University of Engineering and Management

INSTITUTE OF ENGINEERING & MANAGEMENT, NEWTOWN

DEPARTMENT OF COMPUTER APPLICATIONS

DETAILED SYLLABUS BOOKLET –

1ST SEMESTER – MCA – 2025-2027 BATCH

3RD SEMESTER – MCA – 2024-26 BATCH

Syllabus Structure
1st Year 1st Semester

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
Bridge Course						
MCA001	Bridge Course - English	0	0	0	0	0
MCA002	Bridge Course - Introduction to C Programming	0	0	0	0	0
MCA003	Bridge Course - Basic Mathematical Computation	0	0	0	0	0
1st Semester (Theory)						
MCA101	Computer Organization and Architecture	3	1	0	4	3
MCA102	Computer Programming with C	3	1	0	4	4
MCA103	Data Structures with C	3	1	0	4	4
MCA104	Discrete Mathematical Structure	3	1	0	4	3
MCA105	Business English and Communication	3	1	0	4	3
MCA(GS)101	Mental Maths for Professionals - I	2	0	0	2	0.5
Total of Theory					22	17.5
1st Semester (Practical)						
MCA192	C Programming Laboratory	0	0	3	3	3
MCA193	Data Structures with C Laboratory	0	0	3	3	3
Total of Practical					9	9
1st Semester (Sessional)						
MCA(GS)181	Competitive Aptitude Training - I	2	0	0	2	0.5
MCA171	Research Methodology and IPR	2	0	0	2	2
MAR	Mandatory Additional Requirements (Co-Curricular/Extra-Curricular Activity)	0	0	0	0	0
IFC	Industry and Foreign Certification	0	0	0	0	0
MOOCS	Massive Open Online Courses	0	0	0	0	0
Total of Sessional					2	0.5
Total of Semester					33	27

Syllabus Structure
2nd Year 1st Semester (3rd Semester)

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
3rd Semester (Theory)						
MCA301	Operating Systems and Systems Software	3	1	0	4	4
MCA304	Software Engineering & TQM	3	1	0	4	4
MCA306	Data Science & Data Analytics	3	1	0	4	4
MCA307	Statistics and Numerical Techniques	3	1	0	4	3
MCA(GS)301	General Studies & Current Affairs-III	2	0	0	2	0.5
Total of Theory					18	15.5
3rd Semester (Practical)						
MCA391	Operating Systems Laboratory (Unix)	0	0	2	2	3
MCA394	Software Project Management Laboratory	0	0	2	2	3
MCA396	Data Science & Data Analytics Laboratory (PYTHON)	0	0	2	2	3
Total of Practical					6	9
3rd Semester (Sessional)						
MCA371	Sustainability, Climate Action and Environmental Sciences	2	0	0	2	2
MCA381	Industrial Training	0	0	0	0	2
MCA382	Minor Project	0	0	0	6	6
MCA373	Seminar	0	0	0	0	1
MCA(GS)381	Competitive Aptitude Training - III	2	0	0	2	0.5
IFC	Industry and Foreign Certification	0	0	0	0	0
MAR	Mandatory Additional Requirements	0	0	0	0	0
MOOCS	Massive Open Online Courses	0	0	0	0	0
Total of Sessional					10	11.5
Total of Semester					34	36

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
1st Semester Syllabus for MCA Admission Batch 2026

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: Computer Organisation and Architecture **Credit: 4**

Subject Code: MCA101 **Lecture Hours: 40**

Name of the Course: Computer Organization and Architecture

Course Code: MCA101 & MCA191	**Semester: 1st**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 2	Practical Sessional Internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100

Aim:	
Sl. No.	
1	To have a thorough understanding of the basic structure and operation of a digital computer.
2	To study the different communication methods with I/O devices and standard I/O interfaces.
3	To learn the architecture and assembly language programming of 8085 microprocessor.
Objective:	
Sl. No.	
1	Understanding Logic gates, flip flops and counter.
2	Clear Understanding of Computer Architecture.
3	Clear Understanding of Pipeline processing, RISC and CISC architectures.

4	Develop a base for advanced microprocessors.
Pre-Requisite:	
Sl. No.	
1.	Proficiency in basic Digital Electronics
Course Outcome:	
1.	Summarize the fundamental components of a basic computer system and its organization.
2.	Apply arithmetic and logical microoperations of binary number systems.
3.	Analyze control unit design and concept of pipelining.
4.	Classify memory hierarchy and examine numerical problems based on it.
Relevant Links:	
COA Linkedin Learning Link	COA Coursera Link COA NPTEL Link

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	-	-	-	-	-	2	-	2	-	-	-
CO2	3	2	2	2	-	-	1	-	-	2	-	2	-	-	-
CO3	2	2	3	3	-	-	1	-	-	2	-	2	-	-	-
CO4	3	2	3	2	-	-	-	-	-	2	-	2	-	-	-

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Structure of Computers and Computer Arithmetic**	Computer types, Functional units, Basic operational concepts, von Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4

2	**Basic Computer Organization and Design**	Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8
3	**Register Transfer, Micro-Operations and Micro-Programmed Control**	Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit, Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8

4	**Memory System:**	Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	7

5	**Input-Output:**	I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	7
6	**MULTIPROCESSORS**	Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Interprocessor Communication and Synchronization, and Cache Coherence.	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	6

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
M. Moris Mano	Computer System Architecture	3rd Ed	Pearson/PHI
Reference Books: **1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.**			

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: Computer Programming with C **Credit: 4**

Subject Code: MCA102 **Lecture Hours: 40**

Name of the Course: Computer Programming with C	
Course Code: MCA102 & MCA192	**Semester: 1st**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 2	Practical Sessional Internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100

Aim:	
Sl. No.	
1	To gain Knowledge of Various aspects of algorithm development
2	To enhance Ability to identify qualities of a good solution
3	To implement learned algorithm design techniques and data structures to solve problems.
Objective:	
Sl. No.	
1	The fundamental design, analysis, and implementation of basic data structures.
2	Basic concepts in the specification and analysis of programs.
3	Principles for good program design, especially the uses of data abstraction.
4	Significance of algorithms in the computer field
Pre-Requisite:	
Sl. No.	
1.	Proficiency in one high level programming language
Course Outcome:	
1.	will be able to develop simple applications in C using basic constructs
2.	will be able to design and implement applications in C using Arrays and Strings
3.	will be able to design and implement applications in C using Functions and Pointers
4.	will be able to develop applications in C using Structures and Students will be able to design applications using sequential and random-access file processing.
Relevant Links:	
C Study Material	C NPTEL LINK C Coursera Link C LinkedIn Learning Link

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	3	0	0	0	1	1	0	2	3	1	1
CO2	3	3	3	1	3	0	0	0	1	1	0	2	3	1	1
CO3	3	3	3	1	3	0	0	0	1	1	0	2	3	1	1
CO4	3	3	3	1	3	0	0	0	1	1	0	2	3	1	1

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Basics of 'C' Programming**	Fundamentals of algorithms: Notion of algorithm, Notations used for assignment statements and basic control structures. Introduction to 'C': General structure of ' C' program, Header file, 'main ()' function. Fundamental constructs of 'C': Character set, tokens, keywords, Identifiers, Constants - number constants, character constants, string constants, Variables. Data types in	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry	6	

		'C': Declaring variables, data type conversion. Basic Input and Output functions: input and output statements using printf(), scanf() functions. Assignments and expressions: simple assignment statements, arithmetic operators, shift operators, bitwise operators, sizeof operator	standards		
2	**Control structures**	Conditional statements: Relational operators, logical operators, if statement, if-else statements, nested if-else statements, if-else ladder, switch statement. Looping statements: while loop, do-while loop, for loop. Branching Statements: goto statement, use of 'break' and 'continue' statements.	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	6	1. Write a C program to find sum and average of three numbers. 2. Write a C program to find the sum of individual digits of a given positive integer. 3. Write a C program to generate the first n terms of the Fibonacci sequence. metrices from the console, verifies if metrics multiplication is possible or not. Then multiplies the metrices and prints the 3rd metrics. 4. Write a C program to generate prime numbers between 1 to n. 5. Write a C program to Check whether given number is Armstrong Number or Not. 6. Write a C program to evaluate the algebraic expression (ax+b)/(ax-b). 7. Write a C program to check if the given number is perfect number? 8. Write a C program to check if given number is strong number? 9. Write a program to print your name without using any semicolon in the program. 10. Write a program to convert temperature in Celsius to Fahrenheit and vice-versa.

					11. Write a C program to check whether a number is Palindrome or not. 12. Write a C program to find maximum between two numbers. 13. Write a C program to find maximum between three numbers. 14. Write a C program to check whether a number is negative, positive or zero. 15. Write a C program to check whether a number is divisible by 5 and 11 or not within the range 100 to 500. 16. Write a C program to check whether a number is even or odd. 17. Write a C program to check whether a year is a leap year or not. 18. Write a C program to check whether a character is alphabet or not. 19. Write a C program to input any alphabet and check whether it is vowel or consonant. 20. Write a C program to input any character and check whether it is an alphabet, digit or special character.
3	**Arrays and structure**	3.1 Characteristics of an array, One dimension and two dimensional arrays, concept of multi-dimensional arrays. 3.2 Array declaration and Initialization. 3.3 Operations on Arrays. 3.4 Character and String input/output and String related operations. 3.5 Introduction and Features of Structures, Declaration and Initialization of Structures, array of structures. 3.6 Type def, Enumerated Data Type	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf	8	1. Write a program to store marks for n number of student in an array and print their marks. 2. Write a program which stores the marks of subject Mathematics and English of n number of students in an array and then prints their individual total marks. 3. Write a program to insert an element in an array in a particular position. 4. Write a program to delete an element from a particular position of an array. 5. Write a program to convert a decimal number taken as input from user to corresponding binary number and store the result in an array.

