johnsonbaugh, *Discrete Mathematics*, 6th Edition, Pearson Education Asia, 2011.
6. S. Lipschutz and M. Lipson, *Discrete Mathematics*, Tata McGraw Hill, 3rd Edition, 2010.
7. B. Kolman, R. C. Busby and S. C. Ross, *Discrete Mathematical structures*, 6th Edition, PHI, 2010.

Course code	MDC-2			
Category	Multidisciplinary Course			
Course title	**Modelling & Simulation**			
Course ID	241/MCA/MD202			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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 define the different modelling terms by analyzing the system or the data that is present.

CO2: Able to learn different mathematical model and their application in simulation.

CO3: Able to implement the model and from the results check for the correctness of the assumptions.

CO4: Able to analyse the outcomes and make predictions.

UNIT-I

Introduction: System, environment, input and output variables; State variables; StaticandDynamicsystems;HierarchyofknowledgeaboutasystemandModeling strategy.

Introduction to Simulation: Simulation, Why simulation: Advantages &Disadvantages,Areas of application, Model of asystem,Types ofmodels;Step sina simulation study, Simulation of continuous and discrete processes, Hybrid Simulation, Representationof time,Simulation ClockandTimeManagement.

UNIT-II

Modelsof ArrivalProcesses: Importance &Characteristics,Poisson Processes, Non- Stationary Poisson Processes, Batch Arrivals,Probability andMonteCarloSimulation.

Models of Queuing System: Queuing system importance, Characteristics & applications, Models of QueuingSystem, Single server and Multiple server Queueing Systems, Measurement of performance.

Random Numbers: Importance & characteristics, Pseudo Random Numbers, generation of random numbers, Tests forRandomness.

UNIT-III

Analysis ofSimulation Output: Input Modelling: Data collection,Identificationand distribution with data, parameter estimation; Stochastic nature of output data, Measures of Performance and their estimation,Goodness of fittests,Confidence IntervalsandHypothesisTesting,Estimationmethods,Simulationrunstatistics, Elimination of initialbias.

Verification and Validation: Model Building: Design & verification of simulation models, Validation of models &calibration,Three-Step Approach for Validation of Simulation Models.

SimulationSoftware: Selectionof Simulation Software,Simulation packages,Trend in Simulation Software.

UNIT-IV

Modelling& SimulationofCloud,Fog & EdgeComputing: Concept ofanddifferences between Cloud, Fog & Edge Computing, Application of Cloud, Edge &Fog in healthcare centre, Computing implementation issues, iFogSimsimulator and its components, installing iFogSim, Simulating with iFogSim.

CaseStudy: Simulationofsmarthealthcaresystem

Textbooks&ReferenceBooks:

1. NarsinghDeo,SystemsSimulationwithDigitalComputer,PHIPublication {EEE},3rdEdition,2004
2. ZeiglerB.P.Praehofer.H.andKimI.G."Theoryofmodelingandsimulation", 2 ndEdition,Academic press 2000.
3. Shannon,R. E., "SystemSimulation:theArtand Science",PrenticeHall Inc. 1990.
4. Geoffrey Gordon, System Simulation, Prentice Hallpublication, 2nd Edition, 1978
5. Jerry Banks,John S Carson, II,Berry LNelson, David MNicol, Discrete Event system Simulation,PearsonEducation, Asia, 4thEdition, 2007
6. RajkumarBuyya& SatishNarayanaSrirama,"FogandEdgeComputing",Willey Series onParallelandDistributed Computing.
7. AmirVahidDastjerdiandRajkumarBuyya:FogComputing:Helpingthe Internet of Things Realize itsPotentialll, Universityof Melbourne.
8. Zaigham Mahmood: FogComputing:Concepts,Frameworks andTechnologies, Kindle Edition.
9. Assad Abbas, Samee U. Khan, Albert Y.Zomaya: Fog Computing-Theory and Practice, John Wiley & Sons, 2020.

Course code	SEC-1			
Category	Skill Enhancement Course			
Course title	**Problem solving and python programming**			
Course ID	241/MCA/SE201			
Scheme and Credits	L	T	P	Credits
	1	-	2	2
Theory Internal	05			
Theory External	20			
Practical Internal	05			
Practical External	20			
Total	50			
Duration of Exam	3 hrs			

Note*: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.*

Course Outcomes:

CO1: Develop algorithmic solutions to simple computational problems.

CO2: Develop and execute simple Python programs.

CO3: Write simple Python programs using conditionals and looping for solving problems.

CO4: Decompose a Python program into functions.

CO5: Represent compound data using Python lists, tuples, dictionaries etc.

UNIT I

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values,parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions andmethods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods;advanced list processing – list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation. Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count,copy file, Voter's age validation, Marks range validation

Textbooks&ReferenceBooks:

1. Paul Deitel and Harvey Deitel, "Python for Programrs", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programrs and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press
4. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

Problem solving and python programming Lab

List of Experiments

1. Compute the gcd of two numbers.
2. Find the square root of a number (newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search binary search
6. Selection sort insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)

AEC-02 Syllabus

Semester 3

Course code	CC-A07			
Category	Core Course			
Course title	**Software Engineering**			
Course ID	241/MCA/CC301			
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 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 fundamental principles and characteristics of software, including its evolution and the evolving role of software in modern systems.

CO2. Apply basic concepts of Software Design, including Architectural Design, Modularization, Design Structure Charts, Flow Charts, and measures of Coupling and Cohesion.

CO3. Define Software Quality attributes and understand Software Quality Assurance plans and activities, including Software Documentation

CO4. Understand the need for Software Maintenance and differentiate between categories such as Preventive, Corrective, and Perfective Maintenance.

UNIT-I

Introduction: Software and its Characteristics, Evolving Role of Software, Software Product. Software Processes. Software Crisis. Software Engineering Evolution. Principles of Software Engineering. Programming-in-the-small vs. Programming-in-the-large. Software Components. Software Engineering Processes.

Software Life Cycle (SLC) Models: Water-Fall Model. Prototype Model. Spiral Model. Evolutionary Development Models. Iterative Enhancement Models. Object Oriented Models and other latest Models.

Software Requirements: Functional and Non-Functional. User requirements. System requirements. Software Requirements Document - Requirement Engineering Process: Feasibility Studies. Requirement's elicitation and analysis, requirements validation, requirements management.

UNIT-II

Software Design: Basic Concept of Software Design. Architectural Design. Low Level Design: Modularization. Design Structure Charts. Flow Charts. Coupling and Cohesion Measures; Design Strategies: Function Oriented Design. Object Oriented Design. Top- Down and Bottom-Up Design. User Interface Design. Programming practices and Coding standards.

Software Testing: Introduction. Verification vs. Validation. Software Reliability. Levels of Testing. Structural Testing (WhiteBox Testing). Functional Testing (Black Box Testing).

UNIT-III

Software Quality: Attributes, Software Quality Assurance - plans & activities: Software Documentation.

Software Project Management: Project Management activities. Project Estimation. Project planning. Project scheduling.

