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**

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.