			Industry Mapping: The concepts delivered are in sync with the industry standards		6. Write a program to input a binary number in an array and convert into corresponding decimal number. 7. Write a program to find the smallest and the largest elements in an array. 8. Write a program for deleting duplicate elements in an array. 9. Write a program to search for a particular element in an array. 10. Write a program to sort n elements (ascending order). 11. Write a program to find second highest number from the array without using sorting. 12. Write a program to perform addition and subtraction between two matrices. 13. Write a program to transpose a matrix. 14. Write a program to add the elements of each row and each column of a matrix. 15. Write a program to perform the multiplication of two matrices. 16. Write a program to check whether a matrix is identity matrix or not. 17. Write a program to check whether a matrix is sparse matrix or not 18. Write a C program to create a structure named company which has name, address, phone and no Of Employee as member variables. Read name of company, its address, phone and no Of Employee. Finally display these members‟ value. 19. Define a structure “complex” (typedef) to read two complex numbers and perform addition, subtraction of these two complex numbers and display the result. 20. Write a C program to read Roll No, Name,

					Address, and Age marks of 12 students in the BCT class and display the details from the function.
4	**Functions**	Concept and need of functions. Library functions: Math functions, String handling functions, other miscellaneous functions such as getchar(), putchar(), malloc(), calloc(). Writing User-defined functions - function definition, functions declaration, function call, scope of variables - local variables, global variables. Function parameters: Parameter passing- call by value & call by reference, function return values, function return types, declaring function return types, The 'return' statement. Recursive functions.	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	6	1. Write a C program to add, subtract, multiply and divide two integers using a user-defined type function with return type. 2. Write a C program to calculate sum of first 20 natural numbers using recursive function. 3. Write a C program to generate Fibonacci series using recursive function. 4. Write a C program to swap two integers using call by value and call by reference methods of passing arguments to a function. 5. Write a C program to find sum of digits of the number using Recursive Function. 6. Write a C program to read an integer number and print the reverse of that number using recursion. 7. Write a C program to find maximum and minimum between two numbers using functions. 8. Write a C program to check whether a number is even or odd using functions. 9. Write a C program to check whether a number is prime, Armstrong or perfect number using functions. 10. Write a C program to find power of any number using recursion.
5	Pointers	Introduction to Pointers: Definition, use of pointers, '*' and '&' operators, declaring, initializing, accessing pointers. Pointer arithmetic. Pointer to array.	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed***	8	1. Write a C program to find the sum of all the elements of an array using pointers. 2. Write a C program to swap value of two variables using pointer. 3. Write a C program to add two numbers using pointers.

		Pointer and Text string. Function handling using pointers. Pointers to structure.	***syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards		4. Write a C program to input and print array elements using pointer. 5. Write a C program to copy one array to another using pointer. 6. Write a C program to swap two arrays using pointers. 7. Write a C program to reverse an array using pointers. 8. Write a C program to search for an element in array using pointers. 9. Write a C program to add two 2 X 2 matrix using pointers. 10. Write a C program to multiply two 2 X 2 matrix using pointers. 11. Write a C program to find length of string using pointers. 12. Write a C program to copy one string to another using pointer. 13. Write a C program to concatenate two strings using pointers. 14. Write a C program to compare two strings using pointers. 15. Write a C program to find a substring from a given string using pointers.
6	File handling	Creation of the new file Opening an existing file Reading from the file Writing to the file Deleting the file	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf	6	1. Write a C Program to list all files and sub-directories in a directory. 2. Write a C Program to count number of lines in a file. 3. Write a C Program to print contents of file. 4. Write a C Program to copy contents of one file to another file. 5. Write a C Program to merge contents of two files into a third file. 6. Write a C program to delete a file.

			Industry Mapping: The concepts delivered are in sync with the industry standards		

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
E.Balagurusamy	Programming in ANSI C	7th Ed	McGraw Hill Education
Reference Books: **Let us C** by *Yashavant Kanetkar*, 19th Edition., **The C Programming Language** by *Brian W. Kernighan* and *Dennis Ritchie*, 2nd Edition **Mastering C** by *K. R. Venugopal*			

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: Data Structure with C **Credit: 4**

Code: MCA103 **Lecture Hours: 40**

Name of the Course: Data Structure with C	
Course Code: MCACC103 & MCACC193	**Semester: 1st**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 2	Practical Sessional Internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100

Aim:	
Sl. No.	
1	To gain Knowledge of Various aspects of algorithm development
2	To enhance Ability to identify qualities of a good solution
3	To implement learned algorithm design techniques and data structures to solve problems.
Objective:	
Sl. No.	
1	The fundamental design, analysis, and implementation of basic data structures.
2	Basic concepts in the specification and analysis of programs.
3	Principles for good program design, especially the uses of data abstraction.
4	Significance of algorithms in the computer field
Pre-Requisite:	
Sl. No.	
1.	Proficiency in one high level programming language
Course Outcome:	
1.	On completion of this course students are expected to learn various data structures, their usages, merits andlimitations.
2.	On completion of this course students are expected to design and analyze various algorithms.
3.	On completion of this course students are expected to do a comparative analysis among different data structuresand decide on the appropriate data structure to be used in a given scenario.
4.	On completion of this course students are expected to acquire adequate knowledge and skills to solve a real lifesoftware problem.
Relevant Links:	
DS Study Material	DS NPTEL LINK DS Coursera Link DS LinkedIn Learning Link

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	-	-	1	1	2	2
CO2	3	3	1	2	1	-	-	-	-	-	-	2	3	2	1
CO3	3	2	2	3	2	-	-	-	-	-	-	1	3	2	1
CO4	2	2	3	2	2	-	-	-	-	-	-	2	3	2	2

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Algorithm Concept**	Algorithm concept, Time Complexity, Space Complexity, Running Time– Worst Case, Best Case, Average Case, time space trade-off, Algorithm Efficiency- Linear loops, Logarithmic loops, Nested loops, Time complexity comparison- Polynomial vs Exponential, Algorithm Notations- Big O , Big Omega, Theta Notation	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	

2	**Introduction to Data Structure, Array**	Program Efficiency, Data Structure-definition, usage, examples, Selection of Appropriate Data Structure, Data Structure-some terminologies, Classification of Data Structure, Fundamental difference between Linear and Non-linear Data Structure with examples, Operations on Linear Data Structure Introduction to Linear Data Structure-Array, 1D, 2D arrays, Row/Column major representation, sparse matrix	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8	1. Write a C program to print an array. 2. Write a C program to check whether a given string is Palindrome or not. 3. Write a C program to convert temperature from degree Centigrade to Fahrenheit. 4. Write a C program to sort an array. 5. Write a C program to print the largest and second largest element of the array. 6. Write a C program to display Fibonacci series. 7. Write a program that reads two 2D metrices from the console, verifies if metrics multiplication is possible or not. Then multiplies the metrices and prints the 3rd metrics. 8. Write a program that reads a 2D metrics and checks if the metrics is a symmetric metrics or not. 9. Write a C program to print reverse array 10. Write a C program to check the sum of all elements of an array 11. Write a C program to check duplicate number in an array. 12. Write a C program to read a 2D array (with most of the elements as 0s) and then represent the same array as Sparse Metrics. 13. Write a C program to pass an array to a function using Call by Value, update the array values in the function, print the array elements both in the function and in the calling function. 14. Write a C program to pass an array to a function using Call by Reference, update the array values in the function, print the array elements both in the function and in the calling function. 15. Write a program to display n number of

					elements. Memory should be allocated dynamically using malloc( ). 16. Write a program to display n number of elements. Memory should be allocated dynamically using calloc( ). 17. Write a program to allocate memory using malloc( ) and then reallocate the previously allocated memory using realloc( ). Display the elements which have been taken after reallocation. 18. Write a program to allocate memory using calloc( ) and then reallocate the previously allocated memory using realloc( ). Display the elements which have been taken after reallocation. 19. Write a C program to search an element in an Array using dynamic memory allocation
3	**Linear Data Structure-Linked List**	Linked List-Introduction, Representation, Memory Allocation, Types- Singly, circular, doubly, doubly & circular, Operations on various linked lists-Count, Traverse/Display, Search, Insert, Delete	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8	1. Write a Menu driven C program to accomplish the following functionalities in single linked list. a) Create a single linked list. b) Display the elements of a single linked list. c) Insert a node at the beginning of a single linked list. d) Insert a node at the end of a single linked list. e) Insert a node before a given node of a single linked list. f) Insert a node after a given node of a single linked list. g) Delete a node from the beginning of a single linked list. h) Delete a node from the end of a single linked list. i) Delete a node after a given node of a single

					linked list. j) Delete the entire single linked list. 2. Write a Menu driven C program to accomplish the following functionalities in circular linked list. a) Create a circular linked list. b) Display the elements of a circular linked list. c) Insert a node at the beginning of a circular linked list. d) Insert a node at the end of a circular linked list. e) Delete a node from the beginning of a circular linked list. f) Delete a node from the end of a circular linked list. g) Delete a node after a given node of a circular linked list. h) Delete the entire circular linked list. 3. Write a Menu driven C program to accomplish the following functionalities in doubly linked list. a) Create a doubly linked list. b) Display the elements of a doubly linked list. c) Insert a node at the beginning of a doubly linked list. d) Insert a node at the end of a doubly linked list. e) Insert a node before a given node of a doubly linked list. f) Insert a node after a given node of a doubly linked list. g) Delete a node from the beginning of a doubly linked list.