Software Risk Management: Reactive versus Proactive Risk Strategies. Risk management activities: Software Risks (Risk Identification. Risk Projection. Risk Refinement. Risk Mitigation). Risks Monitoring and Management.

Software Measurement and Metrics: Process Metrics.Project metrics. Estimation-LOC, Halstead's Software Science. Function Point (FP). Cyclomatic Complexity Measures: Software Project Estimation Models- Empirical. Putnam. COCOMO I & II.

UNIT-IV

Software Maintenance: Need for Maintenance. Categories of Maintenance: Preventive. Corrective and Perfective Maintenance. Cost of Maintenance: Software Re-Engineering. Reverse Engineering, Software Documentation.

Software Configuration Management: SCM Activities. Change Control Process. Software Version Control: Software Reuse. Software Evolution.

CASE Computer Aided Software Engineering(CASE).CASE Tools.

Textbooks &References:

1. Gill, Nasib Singh. Software Engineering. Khanna Book Publishing Co. (P) Ltd., New Delhi.
2. Pressman, Rogers. Software Engineering. TMH.
3. Jalote, Pankaj. An Integrated Approach to Software Engineering. Narosa Publications.
4. Chhillar, Rajender Singh. Software Engineering: Testing Faults Metrics. Excel Books, New Delhi.
5. Ghezzi, Carlo. Fundamentals of Software Engineering. PHI.

6. Fairley, R. E. Software Engineering Concepts. McGraw-Hill.
7. Lewis, T. G. Software Engineering. McGraw-Hill.
8. Shere. Software Engineering & Management. Prentice Hall.
9. Deutsch, Willis. Software Quality Engineering: A Total Technical and Management Approach. Prentice Hall.

Software Engineering Lab

Experiment List

1. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
2. To perform the user‘s view analysis for the suggested system: Use case diagram.
3. To draw the structural view diagram for the system: Class diagram, object diagram.
4. To draw the behavioral view diagram: State-chart diagram, Activity diagram
5. To perform the behavioral view diagram for the suggested system: Sequence diagram, Collaboration diagram
6. To perform the implementation view diagram: Component diagram for the system.
7. To perform the environmental view diagram: Deployment diagram for the system.
8. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.
9. To perform Estimation of effort using FP Estimation for chosen system.
10. To Prepare time line chart/Gantt Chart/PERT Chart for selected software project

Course code	CC-A08			
Category	Core Course			
Course title	**Computer System Architecture**			
Course ID	241/MCA/CC302			
Scheme and Credits	L	T	P	Credits
	3	1	-	4
Theory Internal	30			
Theory External	70			
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 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 and apply number systems including Binary, Octal, Hexadecimal, Decimal, and perform interconversion of numbers.

CO2. Understand the architecture and components of Basic Computer Design, including Computer Instructions and Types, Instruction Cycle.

CO3. Analyze CPU Design principles, including CPU Registers, Micro-operations and their types.

CO4. Describe the organization and functionality of Input/Output Systems including Peripheral Devices, Input-Output Interface.

UNIT-I

Number System: Number System: Binary, Octal, Hexadecimal, and Decimal; 1's and 2's Complements; Interconversion of Numbers.

Codes: Weighted and Non-weighted Codes, BCD Codes, Gray Codes, Self-complementing Codes, Error-Detecting/Correcting Codes, Alphanumeric Codes, Hamming Codes.

Floating Point Numbers: Binary Arithmetic, Binary Addition and Subtraction, 2's Complement Arithmetic, Booth Coding, Binary Multiplication.

Logic Design: Logic Gates, Truth Tables, Boolean Algebra, Boolean Expressions- Variables and Literals, Equivalent and Complement of Boolean Expressions, Theorems of Boolean Algebra, Simplification Techniques, SOPs & POSs of Boolean Expressions.

UNIT-II

Combinational Circuits: Combinational Logic, Arithmetic Circuits - Adder and Subtracter, BCD Adder, Code Converters, Magnitude Comparator, Parity Generators/Checkers, Multiplexers, Demultiplexers, Decoders, Encoders.

Sequential Circuits: Latches, RS Flip-Flop, Level-Triggered and Edge-Triggered Flip-Flops, JK Flip-Flop, Master-Slave Flip-Flops, T Flip-Flop, D Flip-Flops.

UNIT-III

Basic Computer Design: Computer Instructions and Types, Instruction Set, Instruction Cycle, Instruction Formats, Addressing Modes, Computer Registers, Bus System, Register Transfer Language Terminology.

Programming in 8086/8088 Assembly Language: Assembly Language Program Structure, Segments, Registers, Instructions, Macros, Assembly Language Directives.

CPU Design: CPU Registers, Micro-operations and Types, Design of ALU, Control Unit Design - Microprograms, Control Unit of a Basic Computer, Timing and Control: Hardwired and Micro-programd Controlled Unit, Architectures - RISC, CISC, Scalar, Superscalar, and Pipelined Architectures.

UNIT-IV

Input/Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, Serial Communication.

Advanced Architecture: Introduction to Parallel Processing - Pipelining, Parallel Computer Structures, Architectural Classification, Pipelining & Vector Processing; Instruction and Arithmetic Pipelines, Principles of Designing Pipelined Processors, Structures for Array Processors - SIMD Array Processor, SIMD Interconnection Networks, Parallel Processing Applications.

Textbooks & References:

1. Mano, M. M. Digital Logic and Computer Design. Prentice-Hall of India.
2. Gill, Nasib Singh and Dixit, J. B. Digital Design and Computer Organisation. University Science Press (Laxmi Publications), New Delhi.
3. Stallings, William. Computer Organisation& Architecture.
4. Anand Kumar. Fundamentals of Digital Circuits. PHI.
5. Hwang, Kai. Advanced Computer Architecture. McGraw-Hill International.
6. Mano, M. M. Computer System Architecture. Prentice-Hall of India.
7. Tokheim. Digital Electronics. TMH.

Course code	CC-A09			
Category	Core Course			
Course title	**Data Communication and Computer Networks**			
Course ID	241/MCA/CC303			
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 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 fundamental concepts of computer communications and networking technologies, including the OSI and TCP/IP reference models, network topologies, and types of networks.

CO2: Analyze and differentiate between various network devices, nodes, hosts, and their functionalities in different network architectures.

CO3: Apply principles of analog and digital communication, modulation techniques, and transmission media to design and troubleshoot effective communication networks.

CO4: Design and implement network services and protocols for reliable and secure data transmission, including connection-oriented and connectionless services, error detection, and correction techniques.

CO5: Understand LAN technologies such as Ethernet, VLANs, and wireless LANs, and understand the configurations of WAN technologies like Frame Relay and ATM.

UNIT-I

Introduction to Computer Communications and Networking Technologies, Uses of Computer Networks, Network Devices, Nodes, and Hosts, Types of Computer Networks and their Topologies, Network Software: Network Design Issues and Protocols, Connection-Oriented and Connectionless Services, Network Applications and Application Protocols, Computer Communications and Networking Models: Decentralized and Centralized

Systems, Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model, Network Architecture and the OSI Reference Model, TCP/IP Reference Model, Example Networks: The Internet, X.25, Frame Relay, ATM.

UNIT-II

Analog and Digital Communications Concepts, Concept of Data, Signal, Channel, Bit Rate, Maximum Data Rate of Channel, Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth Capacity, Baud Rate, Asynchronous and Synchronous Transmission, Data Encoding Techniques, Modulation Techniques, Guided and Wireless Transmission Media, Communication Satellites, Switching and Multiplexing, Dial-up Networking, Analog Modem Concepts, DSL Service.

UNIT-III

Data Link Layer: Framing, Flow Control, Error Control; Error Detection and Correction, Sliding Window Protocols, Media Access Control: Random Access Protocols, Token Passing Protocols, Introduction to LAN Technologies: Ethernet, Switched Ethernet, VLAN, Fast Ethernet, Gigabit Ethernet, Token Ring, FDDI, Wireless LANs, Bluetooth, Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways.

UNIT-IV

Network Layer and Routing Concepts: Virtual Circuits and Datagrams, Routing Algorithms, Flooding, Shortest Path Routing, Distance Vector Routing, Link State Routing, Hierarchical Routing, Congestion Control Algorithms, Internetworking, Network Security Issues: Security Threats, Encryption Methods, Authentication, Symmetric-Key Algorithms, Public-Key Algorithms.

Textbooks & References:

1. Michael A. Gallo, William M. Hancock, Computer Communications and Networking Technologies, CENGAGE Learning.
2. Andrew S. Tanenbaum, Computer Networks, Pearson Education.
3. James F. Kurose, Keith W. Ross, Computer Networking, Pearson Education.
4. Behrouz A. Forouzan, Data Communications and Networking, McGraw-Hill.

Data Communication and Computer Networks Lab

List of Experiment

1. To construct a simple network topology on Packet Tracer.
2. To verify and configure VLAN and VLAN trunk in packet tracer.
3. To construct RJ45 cable.
4. a) To configure simple static routing.

b) To implement Security on interconnecting devices.

5. To configure a Network Topology constitutes Routers and Switches using PacketTracer.

6 Working with complex network topologies.

7. To monitor network traffic using Wire Shark

8. To get the MAC or Physical Address of the system Using Address Resolution Protocol.

9. To Configure network using Routing Information Protocol (RIP)

10. To configure network state routing protocol (OSPF).

11. To configure Border Gateway Protocol.

12. To configure Application Layer protocols: DHCP and DNS.

Course code	DSE-03			
Category	Discipline Specific Elective Course			
Course title	**Full Stack Pogramming-1**			
Course ID	241/MCA/DS301			
Scheme and Credits	L	T	P	Credits
	2	-	2	3
Theory Internal	15			
Theory External	35			
Practical Internal	05			
Practical External	20			
Total	75			
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 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: Explain the significance of Full Stack Development and distinguish it from traditional web development practices.

CO2: Understand different types of CSS selectors, cascading, inheritance, specificity, and units of measure for specifying width and height of elements.

CO3: Apply the basics of JavaScript programming language including variables, data types, objects, strings, numbers, math operations, arrays, and boolean logic.

CO4: Understand the fundamentals of AngularJS framework including expressions, modules, data binding, scopes.

UNIT-I

Why Full Stack Development? Web development vs FullStack Development, Client-Server architecture , Rules of three-tier architecture, Front End Frameworks and Libraries, Web, Web Browser, Web Server, Anatomy of a Website, Developer tools, inspector, Web hosting steps, HTML, HTML Document Object Model, W3C standards for HTML, HTML Validation, Structural markup , Semantic markup, HTML Lists, Links , Absolute versus relative path names, URL: Anatomy, Types, HTML Formatting , HTML Tables, Meta tags, Structural tags, Character entities, escape codes, Image maps, Font awesome Icons , Forms Input Types.

UNIT-II

Why CSS? W3C CSS Validator, Syntax, Types, CSS Selectors, Cascading, Inheritance, Specificity, Units of Measure, Width and Height of element, Box Model Layout, Border Box Versus Content Box, Responsive website Design Bootstrap Grid System, CSS pre-processor: Less, Sass and features.

UNIT-III

JavaScript: Java Script Language Basics, Objects, Strings, Numbers, Math, Arrays, Boolean, JavaScript Scope, JavaScript Events, Comparisons, Conditions, Switch, Loops in JavaScript, JavaScript Type Conversion, JavaScript RegExp, JavaScript Errors, JavaScript Debugging, JavaScript Hoisting, JavaScript Strict Mode, JavaScript Functions, JavaScript Objects, JavaScript Forms, JavaScript HTML DOM, JavaScript BOM, DOM vs BOM.

UNIT-IV

Introduction to AngularJS, AngularJS Expressions, AngularJS Modules, AngularJS Data Binding, AngularJS Scopes, AngularJS Directives & Events, AngularJS Controllers, AngularJS Filters, AngularJS Services, AngularJS HTTP, AngularJS Tables, AngularJS Select, Fetching Data from MySQL, AngularJS Validation, AngularJS API

Textbooks & References:

1. Duckett, Jon. HTML and CSS: Design and Build Websites. Wiley.
2. McFarland, David. CSS: The Missing Manual. O'Reilly Media.
3. Brown, Tiffany B. CSS Master, 3rd Edition. Packt Publishing, 2021.
4. Flanagan, David. JavaScript: The Definitive Guide. O'Reilly Media.
5. Freeman, Adam. AngularJS Programming by Example. Packt Publishing.
6. Frisbie, M. AngularJS web application development cookbook. Packt Publishing.

Full Stack Pogramming-1 Lab

List of Experiment

1. Prepare a survey document of ten website which you like and dislike with various reasons. (Prerequisite)
2. Use table tag to format web page. Also create the Time-Table of your class using table tag.
3. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
4. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.
5. Design a web page and embed various multimedia features in the page.
6. Design signup form to validate username, password, and phone numbers etc using Java script.
7. Write a JavaScript program to determine whether a given year is a leap year in the Gregorian calendar.
8. Write a JavaScript program to convert temperatures to and from celsius, Fahrenheit.

Course code	MDC-03			
Category	Multidisciplinary Course			
Course title	**Probability and Statistics**			
Course ID	241/MCA/MD301			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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: Elucidate the basic principles of statistics

CO2: Apply the correlation and regression analysis to engineering problem

CO3: Apply the principles of probability to thermodynamic problems

CO4: Explain probability distribution and solve problems

Unit –I

Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: Quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio.

Measures of Central Tendency: Mean, Median, Mode. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, skewness and kurtosis.

Unit – II

Statistical Methods: correlation and regression –Karl Pearson's coefficient of correlation and rank correlation problems, regression analysis-lines of regression, problems.

Curve fitting: curve fitting by the method of least square-fitting the curves of the form

Unit –III

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

Unit –IV

Probability Distributions: Random variables (discrete and continuous), probability mass/density function, Binomial, Poisson, Exponential and normal distributions

Textbooks & References:

1. Gupta, S. C., & Kapoor, V. K. . Fundamentals of Mathematical Statistics. Sultan Chand & Sons.
2. Hogg, R. V., Tanis, E. A., & Rao, J. M. Probability and Statistical Inference (7th ed.). Pearson Education, New Delhi.
3. Goon, A. M., Gupta, M. K., & Dasgupta, B. Fundamentals of Statistics, Vol. I & II. The World Press, Kolkata.
4. Ross, S. M. Introduction to Probability and Statistics for Engineers and Scientists. Academic Press.