					h) Delete a node from the end of a doubly linked list. i) Delete a node after a given node of a doubly linked list. j) Delete the entire doubly linked list. 4. Write a Menu driven C program to accomplish the following functionalities in circular doubly linked list. a) Create a circular doubly linked list. b) Display the elements of a circular doubly linked list. c) Insert a node at the beginning of a circular doubly linked list. d) Insert a node at the end of a circular doubly linked list. e) Delete a node from the beginning of a circular doubly linked list. f) Delete a node from the end of a circular doubly linked list. g) Delete a node after a given node of a circular doubly linked list. h) Delete the entire circular doubly linked list.
4	**Linear Data Structure-Stack**	Introduction, Stack Operations – Push, Pop, Peek, Representation of Stack (Array, Linked List), Application of Stack: Reversing a list, Parentheses checker, Conversion of an infix expression into a postfix expression, Evaluation of a postfix expression, Conversion of an infix expression into a prefix Expression, Evaluation of a	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf	7	1. Write a Menu driven C program to accomplish the following functionalities in Stack using an Array: a. Insert an element into the stack using an array (Push Operation). b. Delete an element from the stack using an array (Pop Operation). c. Return the value of the topmost element of the stack (without deleting it from the stack) using an array. d. Display the elements of a stack using an array.

		prefix expression, Recursion, Tower of Hanoi	***Industry Mapping:*** The concepts delivered are in sync with the industry standards		2. Write a Menu driven C program to accomplish the following functionalities in Stack using Linked List: a. Insert an element into the stack using a Linked List (Push Operation). b. Delete an element from the stack using a Linked List (Pop Operation). c. Return the value of the topmost element of the stack (without deleting it from the stack) using a Linked List. d. Display the elements of the stack using a Linked List. 3. Write a program to convert an infix expression into its equivalent postfix notation. 4. Write a program to convert an infix expression into its equivalent prefix notation. 5. Write a program to evaluate a postfix expression. 6. Write a program to evaluate a prefix expression. 7. Write a program to print the Fibonacci series using recursion. 8. Write a program to solve the tower of Hanoi problem using recursion
5	**Linear Data Structure-Queue**	Introduction, Queue Operations – Enqueue, Dequeue, Peep, Representation of Queue (Array, Linked List), Types of Queues-Circular Queue, Deque, Priority Queue, Multiple Queue; Various operations (Enqueue, Dequeue, Peep) on the above mentioned queues-Both iterative & recursive implementation; Application of Queue	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The concepts delivered are in	7	1. Write a Menu driven C program to accomplish the following functionalities in Queue using an Array: a. Insert an element into the queue using an array (Enqueue Operation). b. Delete an element from the queue using an array (Dequeue Operation). c. Return the value of the FRONT element of the queue (without deleting it from the queue) using an array (Peep operation) d. Display the elements of a queue using an array.

			sync with the industry standards		2. Write a Menu driven C program to accomplish the following functionalities in Queue using Linked List: a. Insert an element into the queue using a Linked List (Enqueue Operation). b. Delete an element from the queue using a Linked List (Dequeue Operation). c. Return the value of the FRONT element of the queue (without deleting it from the queue) using a Linked List (Peep operation). d. Display the elements of a queue using a Linked List. 3. Write a Menu driven C program to accomplish the following functionalities in Circular Queue using Array: a. Insert an element into the circular queue. b. Delete an element from the circular queue. c. Return the value of the FRONT element of the circular queue (without deleting it from the queue). Display the elements of a circular queue using the circular queue
6	**Searching & Sorting**	Searching- Types of Searching (Linear Search, Binary Search, Interpolation Search), Comparison among various Searching techniques Sorting-Types, Methods (Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort), Technique, Explanation, Algorithm and Examples on various sorting methods, Comparison of various sorting	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The	6	1. Write a C program to implement the concept of Bubble sort. 2. Write a C program to implement the concept of Selection sort. 3. Write a C program to implement the concept of Insertion sort. 4. Write a C program to implement the concept of Quick sort. 5. Write a C program to implement the concept of Merge sort. 6. Write a C program to show that Quick sort is better than Bubble sort.

		algorithms in terms of time complexity (Average case, Worst case)	concepts delivered are in sync with the industry standards		7. Write a C program to show that merge sort is more effective than quick sort. 8. Write a C program to search an element in an array using linear search. 9. Write a C program to search an element in an array using binary search. 10. Write a C program to search an element in an array using interpolation search.

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Reema Thareja	Data Structure Using C	2nd Ed	Oxford
Reference Books:			
Tenenbaum	Data Structure Using C & C++	2nd Ed	PEI
Kruse, Tondo & Leung	Data Structures & Program Design in C	2nd Ed	PHI
Loudan	Mastering Algorithms With C		SPD/O'REILLY
Radhaganesan	C and Data Structures		Scitech Publications

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
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Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: Business English and Communication **Credit: 3**

Subject Code: MCA105 **Lecture Hours: 33**

Name of the Course: Business English and Communication	
Course Code: MCA105	**Semester: 1**
Duration: 33	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	

Aim:	
Sl. No.	
1	Making the students industry-ready.
2	Making the students relevant in the contemporary society.
3	Making the students prepared to analyze and solve problems through listening, speaking, reading and writing skills.
Objective:	
Sl. No.	
1	To develop effective business writing and communication skills.
2	To enhance oral communication and presentation abilities among students.
3	To help students learn to prepare various business documents and technical reports.
4	To improve listening and reading comprehension.
Pre-Requisite:	
Sl. No.	
1.	Basic English Proficiency, Listening and Speaking Skills, Reading and Writing Skills, Academic and Social Contexts, and Familiarity with Corporate Ethics.
Course Outcome:	
1.	Achieve competence in grammar, syntax, and vocabulary fundamentals.
2.	Effectively communicate in academic and social contexts.
3.	Develop readiness for the industry and understand corporate ethics.
4.	Acquire basic proficiency in English encompassing reading, listening, comprehension, writing, and speaking skills.
Relevant Links:	
Study Material	NPTEL Coursera Linkedin Learning

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	2	-	1	2	3	-	3	3	-	-
CO2	3	3	-	2	-	3	1	2	3	3	-	3	3	-	-
CO3	2	3	-	2	-	3	1	3	2	3	-	3	3	-	-
CO4	3	3	-	2	-	2	-	2	2	3	-	3	3	-	-

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Introduction to Business Communication.**	- Importance of effective communication in business. - Types of business communication: Internal and External. - Communication process and barriers. - Strategies for effective communication. - Traditional and digital communication channels. - Effective use of email, memos, and business letters. - Communication through social media and professional networks.	International academia: https://www.coursera.org/learn/understanding-corporate-communications	4

2	**Writing Skills Development**	- Formats and styles of business letters. - Writing formal and informal business letters. - Common types of business letters: Inquiry, Complaint, Application, and Appreciation. - Structure of technical reports. - Writing abstracts, executive summaries, and conclusions. - Incorporating visuals and data in reports.	International Academia: https://ocw.mit.edu/courses /21g-222-expository- writing-for-bilingual- students-fall-2002/	8
3	**Oral Communication Skills**	- Preparing and delivering business presentations. - Using multimedia in presentations. - Techniques for effective public speaking. - Prepared speech exercises. - Extempore speech practice. - Role-playing business scenarios.	International Academia: https://ocw.mit.edu/courses /21g-222-expository- writing-for-bilingual-students-fall-2002/ Stanford Courses Online: https://online.stanford.edu/courses/csp-xcom88-high-impact-communication-advance-your-technology-career https://online.stanford.edu/courses/gsb-x0011-sharpen-your-communication-skills *Industry Mapping:* Campus Interviews and Recruitment Drives. Software: Orell Talk https://orelltalk.co m/	8
4	**Listening and Reading Skills**	- Importance of active listening in business. - Techniques for improving listening skills. - Listening comprehension exercises. - Developing reading comprehension. - Strategies for effective reading. - Comprehension tests and exercises.	International Academia: https://ocw.mit.edu/courses /21g-222-expository- writing-for-bilingual-students-fall-2002/ Stanford Courses Online:	

			https://online.stanford.edu/courses/csp-xcom88-high-impact-communication-advance-your-technology-career https://online.stanford.edu/courses/gsb-x0011-sharpen-your-communication-skills *Industry Mapping:* • Campus Interviews and recruitment drives. • Software: Orell Talk https://orelltalk.co m/	
5	**Practical Communication Applications**	- Principles of organizing written material. - Structuring content for clarity and impact. - Editing and proofreading techniques - Designing effective posters for business presentations. - Visual and textual balance. - Presenting posters in professional settings.	*International Academia*: https://ocw.mit.edu/courses /21g-222-expository- writing-for-bilingual-students-fall-2002/ *Industry Mapping:* • Email writing and writing other relevant corporate documents. Software: Orell Talk https://orelltalk.co m/	7