Course code	MDC-03			
Category	Multidisciplinary Course			
Course title	**Fundamentals of Electrical and Electronics Engineering**			
Course ID	241/MCA/MD302			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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 OBJECTIVES

CO1. To provide basic knowledge of different elements of electrical and electronics engineering field.

CO2. To familiarize the students with the concepts of electrical circuits and network Analysis.

CO3. To understand the basics of AC and DC circuits.

CO4. To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

CO5. To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

UNIT-I

DC Circuits: Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources (ideal &Controlled) series and parallel circuits, Network reduction: voltage and current division. Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman, Substitution and Reciprocity theorem.

UNIT-II

AC Circuits: Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

UNIT-III

Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

UNIT-IV

Field Effect Devices: JFET: basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ), Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Textbooks & References:

1. Hughes, E. Electrical Technology. ELBS.
2. Millman, J., &Halkias, C. Integrated Electronics (2nd ed.). McGraw Hill.
3. Mano, M. M. Digital Logic Design. Phi.
4. Kothari, D. P., &Nagrath, I. J. Basic Electrical Engineering. Tata McGraw Hill.
5. Del Toro, V. Principles of Electrical Engineering. PHI.
6. Sedra, A., & Smith, C. Microelectronic Circuits: Theory and Applications (6th ed.). Oxford University Press.
7. Boylestad, R., &Nashelsky, L. Electronic Devices and Circuit Theory (10th ed.). Pearson.
8. Jain, R. P. Modern Digital Electronics. Tmh.
9. Malvino, A. P., & Leach, D. P. Digital Principles and Applications (8th ed.). TMH Publishers.
10. Tyagi, M. S. Introduction to Semiconductor Materials and Devices. John Wiley & Sons.

Course code	SEC-2			
Category	Skill Enhancement Course			
Course title	**Mobile Application Development**			
Course ID	241/MCA/SE301			
Scheme and Credits	L	T	P	Credits
	1	-	2	2
Theory Internal	30			
Theory External	70			
Total	100			
Duration of Exam	**3 hours**			

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 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 basic concepts and functions of Mobile Application and Android Studio.

CO2: Describe the working and architecture of Android Operating System.

CO3: Design Android UI Layout and Describe activities.

CO4: Design and develop an application using Database.

UNIT I

Android Architecture: Introduction to Android, Features of Android, Android Architecture, Android and File Structure, Layouts – Linear, Relative, Grid and Table Layouts, Views and Resources, Activities and Intents, Activity Lifecycle and Saving State,

User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, List View, Spinner View.

UNIT II

Event Handling – Handling clicks or changes of various UI components.

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, using Intent to dial a number or to send SMS.

UNIT III

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions

Location and Mapping: Location based services, Mapping, Google Maps activity, Working with MapView and MapActivity; Playing and Recording of Audio and Video in application.

UNIT IV

Persisting Data to files: Saving to Internal Storage, Saving to External Storage

Introduction to SQLite database: creating and opening a database, creating tables, inserting retrieving and deleting data.

Application Signing, API keys for Google Maps, Publishing application to the Android Market.

Textbooks & References:

1. ZigurdMednieks, Laird Dornin, G,BlakeMeike and Masumi Nakamura, Programming Android, O'Reilly Publications.
2. Wei-Meng Lee, Beginning Android Application Development, Wiley India Ltd.
3. Burd, B. Android Application Development All-in-One for Dummies.
4. James C.S., Android Application development for Java Programr, CENGAGE Learning.
5. Pradeep Kothari, Android Application Development: Black Book, Wiley India Ltd.

Mobile Application Development Lab

List of Experiment

1. Installation of Android studio.
2. Development Of Hello World Application
3. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button
4. Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout)
5. Design an android application Using different layouts
6. Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity
7. Design an android application Send SMS using Intent
8. Create an android application using Fragments
9. Design an android application for menu.
10. Create a user registration application.

VAC-02 Syllabus

Semester 4

Course code	**CC-A10**			
Category	Core Subject			
Course title	**Soft Computing**			
Course ID	241/MCA/CC401			
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 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 soft computing paradigms including Artificial Intelligence Systems, Neural Networks, Fuzzy Logic, and Genetic Algorithms.

CO2: Develop proficiency in genetic algorithms, including concepts like encoding, fitness functions, and selection methods.

CO3: Study various models of ANNs and their learning algorithms (supervised, unsupervised, reinforcement learning).

CO4: Learn the principles of fuzzy logic, including membership functions, fuzzy sets, and fuzzy inference systems.

UNIT-I

Introduction: Introduction to soft computing, Soft Vs Hard Computing, Different Components of Soft Computing: Artificial Intelligence Systems, Neural Networks, Fuzzy Logic, Genetic Algorithms.

Genetic algorithms: Basic concepts; Encoding; Fitness Function; Reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections; Convergence of GA, Problem Solving using GA.

UNIT-II

Artificial Neural Networks: Introduction to biological and artificial neural network; Different artificial neural network models; Supervised, Unsupervised and Reinforcement Learning; Hebbian Learning, Generalized Hebbian learning algorithm.

Artificial Neural Networks Architecture: Basic building block of an artificial neuron, Activation functions, Introduction to Early ANN architectures: McCulloch & Pitts model; Single Perceptron, Backpropagation networks; Multi-Layer Perceptron; Hopfield Network; Applications of Neural Network**.**

UNIT-III

Fuzzy systems and applications: NotionofFuzziness, MembershipFunctions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.

UNIT-IV

Applications: PatternRecognitions,ImageProcessing, BiologicalSequenceAlignment and DrugDesign,RoboticsandSensors,InformationRetrievalSystems,ShareMarketAnalysis, Natural Language Processing.

Textbooks&References:

1. M.Mitchell:AnIntroductiontoGeneticAlgorithms,Prentice-Hall.
2. J.5.R.Jang, C.T.Sun and E.Mizulani; Neuro-Fuzzyand Soft Computing, PHI, Pearson Education.
3. TimothyJ.Ross:FuzzyLogicwithEngineeringApplications, McGraw-ill.
4. DavisE.Goldberg:GeneticAlgorithms:Search,OptimizationandMachine Learning. Addison Wesley.
5. S.RajasekaranandG.A.V.Pai:NeuralNetworks,FuzzyLogicandGenetic Algorithms, PHI.
6. D.E.Goldberg:Genetic AlgorithmsinSearch,Optimization, andMachineLearning, Addison-Wesley.

Soft Computing Lab

List of experiments

1. WAP to implement Artificial Neural Network
2. WAP to implement Activation Functions
3. WAP to implement Adaptive prediction in ADALINE NN
4. WAP to implement LMS and Perceptron Learning Rule
5. WAP to implement ART NN
6. WAP to implement BAM Network
7. WAP to implement Full CPN with input pair

8. WAP to implement discrete Hopfield Network
9. WAP to implement Hebb Network
10. WAP to implement Hetro associate neural net for mapping input vectors to output vectors

Course code	**CC-A11**			
Category	Core Subject			
Course title	**Data science and Visualization**			
Course ID	241/MCA/CC402			
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 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 and implement the basics of programming in Python.