6	**Practical Communication Skill Development**	- Interactive sessions on negotiation and persuasion. - Group discussions and teamwork exercises	International academia: *https://ocw.mit.edu/courses/15-280-communication-for-managers-fall-2016/* *Industry Mapping:* • Campus Interviews and recruitment drives.	6

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
R C Sharma and Krishna Mohan	Business Correspondence & Report Writing	ISBN 978-9385965050 (5th ed)	McGraw Hill Education
Reference Books:			
Matthukutty Monippally	Business Communication Strategies	ISBN 978-0070435773	McGraw Hill Education
K.R. Lakshminarayanan	English for Technical Communication	Volume 1 & 2 Combined Edition	SCITECH PUBLICATIONS (INDIA) PVT LTD
Asha Kaul	Business Communication	Second Edition	PHI Learning
Dr. Anjali Ghanekar	Communication Skills for Effective Management	ISBN 978-8186314500 (19th ed)	Everest Publishing House

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University of Engineering & Management, Jaipur
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Subject Name: Mental Maths for Professionals **Credit: 0.5**

Subject Code: MCA(GS)101 **Lecture Hours: 48**

Module number	Topic	Sub-topics	Mapping with International/National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	**Quantitative Aptitude**	**Textbook: Quantitative Aptitude, Author: R.S Aggarwal, Publisher: S.Chand** **A. Quant Foundation** **1.Number System(Chapter 1)** **2. HCF and LCM (Chapter 2)** **3. Decimal Fractions (Chapter 3)** **4. Simplification (Chapter 4)** **5. Square roots and cube roots (Chapter 5)** **6. Percentage**	***International Exams*** ***1. GRE (https://www.ets.org/gre/test-takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)*** ***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/defau***	24	1. Assignment on Numerical Problem Solving using Vedic Mathematics principle. 2. Assignment on Numerical Problem-Solving using percentage to fraction relation.

		(Chapter 11)- Basic concept of percentage & its shortcut rules & their applications. 7. **Ratio and Proportion (Chapter 13)-** Basic concept of Ratio & Proportion, Shortcut tricks & their applications. 8. **Partnership (Chapter 14)** concept, rules & Applications, Percentage Advanced problems & shortcuts. **Profit & Loss (Chapter 12)-** Basic concept, formulae, shortcut tricks & their application.	*lt/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21* *3. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22* *4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** *1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* *2. Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1*		
2	**Logical Reasoning**	**Textbook: Modern Approach to Verbal and Non-Verbal**	***International Exams*** *1. GRE (https://www.ets.org/gre/test-*	24	1. Assignment on Letter Coding, Number Coding, Conditional Coding and Chinese Pattern. 2. Assignment on Directions and Distance

		Reasoning, Author Dr. R.S Aggarwal, Publisher: S.Chand **1. Coding and Decoding (Chapter 4)** i. Conditional Coding, ii. Word-Pattern Coding, iii. Chinese Coding, **2. Direction Sense Test(Chapter 8)** i. Direction Sense Test, ii. Direction Distance Test, iii. Shadow based Questions. 3. **Series Completion** (Chapter 1) i. Alphabet Series, ii. Random Series, iii. Number Series, iv. Letter Gap, v. Missing Number Series, vi. Series Completion 4. **Blood Relations** (Chapter 5) –	***takers/general-test/prepare/content/verbal-reasoning.html#accordion-9f58105fc6-item-88093eca37)*** ***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22*** ***4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***State Level Exams:*** 1. ***Civil Services Executive Exam (WBCS)***		3. Assignment on Indicating based Blood Relation, Coding based Blood Relation and Family Tree based Blood Relation

		i. Family Tree Questions ii. Indication Type BR, iii. Coding Blood Relations, iv. Miscellaneous Blood Relations.	***(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1*** ***Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg 1***		

Learning Resources: Text

Book

1. Quantitative Aptitude- R.S Agarwal
2. Verbal & non-verbal reasoning- R.S Agarwal

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: Competitive Aptitude Training - I **Credit: 0.5**

Subject Code: MCA(GS)181 **Lecture Hours: 24**

Module number	Topic	Sub- topics	Mapping with International/National/State Level Exams	Lecture Hours	Corresponding Assignment
1	**Verbal English-1:**	**Textbook:** Objective General English **Author:** R.S Agarwal **Publishing house:** S.Chand 1) Introduction of Parts of speech: Introduction, Brief discussion of Parts of speech 2) What is noun, Kinds of Noun, Rules & Application. 3) Definition of Pronoun, Examples, Rules & Application 4) Definition of Subject Verb Agreement,Rules and Examples. 5) Basic Application of Vocabulary (Synonyms and	***3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4EB1C2CE473396B4FD7E5F69CDDE.PDF), pg 22-23*** ***4. IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7.*** ***5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22***	**12**	**Parts of Speech** 1. **Identify Parts of Speech**: o Provide a paragraph and ask students to identify and label each word's part of speech (noun, verb, adjective, adverb, pronoun, preposition, conjunction, interjection). 2. **Parts of Speech Matching**: o Create a list of words and a list of parts of speech. Ask students to matcheach word to the correct part of speech. 3. **Parts of Speech Sentences**: Ask students to write

		Antonyms) Reading Comprehension, 7) Official Letter Writing	***6. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***7. XAT (https://xat.org.in/xat-syllabus/)*** ***8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/)*** ***9. CAT https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1*** ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Downlo***		sentences using specific parts of speech (e.g., write a sentence with at least one noun, one verb, one adjective, and one adverb). **Nouns** 1. **Noun Identification**: o Provide a list of sentences and ask students to underline or highlight the nouns. 2. **Types of Nouns**: o Provide examples of common, proper, abstract, and collective nouns. Ask students to classify given nouns into these categories. 3. **Noun Plurals**: o Give a list of singular nouns and ask students to write their plural forms. **Pronouns** 1. **Pronoun Replacement**: o Provide sentences with nouns and ask students to replace the nouns with appropriate pronouns. 2. **Pronoun Agreement**: o Create sentences with

					pronouns and ask students to correct any errors in pronoun-antecedent agreement. 3. **Types of Pronouns**: Provide a list of pronouns and ask students to classify them intocategories (personal, possessive, reflexive,demonstrative, interrogative, relative, indefinite). **Synonyms** 1. **Synonym Matching**: o Provide a list of words and a list of synonyms. Ask students to match each word with its synonym. 2. **Synonym Sentences**: o Give sentences with underlined words and ask students to rewrite the sentences using synonyms for the underlined words. 3. **Synonym Stories**: o Ask students to write a short story using a list of provided words and their synonyms. **Antonyms** 1. **Antonym Matching**:

					○ Provide a list of words and a list of antonyms. Ask students to match each word with its antonym. 2. **Antonym Sentences**: ○ Give sentences with underlined words and ask students to rewrite the sentences using antonyms for the underlined words. 3. **Antonym Pairs**: ○ Ask students to create a list of ten words and write their antonyms next to them.
2	**Data Interpretation level-I**	Textbook: Table Data12.Interpretation	***National Exams:*** ***1.UPSC Civil Services Exam*** (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf , pg 20-21)*** ***3. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/Uploa***	**12**	• **Calculating Totals and Averages**: a. Provide a table with sales data over several months. Ask students to calculate the total sales and average sales for each month. • **Comparing Data**: b. Provide a table with data on two or more products or categories. Ask students to compare the data and determine which product/category performed better based on different criteria (e.g., sales, growth rate).

			dedFiles/notice_CGLE_03042023.pdf) pg. 20-22 *4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf* ***State Level Exams:*** ***1.Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1*** ***2.* Miscellaneous Services Recruitment Examination (*file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1***		

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Syllabus for MCA Admission Batch 2026, 1st Semester

Subject Name: RESEARCH METHODOLOGY AND IPR **Credit: 02**

Subject Code: MCA171 **Lecture Hours: 36 Hrs.**

Name of the Course: **RESEARCH METHODOLOGY AND IPR**	
Course Code: MCA171	**Semester: FIRST**
Duration: 36	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 1	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 2	
Aim:	
Sl. No.	
1	To develop comprehensive understanding of research methodologies and systematic approaches to academic inquiry
2	To foster awareness of intellectual property rights and their application in research and development
3	To equip students with practical skills for conducting ethical and legally compliant research

Objective:	
Sl. No.	
1	To enable students to formulate well-defined research problems and design appropriate research frameworks
2	To provide knowledge of various data collection methods and their appropriate application in different research contexts
3	To develop competency in data analysis techniques and interpretation of research findings
4	To instill understanding of IPR principles, patent processes, and research ethics in academic and industrial settings
Pre-Requisite: Basic understanding of statistics and data interpretation. Familiarity with computer applications and software tools. Foundational knowledge of research concepts and academic writing	
Course Outcome:	
CO1	Formulate and Design research problem
CO2	Understand and Comprehend the Data Collection Methods
CO3	Perform Data analysis and acquire Insights
CO4	Understand IPR and follow research ethics

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	2	1	1	0	2	1	2	1	3	1	1	3
CO2	2	3	1	3	2	1	0	1	1	1	0	2	1	2	2
CO3	2	2	2	3	2	1	0	1	1	2	1	3	2	3	2
CO4	1	1	1	1	0	2	1	3	1	2	1	2	0	0	2

Module number	Topic	Sub-topics	Lecture Hours
I	**Research Design**	Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.	6
II	**Data Collection and Sources**	Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.	6
III	**Data Analysis and Reporting**	Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.	6

IV	**Intellectual Property Rights**	Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Biodiversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.	6
V	**Patents**	Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.	6

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).			
Reference Books:			
1. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007. 2. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007. 3. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.			