CO2: Apply the Numpy package for numerical calculations in Python.

CO3: Apply Pandas package for loading and preprocessing data in Python. Implement various data visualization tools of Python on real world data.

CO4: Understand and implement the Machine Learning Concepts in Python

Unit I

Overview of Python Programming Concepts: The concept of data types; variables, assignments; numerical types; operators and expressions; Control Structures; String manipulations; File Handling – creating, reading/writing text/number files; Dictionaries; Functions; OOPs Concepts

Unit II

Introduction to Numpy: Creation on Array ,Array generation from Uniform distribution, Random array generation, reshaping, maximum and minimum, reshaping, Arithmetic operations, Mathematical functions, Bracket Indexing and Selection, Broadcasting, Indexing a 2D array (matrices); Data Manipulation with Pandas -Creating a Series - from lists, arrays and dictionaries, Storing data in series from intrinsic sources, Creating Data Frames, Imputation, Grouping and aggregation, Merging, Joining, Concatenation, Find Null Values or Check for Null Values, Reading data from csv, txt, excel, web.

Unit III

Introduction to Visualization - Installing and setting up visualization libraries, Canvas and Axes, Subplots, Common plots – scatter, histogram, boxplot, Logarithmic scale, Placement of ticks and custom tick labels, Pandas Viz, Style Sheets, Plot type, Area, Barplots, Histograms, Line Plots, Scatter Plots, BoxPlots, Hexagonal Bin Plot, Kernel Density Estimation plot (KDE), Distribution Plots, Categorical Data Plots, Combining Categorical Plots, Matrix Plots, Regression Plots, Grids; Python Visualizations toolkits/libraries.

Unit IV

Introduction to Machine Learning with SciKit-Learn &PyTorch– Data Representation and basic functions Estimator, parameters & model validation, Model Selection, Curve, Grid search, Feature engineering, Naive Bayes Classification, Linear regression, SVM etc; Overview of other Python ML/Deep Learning toolkits/Libraries. Introduction to NLP with NLTK and its functions, modules like speech tagging, tokenization, parsing, segmentation, recognition, cleaning & normalization of text etc; Overview of other Python NLP toolkits/Libraries.

Textbooks&References:

1. Charles Dierbach., Introduction to Python using Computer Science, Wiley Publications, Second Edition, 2015
2. Mark Lutz , Learning Python, O'Reilly publications , Fifth Edition, 2015
3. Jake VandarPlas, Python Data Science Handbook, O'Reilly , 2016
4. Paul Barry, Head First Python, Orielly Publications, Second Edition, 2010

Data science and Visualization Lab

List of experiments

1. Python program to display details about the operating system, working directory, files And directories in the current directory, lists the files and all directories, scan and classify them as directories and files
2. Python program to convert an array to an array of machine values and vice versa
3. Python program to get information about the file pertaining to the file mode and to get time values with components using local time and gm time.
4. Python program to connect to Google using socket programming
5. Python program to perform Array operations using Numpy package
6. Python program to perform Data Manipulation operations using Pandas package.
7. Python program to display multiple types of charts using Matplotlib package
8. Python program to perform File Operation on Excel Data Set
9. Python program to implement with Python Sci Kit-Learn & NLTK.

10. Python program to implement with Python NLTK/Spicy/Py NLPI.

Course code	DSE-04			
Category	Discipline Specific Elective Course			
Course title	Full Stack Programming-2			
Course ID	241/MCA/DS401			
Scheme and Credits	L	T	P	Credits
	2	-	2	3
Theory Internal	15			
Theory External	35			
Practical Internal	05			
Practical External	20			
Total	75			
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 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 Objectives:

CO1: Understand Web Development and Frameworks and develop applications using advanced Backend Development Skills

CO2: Develop Node.js applications utilizing event handling, timers, callbacks, and handling data I/O operations.

CO3: Understand concepts of NoSQL and MongoDB

CO4: Develop Full-Stack Applications with Express, Angular, and React

UNIT I

Understanding the Basic Web Development Framework - User - Browser – Webserver - Backend Services – MVC Architecture - Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React.

UNIT II

Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

UNIT III

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications

UNIT IV

Implementing Express in Node.js, Angular - Typescript - Angular Components - Expressions - Data binding - Built-in directives, MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering

Textbooks&References:

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular WebDevelopment', Addison-Wesley, Second Edition, 2018.
2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node', Second Edition, Apress, 2019.
3. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday SkillsExpected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018
4. KirupaChinnathambi, 'Learning React: A Hands-On Guide to Building Web Applications Using React and Redux', Addison-Wesley Professional, 2nd edition, 2018

Full Stack Pogramming-2 Lab
List of Experiment

1. Develop a portfolio website for yourself which gives details about yourself for a potential recruiter.
2. Create a web application to manage the TO-DO list of users, where users can login and manage their to-do items
3. Create a simple micro blogging application (like twitter) that allows people to post their content which can be viewed by people who follow them.
4. Create a food delivery website where users can order food from a particular restaurant listed in the website.
5. Develop a classifieds web application to buy and sell used products.
6. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days.
7. Develop a simple dashboard for project management where the statuses of various tasks are available. New tasks can be added and the status of existing tasks can be changed among Pending, InProgress or Completed.
8. Develop an online survey application where a collection of questions is available and users are asked to answer any random 5 questions.

Course code	MDC-4			
Category	Multidisciplinary			
Course title	Cloud, Edge & Fog Computing			
Course ID	241/MCA/MD401			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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 Cloud Computing comprehensively and cloud security challenges.
CO2: Deploy Models and Service Offerings
CO3: Investigate management principles in cloud computing and virtualization technologies.
CO4: Analyse case studies and real-world examples of emerging paradigms like Fog Computing and Edge Computing.

UNIT-I

Cloud computing: Concept & definitions, Characteristics of Cloud, Cloud Computing Benefits and Limitations, Evolution of Cloud Computing, NIST model, cloud cube model, Cloud Computing v/s Client Server Architecture, Cloud computing vs. Cluster computing vs. Grid computing.

Models & Services: Deployment models: public, private, hybrid & community, Deploying a web service from inside and Outside of a Cloud. Service models: laaS, PaaS,Saas,IDaaS,CaaSandothers.

Applications: Applications areas of Cloud Computing. Cloud computing as indispensable to modern smart healthcare system, Role played by cloud computing/servicesduringoutbreakofpandemics {likeCovid-19}in keepingthe life moving.

UNIT-II

Cloud Management: Concept of Service Oriented Architecture, Service Oriented Architecture & Service Level Agreements (SLAs). Monitoring of an entire cloud computingdeployment stack,lifecyclemanagement of cloudservices.

Virtualization: Objectives, Benefits of Virtualization,Importance of virtualizationin cloud computing, Load Balancing and Virtualization,Improving Performancethrough Load Balancing, Hypervisors, Machine Imaging, Case Study: VMware.

Cloud Security Concepts: Cloud security challenges, Cloud security approaches, Cloud SecurityAlliancestandards,cloudsecurity models andrelated patterns.

Case Study: Cloud services offered by popular vendors like Amazon, Microsoft, Oracle. GI Cloud initiative.

UNIT-III

Fog Computing: Concept of Fog computing: Background, Motivation & Application Scenarios, Characteristics&Issues, ProsandCons, Myths about FogComputing,Fog Computing Services, Fog Computing Components.

Fog Protocols: Fog Protocol, Fog Kit, Proximity Detection Protocols- DDS/RTPS computing protocols.

Privacy-PreservingComputationinFogComputing: Introduction,ConceptofBlock Chain,Multi-PartyComputation andBlockChain.

SimulatingwithiFogSim

Casestudy: ExploitingFogcomputinginHealthMonitoring.

UNIT-IV

Edge Computing: Introduction, Application Scenarios, Characteristics & Issues, Edge Architectures,Edge Computing Applications. Difference between Cloud, Edge & Fog computing(s), Mobile Edge Computing.

Challenges in Federating Edge Resources: Network challenges, management challenges, other miscellaneous challenges.

Middleware for Fog & Edge Computing: Concept & importance, middleware infrastructures. Security managementinEdgeCloud Architecture.

Casestudy: Smart surveillancevideostreamprocessingatedge

Textbooks&References:

1. TobyVelte,AnthonyVelte,RobertElsenpeter,"CloudComputing:APractical Approach", The McGraw-Hill.
2. KrisJamsa,"CloudComputing:Saas,PaaS,laaS,Virtualizationandmore."
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy: AnEnterprisePerspectiveonRisksandCompliance.",O'ReillyMediaInc.
4. RajkumarBuyya, JamesBroberg,AndrzejM.Goscinski,"CloudComputing: Principles and Paradigms.", Wiley.
5. NikosAntonopoulos,LeeGillam,"CloudComputing:Principles,Systemsand Applications.", Springer, 2012.

6. Ronald L.Krutz,Russell Dean Vines,"Cloud Security: AComprehensive Guide to Secure Cloud Computing.", Wiley-India.
7. BarrieSosinsky,"CloudComputingBible.",Wiley-India.
8. RajkumarBuyya& SatishNarayanaSrirama,"FogandEdgeComputing",Willey Series onParallelandDistributed Computing.
9. AmirVahidDastjerdiandRajkumarBuyya,"Fog Computing:Helpingthe InternetofThingsRealize its Potential.",University of Melbourne.
10. Zaigham Mahmood, "Fog Computing: Concepts, Framework and Technologies.",Kirtdle Edition.
11. Assad Abbas,Samee U.Khan,AlbertY.Zomaya, "FogComputing-Theory and Practice.", John Wiley & Sons, 2020.

Course code	MDC-4			
Category	Multidisciplinary			
Course title	Internet of Things			
Course ID	241/MCA/MD402			
Scheme and Credits	L	T	P	Credits
	3	-	-	3
Theory Internal	25			
Theory External	50			
Total	75			
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 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 concepts of Internet of Things
CO2: Analyze basic protocols network
CO3: Understand the concepts of Web of Things
CO4: Basic Understanding of Cloud Computing.
CO5: Design IoT applications in different domain and be able to analyze their performance

UNIT - I

INTRODUCTION TO IOT: Introduction to IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Challenges in IoT (Design ,Development, Security)

UNIT – II

NETWORK AND COMMUNICATION ASPECTS: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

UNIT - III

WEB OF THINGS: Web of Things vs Internet of things, two pillars of web, Architecture and standardization of IoT, Unified multi tier-WoT architecture, WoT portals and Business intelligence, Cloud of things: Grid/SOA and cloud computing, Cloud middleware, cloud standards

UNIT – IV

RESOURCE MANAGEMENT IN IOT: Domain specific applications of IoT, Home automation, Industry applications, Surveillance applications, Other IoT applications Clustering, Synchronization, Software agents.

Textbooks&References:

1. Vijay Madisetti, ArshdeepBahga, “Internet of Things: A Hands-On Approach”

2. WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

3. CunoPfister, “Getting Started with the Internet of Things”, Shroff Publisher/Maker Media.

4. Internet of Things, RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan, JohnWiley and Sons

AEC-03 Syllabus

Chapter 4: Guidelines for Assessment of Theory Courses

Assessmenttoolsfortheorycourses

Theoveralldirectandindirecttoolsofassessmentfortheorycoursesaregivenbelow.

AssessmentToolsforTheoryCourses		
DirectTools		
SrNo.	**Descriptionof the tool**	**COsCovered**
1	Sessional ExaminationI	Questions must coverat least first three Levels of COs. (Remember, Understand, Apply)
2	Sessional ExaminationII	QuestionsmustcoveratleastfourLevelsof COs including the first three levels (Remember, Understand,Apply).
3	InternalExaminationIII (OpenBookMode)	Lastfourlevelsof COs (Apply,Analyse,Evaluate,Create)
4	AssignmentI	LastThreeLevelsofCOs (Analyse,Evaluate,Create)
6	AssignmentII	LastTwoLevelsofCOs (Evaluate and Create)
7.	Attendance/Levelof ParticipationinClass	LearningCurveandCommunication
8.	FinalExamination	PossiblyCoveringalllevelsofCOs
Indirect Tools		
1.	End-SemesterSurvey	CoveringalllevelsofCOs
2.	ExitSurvey	Coveringall POs

Guidelinesforinternal evaluation

1. Alltheteachersarerequiredtosetquestionssessional/minorexamsaccordingtotheCOsandthelevelofCO needs to be mentioned against each question.
2. Thethreeminorexaminationstogethermustcoverallthelevelsof COs.
3. Itiscompulsorytogivetwoassignmentsduringthesemesterpertainingtothelastthreelevelsof COs.
4. Thesessional/minorexaminationanswersheetmustbeevaluatedaspertheCOs.
5. Alltheteachersarerequiredtomaintaintheinternalevaluationrecordaccordingthe COs
6. Alltheteachersarerequiredtosubmittheinternalevaluationrecordalongwiththecomputationofattainment levels of COs.
7. Therespectiveproformasformakingsessional/minorquestionpapers,maintainingCO-wiseevaluationrecord of the course and submitting the CO attainment levels are given next in this chapter.
8. Forthepurposeofinternalassessment,theaverageofthehighest marksobtainedbyastudentinanyofthe two minor examinations will be considered. Class Performance will be measured through percentage of lectures attended Assignments and class performance.