University of Engineering and Management

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University of Engineering & Management, Jaipur

3rd Semester Syllabus for MCA Admission Batch 2025

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Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 3rd Semester

Subject Name: Operating System and System Software **Credit: 04**

Subject Code: MCA301 & MCA391 **Lecture Hours: 40 Hrs.**

Name of the Course: Operating System and System Software & Operating Systems Laboratory (Unix)	
Course Code: MCA301 & MCA391	**Semester: 3**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3L	End Semester Exam: 100
Tutorial: 1T	Continuous Assessment: 100
Practical: 2	Practical Sessional Internal continuous evaluation: 100
Credit: 4 +2	Practical Sessional external examination: 100

Aim:	
Sl. No.	
1	To understand the system architecture of an operating system
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.
Objective:	
Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system – Operating System.
2	To understand the workings of an operating system as a resource manager.
3	To familiarize the students with Process and Memory management.
4	To describe the problem of process synchronization and its solution.
Pre-Requisite:	
Sl. No.	
1.	You should know about Computer Architecture and Organization.
2	Proficiency in C or another programming language.
3	Familiarity with Assembly language.

Course Outcome:	
1.	Understand Operating System Concepts: Gain knowledge about operating system functions, generations, processes, and threads.
2.	Develop Process Scheduling Algorithms: Create algorithms for process scheduling, considering CPU utilization, throughput, turnaround time, waiting time, and response time.
3.	Identify the deadlock situation and provide an appropriate solution so that the protection and security of the operating system are also maintained.
4.	Learn File Handling and Process Control: Understand the basics of File, Device, and Disk Storage Management
Relevant Links:	
OS Study Material	OS NPTEL LINK OS Coursera Link OS LinkedIn Learning Link

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	1	2	1	0	0	1	1	0	3	2	0	1
CO2	3	3	3	2	2	1	0	0	1	1	0	2	3	1	1
CO3	3	3	2	2	2	2	1	2	1	1	0	2	3	1	1
CO4	3	2	3	1	2	1	0	0	1	1	0	3	3	0	1

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction**	1. Introduction to Operating Systems 2. Hardware Support for Operating Systems 3. Resource Management 4. Operating System Architectures	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	• Basic Unix Commands
2	**Process Management**	5. Fundamentals of Process Management 6. Process Scheduling 7. Process Communication and Synchronization 8. Deadlocks 9. Multi-threading	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8	• C Programs for Process Scheduling • Implementation of Banker's Algorithm

3	**Memory Management**	10. Basic Memory Management 11. Virtual Memory	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8	• C programs to simulate contiguous memory allocation techniques • C programs to simulate the paging technique
4	**File Management**	12. File Systems 13. File System Implementation	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	7	• Unix commands on file operations • C program for file organization technique.

5	**Input –Output Management**	14. Basics of I/O Management 15. Disk Management	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	7	• C programs to simulate disk scheduling algorithms
6	**Security and Protection** **Advanced Operating System**	16. Security Issues 17. Protection Mechanisms 18. Distributed Operating Systems	***International Academia:*** CS 372 Operating Systems Syllabus (utexas.edu); CS 140: Operating Systems (stanford.edu) ***AICTE-prescribed syllabus:*** mcadegree.pdf (aicte-india.org) ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	6	• Advanced Unix commands

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Naresh Chauhan	Principles of Operating Systems (Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18)	1st Ed/ 9780198082873	Oxford University Press
Reference Books:			
Abraham Silberschatz, Peter B. Galvin	Operating System Concept	9th Ed/ 9788126554270	WILEY
Andrew S. Tanenbaum	Modern Operating Systems	4th Ed/ 9789332575776	Pearson Education India
William Stallings	Operating Systems	9th Ed/ 9789352866717	Pearson Education
Sumitabha Das	UNIX: Concepts and Applications (Lab Reference)	4th Ed/ 9780070635463	McGraw Hill Education

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 3rd Semester

Subject Name: Software Engineering & TQM **Credit: 04**

Subject Code: MCA304, MCA394 **Lecture Hours: 40 Hrs.**

Name of the Course: Software Engineering & TQM	
Course Code:	**Semester: 3rd**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Practical: 2	Practical Sessional internal continuous evaluation: 100
Credit: 4+2	Practical Sessional external examination: 100

Aim:	
Sl. No.	
1	To gain knowledge of various aspects of software engineering project management.
2	To enhance ability to identify qualities of a good solution
3	To implement learned algorithm/design techniques to solve problems
Objective:	
Sl. No.	
1	The fundamental knowledge of software engineering
2	The different basic models need to implement different project problems
3	The various design methods to develop the software system
4	The quality and other issues related to the software products and systems
Pre-Requisite:	
Sl. No.	
1.	Knowledge in fundamental theories of computer science and one programming language
Course Outcome:	
1.	On completion of this course students are expected to learn fundamentals and different models of software engineering.
2.	On completion of this course students are expected to learn different aspects of requirement analysis in software project management.
3.	On completion of this course students are expected to learn various types of software design and concepts of coding.
4.	On completion of this course students are expected to learn different types of testing and quality issues.
Relevant Links:	
SE Study Material	SE NPTEL LINK SE Coursera Link SE LinkedIn Learning Link

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		2	1	1		1							
CO2	1	3	2	1	1		1								
CO3		1	2	2	1	1		1							
CO4	1	1	2	1	3		1								

Modulenumber	Topic	Subtopics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction and Software Process Models**	Software, Software Engineering, Myths, Software Process, Work Products, Importance of Software Engineering, Standard for Software Process, Waterfall Model, Prototyping Model, Iterative Enhancement Model, Spiral Model, RAD model.	***International Academia:*** (https://ocw.mit.edu/courses/16-355j-software-engineering-concepts- fall-2005/pages/lecture- notes/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/CS%20%28AI&ML%29.pdf) ***Industry Mapping:*** IEEE SRS standard, Rational Rose, Reqview,	8	1. Make a comparative studies of different models of software development process.

			Jira software,Axosoft.		
2	**Requirement Engineering and Software Project Management**	Software Requirements, Types of Requirements, Requirement Engineering Cycle, Requirements Specification document, Characteristics of Requirements, Requirement verification and validation, Role of Management in Software Development, Project Estimation Techniques, Staffing, Scheduling, Earned Value Analysis, Software Risks, Software Configuration Management, Software Process and Project metrics.	**International Standards** https://ocw.mit.edu/courses/16-355j-software-engineering-concepts- fall-2005/pages/lecture- notes/) ***AICTE prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/CS%20%28AI&ML%29.pdf) ***Industry Mapping:*** MS project, ProjectLibre, FunctionPointmodeler.	12	1. Write an SRS. 2. Compute function points using the method of FPA to determine the cost of s/w project 3. Implement COCOMO using the different formulas 4. Implement Gantt Chart and determine milestones 5. Implement PERT-CPM method

3	**Software Design and Coding**	Process, Data and Behavioural Modelling, Design Concepts, Modularity, Architectural design, Coupling and Cohesion, Top-down and bottom-up design, Object- oriented Analysis, Function- oriented and Object-Oriented Design approach, Software Design Document, Coding styles and documentation,	***International Standards*** : (https://ocw.mit.edu/courses/16-355j-software-engineering-concepts-fall-2005/pages/lecture-notes/) ***AICTE prescribed syllabus:*** *(*https://www.aicte-india.org/sites/default/files/Model_Curriculum/CS%20%28AI&ML%29.pdf) ***Industry Mapping:*** IEEE SDD document.Smart draw, Visual Paradigm/Microsoft Visio/MS Project/Umbrello/R ational Rose.	8	1. Implement the Cyclomatic Complexity of coding 2. Implement and evaluate the Halstead's Metrics of Coding 3. 3. Implement Dharma's metrics 4. Implement polymorphism factor formula. 5. Implement inheritance formula
4	**Testing and Software Quality**	Testing principles, testing strategies, Black-box and White- box Testing Techniques, Levels of testing -unit, integration, system, regression, Test Plan, Test Cases Specification, Software debugging, Software Maintenance, Software Quality Factors, ISO , SEI CMM, CMMI, Software Reliability, Software Availability.	***International Standards:*** (https://ocw.mit.edu/courses/6-170-laboratory-in-software-engineering-fall-2005/pages/assignments/) ***AICTE prescribed syllabus:*** (https://www.aicte-india.org/sites/default/files/Model_Curriculum/CS%20%28AI&ML%29.pdf) ***Industry Mapping:*** Eclipse, Bugzilla, MantisBT, Jira Software.	12	1. Implement H-K information factor. 2. Implement EMV method 6.

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Rajib Mall	Fundamentals of Software Engineering(Chapter No. 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12)	4th edn	PHI
Reference Books:			
Roger S. Pressman	Software Engineering, A Practitioners Approach(Chapter No. 8, 10, 14, 16, 26, 28)	7th edn	MGH

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 3rd Semester

Subject Name: Artificial Intelligence and Machine Learning **Credit: 04**

Subject Code: MCA305 & MCA395 **Lecture Hours: 40 Hrs.**

Name of the Course: Artificial Intelligence and Machine Learning	
Course Code: MCA305 & MCA395	**Semester: 3rd**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam:100
Tutorial: 1	Continuous Assessment:100
Practical: 2	Practical Sessional internal continuous evaluation:100
Credit:4+3	Practical Sessional external examination:100

Aim:	
Sl. No.	
1	To gain knowledge of various aspects of artificial intelligence
2	To enhance the ability to identify qualities of a good solution of AI, ML etc.
3	To implement learned analytical techniques and AI & ML to solve problems.

Objective:	
Sl. No.	
1	Provide you with the knowledge and expertise to become a machine learning expert.
2	Demonstrate an understanding of intelligence and machine learning concepts that are vital for real-life problems.
3	Produce Python code to analyze different problems.
4	Critically evaluate intelligent problems based on their design, development and use in real-time.
Pre-Requisite:	
Sl.No.	
1.	Proficiency in Mathematics, Algorithms and Programming related to AI, ML etc.
Course Outcome:	
CO1.	Explain how knowledge is collected, created and managed for intelligence.
CO2.	Understand the key concepts in AI including their real-world applications and the toolkit used by intelligent systems.
CO3.	Implement AI & ML techniques using knowledge and toolkits.
CO4.	To enable systems to solve complex problems and automate decision-making processes.
Relevant Links:	
AIML Study Material	AIML NPTEL LINK AIML Coursera Link AIML LinkedIn Learning Link

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		2	1	1		1	-	-	-	-	-	-	-
CO2	1	3	2	1	1		1		-	-	-	-	-	-	-

CO3		1	2	2	1	1		1	-	-	-	-	-	-	-
CO4	1	1	2	1	3		1		-	-	-	-	-	-	-

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Module I: Introduction to AI(2L)**	Overview of Artificial Intelligence – Introduction–History of AI– Applications of Al– Objectives of Al- features of AI	***International Academia:*** https://ocw.mit.edu/courses/res-str-002-data-management-spring-2016/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	1. Write a program for displaying reversal of a number. 2. Implement python script to read person's age from keyboard and display whether he is eligible for voting or not. 3. Implement python script to check the given year is leap year or not. 4. Implement Python Script to generate prime numbers series up to n 5. To display elements of list in reverse order. 6. Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.

					7. Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between 1000 and 2000. 8. Implement a python script for factorial of number by using recursion.
2	**Module II: Symbolic Logic(6L)**	Normal Forms in Propositional Logic – Logical Consequences – Resolution Principal – Predicate Calculus – Well Formed Formulas – Clausal Form – Rules of Inference – Unification – Resolution	***International Academia:*** https://ocw.mit.edu/courses/15-062-data-mining-spring-2003/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	1. Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program: 34, 67, 55, 33, 12, 98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12', '98'). 2. Write Python script to copy file contents from one file to another. 3. Implement a python script to check the element is in the list or not by using Linear search & Binary search.

					4. Implement a python script to arrange the elements in sorted order using Bubble, Selection, Insertion and Merge sorting techniques. 5. Write a python program by using exception handling mechanism. 6. Write a python program to perform various database operations (create, insert, delete, update).
3	**Module III: Search Techniques (6L)**	Different types of search techniques and comparison among them	***International Academia:*** https://ocw.mit.edu/courses/15-071-the-analytics-edge-spring-2017/pages/visualization/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	6	1. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data. 2. Write a program to demonstrate Regression analysis with residual plots on a given data set.

4	**Module IV: Knowledge Representation (8L)**	Procedural verses declarative knowledge, forward verses backward reasoning, Structured Knowledge: Graphs, Frames, and Related Structures, Object-Oriented Representations, Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics	***International Academia:*** **https://prolearn.mit.edu/data-science-and-big-data-analytics-making-data-driven-decisions** ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	1.Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data. 2. Write a program to demonstrate Regression analysis with residual plots on a given data set.
5	**Module V: Expert systems(2L)**	Characteristic features of expert systems Applications, importance of expert systems Rule based system architectures (the knowledge base, the inference process, explaining how or why, building a knowledge base, the I/O interface)	***International Academia:*** ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	

6	**Module VI: Machine Learning (10L)**	Computational learning tasks for predictions, learning as function approximation, generalization concept. - Linear models and Nearest-Neighbors (learning algorithms and properties, regularization). - Neural Networks (MLP and deep models, SOM). - Probabilistic graphical models. - Principles of learning processes: elements of statistical learning theory, model validation. - Support Vector Machines and kernel-based models. To implement linear regression, Data classification, Data clustering – To learn how to create segments based on similarities using K-Means and Hierarchical clustering	***International Academia:*** **https://professionalprograms.mit.edu/online-program-internet-of-things/** ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	1. Write a program to demonstrate the working of the decision tree-based ID3 algorithm. 2. Write a program to implement the Naïve Bayesian classifier for a sample training data set stored as a .CSV file. 3. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. 4. Write a program to implement k-Means clustering algorithm to cluster the set of data stored in .CSV file
7.	**Module VII: Introduction to Robotics(4L)**	Definitions, illustration of application domains -Mechanics and kinematics of the robot-Sensors for robotics -Robot Control-Architectures for controlling behavior in robots-Robotic Navigation-Tactile Perception in humans and robots-Vision in humans and robots.	***International Academia:*** https://ocw.mit.edu/courses/6-034-artificial-intelligence-fall-2010/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4	Python lab for text analysis 1. Choose some book-length document and download it. 2. Count its characters, lines and words. 3. Count sentences, vocabulary, and the like. 4. Show collocations, common context, concordance, and similar relationships among the words. 5. Plot a lexical dispersion or two. 6. Plot a frequency distribution of the most common words.

List of Books Text Book			
Name of Author	**Title of the Book**	**Edition**	**Name of the Publisher**
Rich, Knight	Artificial Intelligence	3rd edn	PHI
Patterson	Introduction to Artificial Intelligence and Expert Systems	2nd edn	Pearson
Akerkar	Introduction to Artificial Intelligence	2nd edn	PHI
Alpaydin	Introduction to Machine Learning	3rd edn	PHI

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 3rd Semester

Subject Name: Statistics and Numerical Techniques **Credit: 04**

Subject Code: MCA307 **Lecture Hours: 48 Hrs.**

Name of the Course: Statistics and Numerical Techniques	
Course Code: MCA307	**Semester: 3rd**
Duration: One Semester	**Maximum Marks: 100**
Teaching Scheme: Lecture method	**Examination Scheme**
Theory: 03 L	End Semester Exam: 100
Tutorial: 01 L	Continuous Assessment: 100
Credit: 4	
Aim:	
Sl. No.	
1	Equip students with the skills to collect, organize, and summarize data effectively, enabling them to understand the fundamentals of descriptive and inferential statistics.
2	Provide students with the knowledge of numerical techniques for solving complex mathematical problems, fostering proficiency in methods such as root finding, interpolation, and numerical integration.
3	Enable students to apply statistical and numerical methods to real-world scenarios across various disciplines,

	promoting critical thinking, problem-solving, and ethical data practices.

Objective:	
Sl. No.	
1	Develop students' understanding of different data types and the ability to collect, organize, and summarize data effectively, using descriptive statistics techniques.
2	Enable students to grasp the principles of statistical inference, including hypothesis testing, confidence intervals, and regression analysis, to draw meaningful conclusions from sample data about populations.
3	Equip students with proficiency in numerical techniques such as root finding, interpolation, and numerical integration, enabling them to solve complex mathematical problems encountered in various disciplines.
4	Foster the application of statistical and numerical methods in practical scenarios across diverse fields, through case studies and hands-on exercises, promoting critical thinking, problem-solving, and ethical data practices.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of senior secondary and under graduate levels mathematics.
Course Outcome:	
1.	Upon completion of the course, students will demonstrate proficiency in collecting, analyzing, and interpreting data using appropriate statistical techniques, enhancing their ability to make informed decisions based on empirical evidence.
2.	Students will be able to apply numerical techniques like interpolation and numerical integration to solve complex mathematical problems encountered in engineering, science, and other disciplines, effectively utilizing computational tools to address real-world challenges.
3.	Students will be able to apply numerical techniques like solution of equation and system of linear equations to solve complex mathematical problems.
4.	At the end of the course, students will be able to apply numerical methods like numerical solution of ODE to solve complex mathematical problems encountered in engineering, science, and other disciplines to address day-

	to-day life critical problems.
Relevant Links:	
Study Material	NPTEL LINK	Coursera Link	LinkedIn Learning Link

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	2	-	-	-	-	-	-	-			
CO2	3	2	-	2	3	-	-	-	-	-	-	-			
CO3	3	3	-	2	3	-	-	-	-	-	-	-			
CO4	3	3	-	2	3	-	-	-	-	-	-	-			

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Statistics, Probability and Distribution	Statistics - measure of central tendency, dispersion (Moments, Skewness & Kurtosis). Least square curve fitting - linear & non-linear. Probability, introduction to mass function, density function, distribution function (Binomial, Poisson, Normal), estimation of parameters (unbiasedness-concept of noise/error, consistency).	**Industry Mapping:** https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/18-440-probability-and-random-variables-spring-2014/pages/lecture-notes/ , https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	16
2	Interpolation and Numerical Integration	Interpolation-Newton's Forward, Backward, Sterling & Bessel's Interpolation formulae, Lagrange's Interpolation. Inverse Interpolation. Integration - Trapezoidal, Simpson's 1/3rd, Weddle's Rule, Romberg Integration, Gauss- Legendre two & three points formula, Newton Cotes Formula.	**Industry Mapping:** https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	12
3		Solution of any equation - Method of Iteration, Method of Bisection, Newton-Raphson Method, Regula-Falsi method and Secant Method. Solution of system of linear equations - Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel, LU factorization and	**Industry Mapping:** https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-	12

		Tri-diagonalization.	engineering-13-002j-spring-2005/pages/lecture-notes/	
4		Solution of differential equations - Picard's method, Euler-modified method, Taylor's Series method, Runge-Kutta method, Milne's Predictor-Corrector method.	**Industry Mapping:** https://www.sagemath.org/ , MATLAB **International Academia:** https://ocw.mit.edu/courses/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/pages/lecture-notes/	8

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
B. S. Grewal	Higher Engineering Mathematics	44th Edition	Khanna Publishers
Reference Books:			
Dr. Hari Arora	PROBABILITY AND STATISTICS	3rd Edition	S.K. KATARIA & SONS
K. DAS	NUMERICAL METHODS	2nd Edition	U.N.DHUR & SONS PRIVATE LTD.
B.K. PAL & K. DAS	ENGINEERING MATHEMATICS Volume - IIA	1st Edition (2021)	U.N.DHUR & SONS PRIVATE LTD.
Madhumangal Pal	Numerical Analysis for Scientists and Engineers: Theory and C Programs	1st Edition (2007)	Alpha Science International Ltd

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 3rd Semester

Subject Name: General Studies & Current Affairs - III **Credit: 0.5**

Subject Code: MCA(GS)301 **Lecture Hours: 48 Hrs.**

Module number	Topic	Sub-topics	Mapping with International/National/State Level Exams	Lecture Hours	Corresponding Assignment
1	**GK, Current Affairs and Economics**	**National income-** Concept of GDP, GNP, NNP bothin FC & MP, PCI Tax (**BECC-103, Unit-1,Unit- 2,Unit-3)** http://egyankosh.ac.in//handle/123456789/67653 **NCERT Textbook: (Chapter 2): https://ncert.nic.in/textbook.php?leec1=2-6** Frank, ISC Economics (Chapter-14, 15, 16) https://books.google.co.in/books?id=4lGQISi9G7wC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false **2. Concept of tax,** objective of tax, Direct & Indirect	***International Exams1.GRE (https://www.ets.org/pdfs/gre/gre-math-review.pdf)2.GMAT (https://downloads.mba.com/downloads/gmat-handbook.pdf)*** ***National Exams:*** ***1. UPSC Civil Services Exam*** (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26 ***UPSC Combined DefenceServices (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. RBI Grade B (https://rbidocs.rbi.org.in/rd***	48	1. **National Income**: Write a report on the challenges and limitations in measuring national income, such as the informal sector, data collection issues, and non-markettransactions. **2. Concept of Tax-** Write a report on the difference between tax evasion and tax avoidance. Discuss the measures taken by the Indian government to combat tax evasion and promote tax compliance. **3. Inflation & Deflation** Write a report on the causes of

		Tax, Progressive, Regressive & Proportional tax**.** 3. **Textbook: Principles of Microeconomis: N Gregory Mankiew, Chapter 12)** Textbook: FRANKChapter-19 (class - 12) https://books.google.co.in/books?id=4lGQISi9G7wC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false 4. **Inflation & Deflation -** Inflation & its impact, Deflation & its impact, WPI, CPI, GDP deflator. **(BECC-106, Block-2, Unit-6)** http://egyankosh.ac.in//handle/123456789/75067 Textbook: M LJhingan 12th Edition. Macro-Economic Theory, Part-5,Chapter-37 **Market structure-**Perfect competition, monopoly, oligopoly, duopoly, monophony, duopoly, Oligopoly(BECC-101, Block-4, Unit-9,10,11,12)	***ocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23*** ***4. IBPS Probationary officer(https://www.ibps.in/ wp-content/uploads/Detailed- Advt.-CRP-PO-XII.pdf) ,Pg 7.*** ***5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22*** ***6. Intelligence BureauACIO (https://www.pw.live/exams/ wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023- Notification-Emp-News.pdf)*** ***7. XAT (https://xat.org.in/xat-syllabus/)*** ***8. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/)*** ***9. CAT https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1 State Level Exams:*** ***1. Civil Services Executive Exam (WBCS)***		deflation and its consequences for the economy. **4.Market Structure.** Analyze the impact of different market structures on consumers, focusing on factors like price, quality, and choice. Analyze their effectiveness and impact on the economy. ** All the assignments are in line with entrance exams for premier B-Schools and GS Paper-I of UPSC CSE.

		http://egyankosh.ac.in//handle/123456789/67491 Textbook: FRANKChapter-19 (Class-12) https://books.google.co.in/books?id=4lGQISi9G7wC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false **GK and Current Affairs** –Based on Monthly Magazines provided and recent news of national and international importance. **Newspaper Reading:** The Economic Times.**Traditional GK and CA**:Capitals of countries, the currency of countries, important dates, Sports football, hockey, recent events & awards etc. Important books &authors, ImportantHydropower dams, atomicpower plants, importantnational parks, Minister &portfolio & constituencies,Population census, Personsin news -most famous,popular recent only, Important dances & festivals of Indian states, International Head Quarters & world organization, Important president & pm electedfrom	***(https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1*** **2. Miscellaneous Services Recruitment Examination** ***(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf),pg 1***		

		various countries,Important about banks likepayment banks, smallbanks & license system, Awards, Sports, Books & author, National & International affairs			

References

1. Indian Economy-Ramesh Singh

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 3rd Semester

Subject Name: Sustainability, Climate Action and Environmental Sciences **Credit: 03**

Subject Code: MCA373 **Lecture Hours: 36 Hrs.**

Name of the Course: **SUSTAINABILITY, CLIMATE ACTION AND ENVIRONMENTAL SCIENCES**	
Course Code: MCA373	**Semester: THIRD**
Duration: 36	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 1	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 2	
Aim:	
Sl. No.	
1	Imparting knowledge about the environment and ecosystem around us.
2	Imparting knowledge about the natural resources, biodiversity, and the importance of their conservation
3	**Environmental Management and Pollution Control**

Objective:	
Sl. No.	
1	Students will gain knowledge about the environment and ecosystem.
2	Students will learn about natural resources, biodiversity, and the importance of their conservation
3	**To make students aware of problems of environmental pollution, its impact on humans and the ecosystem, and control measures.**
4	**At the end of the course, students will learn about waste disposal measures and environmental management.**
Pre-Requisite: NA	
Course Outcome:	
1.	**Define Environmental factors and the basic components of the ecosystem.**
2.	**Understand and explain the importance of Plantation.**
3.	**List the pollutants and analyze the importance of reducing/ controlling environmental pollution.**
4.	**Analyze the importance of Biohazards, Environmental and Social fety**
Relevant Links:	
EVS Study Material	EVS NPTEL LINK EVS Coursera Link EVS LinkedIn Learning Link

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	2	1	2	1	2	2	2	3	2	1	2	2
CO2	3	2	3	2	2	3	1	2	2	1	1	1	3	1	3
CO3	2	2	1	3	1	2	3	3	1	1	2	3	3	3	1
CO4	1	3	1	3	3	2	2	3	2	3	2	1	1	1	2

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
I	**Overview**	Basic ideas of environment, basic concepts, man, society & environment, their interrelationship Mathematics of population growth and associated problems, Importance of population study in environmental engineering, the definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development. Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. Importance, scope and principles of EIA.	***International Academia:*** https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** https://cbs.umn.edu/populus/downloadplant(WWTP) .	6
II	**Ecology**	Elements of ecology: System, open system, closed system, the definition of ecology, species, population, community, definition of ecosystem- components types and function. (1L) Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web.(2L) Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. (1L) Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.(2L)	***International Academia:*** ***https://ocw.mit.edu/courses/1-020-ecology-ii-engineering-for-sustainability-spring-2008/*** ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** ***https://vsni.co.uk/solutions/ecology*** ***https://www.helsinki.fi/en/researchgroups/statistical-ecology/software***	6
III	**Air Pollution**	Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause. (1L) Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature	***International Academia:*** https://ocw.mit.edu/courses/1-84j-atmospheric-chemistry-fall-2013/pages/lecture-notes/	6

		model [Earth as a black body, earth as albedo], Problems.(1L) Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its consequence, Control of Global warming. Earth's heat budget.(1L) Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion).(2L) Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model.(2L) Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. (2L) Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green-house gases, effect of ozone modification. (1L) Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference). (1L)	***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** https://www.who.int/europe/tools-and-toolkits/airq---software-tool-for-health-risk-assessment-of-air-pollution	
IV	**Water Pollution**	Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds.DO, 5-day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river [deoxygenating, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Waste water standard [BOD, COD], Water Treatment system,primary and secondary treatments, tertiary treatment definition.Water pollution due to the toxic elements. USEPA and WHO guidelines for drinking water.	***International Academia:*** ***https://online.stanford.edu/courses/cee270m-aquatic-and-organic-chemistry-environmental-engineering*** ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** *Activated Sludge Simulation (ASIM), Sewage Treatment Operation and Analysis Over Time (STOAT), and GPS-X are the common softwares*	6

			used for waste water treatment plant(WWTP).	
V	**Lithosphere**	Lithosphere; Internal structure of earth, rock and soil (1L). Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).(2L)	***International Academia:*** ***https://ocw.mit.edu/courses/1-34-waste-containment-and-remediation-technology-spring-2004/*** ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** ***https://www.wasteworksonline.com/***	6
VI	**Noise pollution**	Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] (1L) Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L10 (18hr Index) ,n Ld.Noise pollution control. (1L)	***International Academia:*** ***No link found*** ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** No software found	3
VII	**Environmental Management**	Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol. (2L)	***International Academia:*** ***https://ocw.mit.edu/courses/11-601-introduction-to-environmental-policy-and-planning-fall-2016/*** ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** ***https://www.intelex.com/products/environment/***	3

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
MP Poonia, SC Sharma, S. Kumar	Environmental Studies (AICTE Textbook)	3rd- 2021/ 978-9390779024	Khanna Book Publishing Co.
Reference Books:			
NA			

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 3rd Semester

Subject Name: Competitive Aptitude Training – III **Credit: 0.5**

Subject Code: MCA(GS)381 **Lecture Hours: 48 Hrs.**

Module number	Topic	Sub- topics	Mapping with International/National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	**Quantitative Aptitude**	**Textbook:** Quantitative Aptitude for Competitive Examination **Author:** R.S Agarwal **Publishing House:** S. Chand 1. Simple & Compound Interest, 2. Number System, 3. Quadratic Equations	***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_0304***	12	**1. Simple & Compound Interest:** • **Simple Interest Applications:** ○ Calculate the total interest and amount payable on a loan with simple interest. ○ Determine the time required to double an investment with simple interest. ○ Compare the simple interest earned on different principal amounts or at different interest rates. • **Compound Interest Applications:** ○ Calculate the compound interest and final amount of an investment over multiple years. ○ Compare the growth of an investment with different compounding frequencies (annual, semi-annual, quarterly,

			2023.pdf) pg. 20-22 *4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** *1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement), pg 1* *2.* **Miscellaneous Services Recruitment Examination** (https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf ***) pg 1***		monthly). o Determine the time required to double or triple an investment with compound interest.
					o Understand the concept of effective annual rate (EAR) and how it relates to nominal interest rates and compounding frequencies. **2. Number System:** • **Divisibility Rules:** o Test the divisibility of numbers by 2, 3, 4, 5, 6, 8, 9, 10, and 11. o Apply divisibility rules to simplify calculations and solve problems. • **Prime and Composite Numbers:** o Identify prime and composite numbers. o Find the prime factorization of composite numbers. o Use prime factorization to find the highest common factor (HCF) and least common multiple (LCM) of numbers. • **Number Properties:** o Understand the concepts of even and odd numbers, natural numbers, whole numbers, integers, rational and irrational numbers. o Solve problems involving the properties of these number types. **3. Quadratic Equations:**

					• **Solving Quadratic Equations:**
					  ○ Solve quadratic equations using factoring, completing the square, and the quadratic formula.
					  ○ Determine the nature of roots (real, equal, imaginary) of a quadratic equation.
					• **Word Problems:**
					  ○ Apply quadratic equations to solve real-world problems, such as finding the dimensions of a rectangle given its area and perimeter, or determining the trajectory of a projectile.
					4. Quadratic Functions and Graphs:
					• Graph quadratic functions andinterpret the graph to find the vertex, axis of symmetry, and intercepts.
					• Use the graph to solve quadratic equations and inequalities.

2	**Logical Reasoning**	**Textbook:** Verbal and Non-Verbal reasoning **Author:** R.S Agarwal **Publishing House:** S. Chand 1. Puzzle a) Classification Based Puzzle b) Sequential Based Puzzle c) Selection Based Puzzle d) Ranking Based Puzzle	***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. Combined Graduate Level conducted by SSC***	12	**1. Classification Based Puzzles:** • **Grouping by Attributes:** Provide a list of items (e.g., animals, fruits, professions) and ask students to classify them into groups based on shared characteristics (e.g., habitat, color, skill set). • **Identifying the Odd One Out:** Present a group of items where one does not belong and have students explain why it is different from the others. • **Missing Item:** Give a set of items with a pattern and have students determine the missing item that fits the pattern.

		e) Blood Relation Based Puzzle Inequality	***(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22*** ***4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***State Level Exams:*** ***1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement), pg 1*** ***2.* Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf) pg1***		**2. Sequential Based Puzzles:** • **Logical Sequencing:** Present a series of events or actions and have students arrange them in a logical order. • **Number Series:** Give a series of numbers with a pattern and ask students to find the missing number or continue the series. • **Letter Series:** Provide a series of letters with a pattern and have students determine the missing letter or continue the series. **3. Selection Based Puzzles:** • **Team Selection:** Provide a set of candidates with different skills and have students select the best team for a specific task. • **Item Selection:** Give a list of items with different attributes and ask students to choose the most suitable item for a given purpose. • **Eligibility Criteria:** Present a set of rules or conditions and have students determine which candidates are eligible or ineligible based on those criteria. **4. Ranking Based Puzzles:** • **Height/Weight Arrangement:** Arrange a group of people in ascending or descending order based on their height or weight. • **Marks/Scores:** Order students or players based on their marks, scores, or performance in a competition. • **Preferences:** Determine the order of

					preference for a group of people based on their likes and dislikes. **5. Blood Relation Based Puzzles:** • **Family Tree:** Present a family tree with missing information and have students deduce the relationships between different members. • **Coded Relationships:** Use codes or symbols to represent relationships and ask students to decode them. **6. Puzzles with Statements:** Give a set of statements about the relationships between people and have students draw afamily tree or answer questions based onthose statements **7. Inequality Puzzles:** • **Coded form of Inequalities** • **Either-Or Case** • **Neither -Nor Case** **Single Statement Inequalities**.
3	**VerbalEnglish**	**Textbook:** Objective General English **Author:** R.S Agarwal **Publishing house:** S. Chand 1. Application of Adjectives and Determiners 2. Conjunction and Connectors 3. Rearrangement of Sentences. 4. Multiple Fillers-Level 1 5. Reading Comprehension 6. Precise Writing Notice Writing	***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. Combined Graduate Level conducted by SSC***	12	**1. Application of Adjectives and Determiners:** • Identification of Errors • Comparative and Superlative Forms • Types of Adjectives • Determiners in Context **2. Conjunctions and Connectors:** • Sentence Combining • Coordinating vs. Subordinating Conjunctions • Transition Words and Phrases • Connectors for Cause and Effect **3. Rearrangement of Sentences:**

			(https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22 *4. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)* ***State Level Exams:*** *1. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1* **Miscellaneous Services Recruitment Examination** (https://adda247jobs-wp- assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf) *pg 1*		• Jumbled Sentences • Paragraph Sequencing **4. Multiple Fillers - Level 1:** • Cloze Passages • Sentence Completion **5. Reading Comprehension:** • Inference Questions • Vocabulary in Context • Main Idea and Supporting Details • Critical Thinking Questions **6. Precise Writing:** • Summarizing • Paraphrasing **8.** Editing for Conciseness

4	**Data Interpretation**	**Textbook:** Quantitative Aptitude for Competitive Examination **Author:** R.S Agarwal **Publishing House:** S. Chand Advanced Level: Bar Graph	***National Exams:*** ***1. UPSC Civil Services Exam (https://upsc.gov.in/sites/default/files/Notif-CSP-23-engl-010223.pdf), pg 25-26*** ***2. UPSC Combined Defence Services (https://upsc.gov.in/sites/default/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_030420223.pdf) pg. 20-22*** ***1. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***2. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-***	12	**7.** Application of Data Analysis based on Bar Chart

			23 ***State Level Exams:*** ***1. Civil Services ExecutiveExam(WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement), pg 1*** ***2.*** **Miscellaneous Services Recruitment Examination** (https://adda247jobs-wp-assets-prod.adda247.com/jobs/wp-content/uploads/sites/7/2022/11/21142422/2707970_2019.pdf***) pg 1***		