DepartmentofComputerScienceandEngineering Gurugram University, Gurugram-122018					
SampleDetailedDirectToolsforInternalAssessment					
Sessional1	Thesessionalexamsmustcontainfourquestions.				
	Question No.	QuestionNo.1	QuestionNo.2	QuestionNo.3	QuestionNo.4
	Levels of Bloom's Taxonomy	Firstlevel: Remember	Secondlevel: Understand	Third Level: Apply	Anyoftheselevels (3, 4, 5) Apply, Analyse, Evaluate
	Marks Distribution				
Sessional2	No. of Questions	QuestionNo. 1	QuestionNo.2	QuestionNo.3	QuestionNo.4
	Levels of Bloom's Taxonomy	Firstlevel: Remember	Secondlevel: Understand	Third Level: Apply	Any of these levels: (4, 5, 6) Analyse,Evaluate, Create
	Marks Distribution				
Internal Examination	No. of Questions	QuestionNo. 1	QuestionNo.2	QuestionNo.3	QuestionNo. 4
	Levels of Bloom's Taxonomy	Thirdlevel: Apply	Any one out of fourth and fifth levels: Analyse, Evaluate	Anyoneout fifthandsixth levels:Evaluate	Lastlevel: Create
	Marks Distribution				
Assignment1	Mustbebasedon thelast threelevels ForpurposeofcomputingCO attainment levelonly				
Assignment2	Mustbebasedon thelast two levels ForpurposeofcomputingCO attainment levelonly				
IndustrialTraining	Basedon thelastfour levels				
IndustrialTraining/Mini Project	Basedonthelastfour levels				
MajorProject	Basedonthelastfour levels				

Note:Thecoursecoordinatormaymakeslightmodificationinthestyleofminorexaminationsasperthe requirement the course. The due weightage to higher level COs must be maintained in all respects.

DepartmentofComputerScienceandEngineering
Gurugram University, Gurugram-122018

RecordofCO-wiseInternalAssessment

NameoftheProgramme: Semester:

NomenclatureoftheCourse: CourseCode:

DetailsofStudents		MinorI					MinorII						Minor3				AI (CO5)	AII (CO6)	OverallAttainment				
Roll.No.	Name	Q1CO14	Q2CO24	Q3CO36	Q4CO46	-CO5	Q1CO14	Q2CO24	Q3CO36	Q4CO46	-CO56	-CO6	Q1C0334	Q2CO444	Q3CO556	Q4CO666	10	10	CO1	CO2	CO3	CO4	CO5
101	-	3	3	4	4	-	4	3	5		4		3	2	4	3	5	4	7/8 0.85	6/8 0.80	12/16 0.75	6/110 0.73	4/6 0.77
102	-																		-	-	-	-	-
103	-																		-	-	-	-	-
104	-																		-	-	-	-	-
%studentgetting more than 55 % marks																			0.82	0.78	0.72	0.65	0.60
Attainment Levels																			3	3	3	2	1

Nameofthe Course Coordinator | SignatureoftheCourse Coordinator

MaxmarksforCOs: CO1:8;CO:8;CO3=16;CO4=10;CO5=22, CO6=16.

CriteriaforComputingAttainmentLevel

Attainment Level -(None): Below60%ofstudentsscoremorethan55%marksoutofthemaximumrelevant marks.
Attainment Level 1 (low): 60% of students score more than 55% marks out of the maximum relevant marks.

Attainment Level 2 (Medium): 70%ofstudentsscoremorethan55%marksoutofthemaximumrelevant marks.
Attainment Level 3 (high): 80% of students score more than 55% marks out of the maximum relevant.

SampleOverallAttainmentLevelofCOsforDataStructuresandAlgorithmsCourse	
ListofCourseOutcomes	**Levelofattainment**
CO1.Listordescribetypesofdatastructuresand operationsthatcanbeimplementedonthesedata structures.	**3**
CO2.Demonstratetheuseofvariousdatastructureand their related operations	**3**
CO3. Apply appropriate data structures with respect to effective storage of data and efficiency of the required operations on data for solving real world problems.	**3**
CO4.Analysethe time complexity of searching and algorithms.	**2**
CO5.formulate datastructuresand prescribeoperationsfor given real world situations.	**1**

Note:Theclasscoordinatorsneedtosubmitthecourseoutcomeattainmentlevelsasgiveninthetable above.

Chapter 5: Guidelines Internal and external Assessment of Lab. Courses

AssessmentToolsforLab.Courses

The assessment tools for evaluating lab. courses are given below. The total lab evaluation marks: 100 (Internal: 50; External 50)

AssessmentToolsforLab.Courses		
DirectTools		
Sr No.	**Description ofthetool**	**COs Covered**
1	Assignments	10to15assignmentsbasedonthe lastfour levels of COs (Apply,Analyse,Evaluate,Create)
2.	GroupAssignment(s)	LastthreelevelsofCOs (Analyse,Evaluate,Create)
3.	LaboratoryEvaluations(MLE)IandII(Eachof50 marks)(implementingaproblem,lab.record,VIVA-VOCE, useofethicalpractices,self-learningandgroupspirit	Lastfourlevelsof COs (Apply,Analyse,Evaluate,Create)
4.	ExternalExamination(50Marks) (implementingaproblem,lab.record,VIVA-VOCE,useof ethical practices	Lastfourlevelsof COs (Apply,Analyse,Evaluate,Create)
IndirectTools		
1.	End-SemesterSurvey	CoveringalllevelsofCOs
2.	ExitSurvey	CoveringallPOs

Guidelinesforinternaland externalevaluationof lab. courses:

1. The internal evaluationMEAIand MEAII will be conducted inthe weekbeforeor after the internal minor examinations for the theory courses by the course coordinator.
2. Thecoursecoordinatorwillconductheseminorevaluationsintheslotsassignedtothemaspertheir timetable.
3. TheChairpersonoftheDepartmentwillonlynotifytheweekfortheinternallaboratorycourseevaluations.
4. ThemarksforMLEIandMLEIImustbesubmittedwithinaweekoftheconductoftheselaboratory course evaluations.
5. Theoverallinternalmarkswillbecalculatedastheaverageofthetwominorlaboratorycourseevaluations.
6. Theinternallabpracticalexaminationistobeconductedstrictlyonthepatternofexternalpractical examination.
7. TheevaluationmustbeconductedtomeasuretheattainmentlevelofCOs
8. The proforma for break-up of marks for internal and external lab. course evaluations are given next in this chapter.
9. The external examination will be conducted by external examiner appointed by the Controller of Examination along with the internal examiner, preferably the laboratory course coordinator, appointed by the Chairperson of the Department.
10. For implementing the spirit of continuous evaluation, the course coordinators will maintain theexperiment-wise record ofthe performance of students for the laboratory courses as a part of their lab course file.
11. The course coordinator/Internal Examiners/External Examiners will maintain and submit the bifurcation of marks obtained by the students in internal as well as external evaluations in the prescribed proformas to the respective departments in addition to submitting and uploading of overall marks on the university portal as per the requirement of the result branch.
12. The laboratorycourse coordinator will also conduct laboratorycourse exit surveyand, compute and submit the attainment levels of the course outcomes of the laboratory course based on direct and indirectevaluation components and submit it to the Chairperson office along with the internal assessment marks.

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InternalLaboratoryCourseEvaluationProforma

LaboratoryCourseEvaluation-I(LE-I)/LaboratoryCourseEvaluation-II(LE-II)

NameoftheProgramme: Semester:
NomenclatureoftheCourse:
Course Code:

SR.No.	Roll.No.	Writtenwork and/orconduct of experiment(s)	(VIVA-VOCE) basedonlaboratorycourse outcomes fromCO2toCO4			Laboratory Record/ File.	ClassPerformance (Attendance/ Ethical practices followed, Self-Learning and Team Spirit)	Total
		CO1	CO2	CO3	CO4	CO5	CO6	50
1								
2								
3								
.								
.								

TotalNo.ofStudents	Present:	Absent
NameoftheCourseCoordinator	SignatureoftheCourse Coordinator	

Note:TheCO-wiseweightagebedecidedaspertherequirementoftheLabCoursebytheCourseCoordinator inconsultationwiththe Chairperson.

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ExternalLaboratoryCourseEvaluationProforma

NomenclatureoftheCourse: Course
Code:
Name of the Internal Examiner:
NameoftheExternalExaminer:

SR.No.	Roll.No.	Written work and /or Conduct of Experiment(s)	(VIVA-VOCE)			Laboratory Record/File	TotalMarks
1							
2							
3							
.							

TotalNo.ofStudents:	Present:	Absent:
NameandsignatureoftheInternalExaminer	NameandsignatureoftheExternalExaminer	

Chapter 6: Evaluating Training and ProjectReports

Evaluation ofIndustrialTraining/Internship

It is mandatory for all the students to go for industrial training or internship after fourth semester and sixth semester. The students' internship work is evaluated as per the criteria given in the evaluation proforma given below.

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Name of the Programme: Credits:

Semester: TotalMarks: 100

Session:

EvaluationofIndustrialTraining

SR. No.	Roll. No.	Significanceand originality of the problem addressedand the solution provided CO1+CO2	Knowledgeofthe problem domain andthe toolused (VIVA- VOCE) CO3	Judgement ofthe skill learnt and system developed CO4	Quality of Report Writing CO5	Levelof ethics followed CO6	Total
1							
2							
3							
.							
.							

Name(s)andSignatureoftheInternal/External Examiner(s):

Date:

NameandSignatureofthe Chairperson

TotalCandidates:

No.ofCandidatesPresent:
No.ofCandidatesAbsent:

GuidelinesforPreparingIndustrialTraining(Code)Report

Allthestudentsarerequiredtofollowtheseguidelinesforpreparingtheirindustrial training report.

GeneralGuidelines

1. The industrial training report must include a declaration by the student that he/she has followed ethical practices while doing the industrial trainingwork. Any violation of ethical practices will lead to rejection of the industrial training report. For instance, a plagiarized report or a readymade report purchased from market will be rejected straight away.
2. Industrial trainingwork carried out in groups of two students must include the individual contribution of the students.
3. The industrial training report must be submitted to the internal guide in soft binding at least 7 days before the final submission so that he/she can suggest changes.

FormattingInstructions

TheformattinginstructionsaregiveninTablebelow.

FormattingInstructions		
Sr.No.	**Item**	**Formatting**
1.	No.ofpages	Minimum20andmaximum40
2.	Papersize	A4
3.	FontType	TimesNewRoman
4.	Normaltextsize	12
5.	Pagenumbering	Place:CentreBottom Type:FrontmaterialinRomannumbers
6.	Margins	Leftmargin:3.75cms(1.5inch) Right,bottom,top=2.5cms(1inch)
7.	References/Bibliography	IEEEformat
8.	Binding	softbindingofgoodquality

ContentsoftheIndustrialTrainingReport

Thecontentsoftheindustrialtrainingreportshouldbeorganisedasdescribedbelow.

1. Declaration that the students has carried out his work on his own. It is his/her original creation, not plagiarised from any other source and due credit has been given to the source material used in the industrial training report through references and citations.
2. Acknowledgement
3. Listoffigures
4. ListofTables
5. ListofAbbreviations
6. Contents

ContentsintheBodyoftheindustrialtrainingreport

ThereportmustbewritteninEnglish.Theideasmustbeorganisedinaclearandconcisefashion.

S.No	Content	TentativeNo.of pages
1.	ProfileoftheCompany	Atmost2pages
2.	Introduction	4-5pages
3.	Descriptionofskillslearned	6-10pages
4.	Applicationdeveloped(ifany)basedonskillslearnt	20-40pages
5.	Scopeofthetraining/Applicationdeveloped	2 paragraph

Theindustrialtrainingreportshouldnotnowayexceed70pagesandshouldbesubmittedinsoft binding of good quality as per university norms.

Formatofthetitlepage

Theformatofthetitlepageisgivenisgivenonnext page.

TITLEOFTHEINDUSTRIALTRAININGREPORT

(WriteinTimesNewRoman,16-pointsize,BoldandCentredand Uppercasefont)

Trainingreportsubmittedto

Gurugram University,Gurugram for the partial award of the degree

(WriteinTimesNewRoman,12-pointsizefont,Bold,ItalicsandCentredstyleafter4 lines gap with 12 font size from the title of the project)

of

(WriteinTimesNewRoman,12-pointsizefont,Bold,ItalicsandCentredstyleafter 1 lines gap with 12 font size from the text above in three lines)

Master of Computer Applications

(WriteinTimesNewRoman,14-pointsize,Bold,Centredstyleafter"***of***"after1linegap with 12 font size)

By

(WriteinTimesNewRoman12-pointsize,Bold,Italics,andCentredstyleafterthe name of the degree with 1 line gap with 12 font size)

Your Name
(EnrolmentNumber)

(WriteinTimesNewRoman,14-pointsizefont,Bold,Centredstyleafter1linegap with 12 font from "***By***")

Department of Computer Science & Engineering
GURUGRAM UNIVERSITY, GURUGRAM

Month,Year

(WriteinTimesNewRoman,14-pointsizefont,Bold,Centredstyle,after2linesgap from logo)

Declaration tobesubmitted fortrainingreport

DECLARATION

I, *Your Name, Your Roll No*., certify that the work contained in this industrial training report is original and has been carried by me in the ---------- company name. This work has not been submitted to any other institute for the award of any degree and I have followed the ethical practices andotherguidelinesprovidedbytheDepartmentofComputerScienceandEngineering in preparing the industrial training report.

Signature

Name of Student
RegistrationNumber

DepartmentofComputerScienceand Engineering

Gurugram University, Gurugram

Signature
Supervisor/Mentor
Designation

DepartmentofComputerScienceand Engineering

Gurugram University, Gurugram

Evaluationofmini-project

Theproformaforevaluatingthe projectusingopensource toolsisgiven onthe next page.

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Gurugram-122018

Name of the Programme:_____ | Credits:

TotalMarks:100

EvaluationofIndustrialTraining/InternshipReport(Code)

SR.No.	Roll.No.	Significanceoftheproblem addressed CO1	Knowledge of the problem domain CO2	Knowledge of the techniques and tools used CO3	Qualityofthe solution provided CO4	Quality of the ReportWriting CO5	Level of engagement with ethical practices and self-learning CO6	Total
1								
2								
3								
.								
.								

Nameoftheexaminer(s):

SignatureoftheExaminer(s):

Date:

Signature ofChairperson

TotalCandidates:

No.ofCandidatesPresent:

No. ofCandidatesAbsent: