University of Engineering and Management

INSTITUTE OF ENGINEERING & MANAGEMENT, NEWTOWN

DEPARTMENT OF COMPUTER APPLICATIONS

DETAILED SYLLABUS BOOKLET –

1ST & 2ND SEMESTER – MCA – 2025-2027 BATCH

3RD & 4TH SEMESTER – MCA – 2024-2026 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
1st Year 2nd Semester

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
2nd Semester (Theory)						
MCA201	Database Management System	3	1	0	4	4
MCA202	Object-Oriented Programming with Java	3	1	0	4	4
MCA203	Data Communication & Computer Networks	3	1	0	4	4
MCA204	Advanced-Data Structures with C	3	1	0	4	4
MCA(GS)201	General Studies & Current Affairs-II	2	0	0	2	0.5
Total of Theory					18	16.5
2nd Semester (Practical)						
MCAC291	Database Management System Laboratory	0	0	3	3	3
MCAC292	Object-Oriented Programming with Java Laboratory	0	0	3	3	3
MCAC294	Advanced-Data Structures with C Laboratory	0	0	3	3	3
Total of Practical					9	9
2nd Semester (Sessional)						
IVC282	Economics, Finance and Entrepreneurship Skills - Intermediate	0	0	0	2	0
MCA(GS)281	Competitive Aptitude Training - II	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 Course	0	0	0	0	0
Total of Sessional					2	0.5
Total of Semester					29	26

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

Syllabus Structure
2nd Year 2nd Semester (4th Semester)

Course Code	Course Title	Total No. of Contact Hours				Total No. of Credits
		Lecture (L)	Tutorial (T)	Practical (P)	Total Hours	
4th Semester (Theory)						
MCA401 A/B/C/D	Elective - I	3	1	0	4	3
MCA402 A/B/C	Elective - II	3	1	0	4	3
MCA403	Values and Ethics	2	0	0	2	1
MCA405	Management & Accounting	2	0	0	2	2
MCA(GS)401	General Studies & Current Affairs - IV	2	0	0	2	0.5
Total of Theory					14	9.5
4th Semester (Practical)						
MCA491	Major Project	0	0	10	10	15
Total of Practical					10	15
4th Semester (Sessional)						
MCA(GS)481	Competitive Aptitude Training - IV	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					2	2.5
Total of Semester					31	27

Elective No.	Course Code	Topic	Elective No.	Course Code	Topic
I	MCA401A	Distributed Database Management	II	MCA402A	Compiler Design
	MCA401B	Image Processing		MCA402B	Mobile Computing
	MCA401C	Parallel Programming		MCA402C	Embedded Systems
	MCA401D	Cloud Computing		MCA402D	Natural Language Processing

University of Engineering and Management

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

1st Semester Syllabus for MCA Admission Batch 2025

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	***International Academia:*** https://web.stanford.edu/dept/registrar/bulletin_past/bulletin02-03/pdf/CompSci.pdf	7

		memory, Paging, Secondary Storage, RAID.	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	
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 2025, 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 '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	***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	

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 ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	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. 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	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-structures.pdf	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

		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.	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/downloads/mcadegree.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards		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. Pointer and Text string. Function handling using pointers. Pointers to structure.	***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	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. 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.

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

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 2025, 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	***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	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.

		Structure-Array, 1D, 2D arrays, Row/Column major representation, sparse matrix	concepts delivered are in sync with the industry standards		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 prefix expression, Recursion, Tower of Hanoi	***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	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. 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 sync with the industry standards	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. 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 algorithms in terms of time complexity (Average case, Worst case)	***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	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. 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
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 1st Semester

Subject Name: Discrete Mathematical Structure **Credit: 3** **Lecture Hours: 41**

Subject Code: MCA104

Name of the Course: **Masters in Computer Applications**	
Course Code: MCA104	**Semester: 1st**
Duration: 2 years	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory:	End Semester Exam: 100
Tutorial:	Continuous Assessment: 100
Credit:	~~3~~

Aim:	
Sl. No.	
1	**Foundational Knowledge**: Establish a strong understanding of set theory, relations, propositional logic, permutations, combinations, generating functions, and recurrence relations.
2	**Graph Theory and Algorithms**: Develop proficiency in graph theory concepts, including sub-graphs, cyclic graphs, trees, spanning trees, and binary trees, along with mastering key algorithms such as Kruskal's, Prim's, Dijkstra's, Floyd's, Warshall's, DFS, and BFS.
3	**Automata and Formal Languages**: Gain expertise in constructing and converting NFA and DFA, state minimization, Mealy and Moore machines, understanding grammars (Types 0-3), and basic properties of fuzzy sets.
Objective:	
Sl. No.	
1	**Understand core Concepts**: Grasp fundamental concepts in set theory, relations, propositional logic, and combinatorics.
2	**Master Graph Theory**: Learn key graph theory principles, including graph types, trees, and essential graph algorithms.
3	**Explore Automata and Formal Languages**: Acquire skills in finite automata, state minimization, and the classification and use of formal grammars.
4	**Apply Advanced Topics**: Apply knowledge of recurrence relations, generating functions, and fuzzy sets to solve complex problems in mathematics and computer science.
Pre-Requisite:	
Sl. No.	
1.	Basic understanding of algebra and familiarity with mathematical reasoning and proof techniques.

Course Outcome:	
1.	Definition and concept of set theory, relation, function, theory of graphs and tree, combinatorics mathematics induction, theory of automata, formal languages, and propositional logics, and their use in real world problems.
2.	Use the mathematical methods and algorithms to solve the problems pertaining to set theory, relation, function, theory of graphs and tree, combinatorics mathematics induction, theory of automata and formal languages, and propositional logics.
3.	Evaluate the problems pertaining to theory of graph and tree, propositional logics, combinatorics mathematics induction, and theory of automata. Also, analyze the best algorithms to solve the real world problems of graphs and tree pertaining to shortest path and minimal spanning tree.
4.	Choose an appropriate approach to design a problem related to graph and tree, propositional logics, automata, generating function and their numerical solution.
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	2	-	2	2	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	2	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	2	2	-	-	-	-	-	-	-	3	-	-

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Set Theory and Functions**	Set Theory: Definitions and operations (union, intersection, complement), Power sets and Cartesian products. Functions: Definitions and types (injective, surjective, bijective), Composition of functions and inverse functions.	Functions: Definitions and types (injective, surjective, bijective), Composition of functions and inverse functions.	4
2	**Relations and Propositional Logic**	Relations: Definitions and properties (reflexive, symmetric, transitive), Equivalence relations and partitions, Partial orders and Hasse diagrams. Propositional Logic: Propositions and logical connectives, Truth tables and logical equivalences, Normal forms (CNF, DNF).	Industry: Software development, logic circuits, artificial intelligence. Academia: Formal methods, logic in computer science	8
3	**Combinatorics and Mathematical Inductions**	Combinatorics: Permutations and combinations, Binomial theorem and Pascal's triangle, Inclusion-exclusion principle. Mathematical Inductions: Principle of mathematical induction, Strong induction, Applications and examples.	Industry: Cryptography, algorithm design, network security. Academia: Discrete mathematics, theoretical computer science	8
4	**Graph Theory and Algorithms**	Graph Theory : Definitions and types of graphs, Sub-graphs, cyclic graphs, and trees, Spanning trees and binary trees Graph Algorithms: Kruskal's and Prim's algorithms (minimum spanning trees), Dijkstra's algorithm (shortest path), FloydWarshall algorithm (all-pairs shortest paths), DFS and BFS (graph traversal).	Industry: Network analysis, operations research, data science. Academia: Algorithm design, computational complexity.	8

5	**Automata and Formal Languages**	Automata: Definitions and differences between NFA and DFA, Conversion of NFA to DFA, State minimization techniques, Mealy and Moore machines. Formal Languages: Grammar types (Type 0, 1, 2, 3), Chomsky hierarchy, Regular expressions and languages.	Industry: Compiler design, text processing, machine learning. Academia: Automata theory, formal language theory	7
6	**Advanced Topics**	Generating Functions: Definitions and basic properties, Applications in counting and solving recurrences. Recurrence Relations: Linear recurrence relations with constant coefficients, Methods of solving recurrences (characteristic equation, generating functions). Fuzzy Sets: Definitions and basic properties, Operations on fuzzy sets (union, intersection, complement), Applications and example.	Industry: Financial modelling, operations research. Academia: Discrete mathematics, combinatorial analysis, Soft computing, artificial intelligence	6

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Rosen and Krithivasan, McGraw Hill.	Discrete Mathematics and Its Applications (SIE)	7th Edition	McGraw Hill
Reference Books:			
Somasundaram	Discrete Mathematical Structure		PHI
Dubey	Discrete Mathematical Structure		Excel books
Bhisma Rao	Discrete Structure and Graph Theory		Scitech
G.S. Rao	Discrete Mathematical Structure		New Age Publication

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

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 1st Semester

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***		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.	***(WBCS) (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 2025, 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	***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_0304***	**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

		Vocabulary (Synonyms and Antonyms) Reading Comprehension, 7) Official Letter Writing	*2023.pdf) pg. 20-22* ***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**:

					○ 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**: ○ Provide a list of words and a list of synonyms. Ask students to match each word with its synonym. 2. **Synonym Sentences**: ○ Give sentences with underlined words and ask students to rewrite the sentences using synonyms for the underlined words. 3. **Synonym Stories**: ○ Ask students to write a short story using a list of provided words and their synonyms.

					Antonyms 1. **Antonym Matching**: o Provide a list of words and a list of antonyms. Ask students to match each word with its antonym. 2. **Antonym Sentences**: o Give sentences with underlined words and ask students to rewrite the sentences using antonyms for the underlined words. 3. **Antonym Pairs**: o 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***	**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

			(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***		criteria (e.g., sales, growth rate).

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 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 a 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
1	**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
2	**Data Collection and Sources**	Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.	6
3	**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
4	**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
5	**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

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

2nd Semester Syllabus for MCA Admission Batch 2025

University of Engineering and Management

Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 2nd Semester

Subject Name: Database Management Systems **Credit: 4**

Subject Code: MCA201 **Lecture Hours: 40**

Name of the Course: **Database Management Systems**	
Course Code: MCA201& MCA291	**Semester: 2nd**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60

Aim:	
1.	To gain Knowledge of technology used to manage data from a database
2.	To enhance Ability to identify Data into information, Information into knowledge and Knowledge to the action
3.	To gain Understanding of ORACLE software
Objective:	
1.	This course introduces the core principles and techniques required in the design and implementation of database systems.
2.	This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration.
3.	It covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery
4.	It provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.
Pre-Requisite:	
1.	Concepts of computer programming (like programming in C --Files concepts).
Course Outcome:	
1.	Understand the basic concepts and the applications of database systems.
2.	Master the basics of SQL and construct queries using SQL.
3.	Understand the relational database design principles.
4.	Familiar with the basic issues of transaction processing and concurrency control.
Relevant Links:	
DBMS Study Material	DBMS NPTEL Link DBMS Coursera Link DBMS Linkedin Learning Link

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

Module Number	Topic	Sub-Topics	Mapping withIndustry & Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction: Database System Applications**	Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems. Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.	***International Academia:*** https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 ***Industry Mapping and Gap Analysis:*** Basic DBMS was previously available in the MCA syllabus and isin sync with the syllabusof AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	3	Annexure – I (SQL Query based Lab – Assignments) Assignment – 1: Design E-R Diagrams for Different case studies
	Relational Model	Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.		5	Assignment – 2: Case Studies usingbasic SQL RelationalAlgebra Operations
2	**Relational Algebra and Calculus**	Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus. SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION,INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity All JNTU World Constraints in SQL, Triggers and	***International Academia:*** https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ ***AICTE-prescribed syllabus:*** https://www.aicte-	10	Assignment – 3: Case Studies usingbasic SQL RelationalAlgebra Operations

		Active Data bases, Designing Active Databases.	india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 ***Industry Mapping andGap Analysis:*** Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.		
3	**Schema Refinement and Normal Forms**	Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.	***International Academia:*** https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 ***Industry Mapping and Gap Analysis:*** Collection Class is incorporated as per international standards.	6	Assignment – 4: SQL based assignment on different normalforms
4	**Transaction Management**	Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation,	***International Academia:*** https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-	8	Assignment – 5: SQL-based assignment on Transaction Management

		Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.	technologies-fall-2013/pages/syllabus/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/flipbook/CSE(UG)/index.html#p=123 ***Industry Mapping and Gap Analysis:*** Java applets were deprecated by Java 9 in 2017. Thus, only the basics of the applet are included and Swings, AWT and event handling are taught in detail. Oracle Announces EndOf Java Applet Support		
	Concurrency Control	Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes. Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.			Assignment – 6: SQL-based assignmenton Transaction Management
5	**Storage and Indexing**	Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations. Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM)	*International Academia& AICTE-prescribed syllabus:* https://ocw.mit.edu/courses/1-264j-database-internet-and-systems-integration-technologies-fall-2013/pages/syllabus/ *Industry Mapping and Gap Analysis:* e-Brochure (cdac.in) Industry requirement for full stack development, previously missing which is partially	8	
	B+ Trees	A Dynamic Index Structure, Search, Insert, Delete. Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.			

			incorporated.		
	Introduction to Unstructured Data and NoSQL	Characteristics of unstructured data, limitations of relational databases for unstructured storage, NoSQL data models (Key–Value, Document, Column–Family, Graph), and industry examples handling unstructured data (MongoDB, Cassandra, Neo4j, Redis).	*International Academia& AICTE-prescribed syllabus:* ***chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.aicte.gov.in/sites/default/files/Updated-AICTE%20-%20UG%20CSE.pdf*** *Industry Mapping and Gap Analysis* ***https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/pages/readings/lec19/***		Assignment – 6: Implement B+ tree in Python Assignment – 7: 1. Inserting JSON Documents 2. Querying JSON Documents 3. Updating JSON Documents 4. Deleting Documents 5. Delete one document 6. Delete multiple documents 7. Drop a collection or database

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Abraham Silberschatz, Henry F. Korth, et al.	Database System Concepts	Seventh Edition	McGraw-Hill
Reference Books:			
Raghu Ramakrishnan and Johannes Gehrke	Database Management Systems (McGraw-Hill International Editions: Computer Science Series)	ISE	Dreamtech Press

Annexure – I (SQL based Lab – Assignments)

Assignment – 1:

Consider the following relational schema for the Office of the Controller of Examinations Application. Student (Rollno, Name, Dob, Gender, Doa, Bcode);

Implement a check constraint for Gender
Date of Admission
Branch (Bcode, Bname, Dno); Department (Dno, Dname);
Course (Ccode, Cname, Credits, Dno); Branch_Course (Bcode, Ccode, Semester);
Enrolls (Rollno, Ccode, Sess, Grade);
For Example,

SESS can take values 'APRIL 2013', 'NOV 2013'

Implement a check constraint for grade Value Set ('S', 'A', 'B', 'C', 'D', 'E', 'U');

Students are admitted to Branches and they are offered by Departments. A branch is offered by only one department.

Each branch has a set of Courses (Subjects). Each student must enroll during a semester. Courses are offered by Departments. A course is offered only by one department. If a student is unsuccessful in a course he/she must enroll for the course during next session. A student has successfully completed a course if the grade obtained by is from the list (A, B, C, D, and E).

A student is unsuccessful if he/she have grade 'U' in a course. Primary Keys are underlined.
Questions
These are questions for assignment 1
Question (A)
Develop a SQL query to list details of Departments that offer more than 3 branches.
Question (B)
Develop a SQL query to list the details of Departments that offer more than 6 courses.
Question (C)
Develop a SQL query to list the details of courses that are common for more than 3 branches.
Question (D)
Develop a SQL query to list students who got 'S' in more than 2 courses during single enrollment.
Question (E)
Create a view that will keep track of the roll number, name and number of courses, a student has completed successfully.

Assignment – 2:

Consider the following relations for an Order Processing Database application in a Company.
Customer (Customerno varchar2 (5), Cname varchar2 (50)); Implement check constraints to check Customerno starts with 'C'.
Cust_Order (Orderno varchar2(5), Odate Date, Customerno references Customer, Ord_amt number(8)); Implement check constraints to check Orderno starts with 'O'.
Ord_amt is derived attribute (default value is 0);
Item (Itemno varchar2 (5), Item_name varchar2 (30), unit_price number (5)); Implement check constraint to check Itemno starts with 'I'.
Order_item (Orderno references Cust_order, Itemno references item, qty number (3));
Primary Key is underlined. Questions
These are questions for assignment 2. The solution is available after the last question.
Question (A)
Develop DDL to implement above schema enforcing primary key, check constraints and foreign key constraints.
Question (B)
Populate Database with rich data set.
Question (C)
Develop SQL query to list the details of customers who have placed more than 3 orders.
Question (D)
Develop a SQL query to list details of items whose price is less than the average price of all items in each order.
Question (E)
Develop a SQL query to list the orderno and number of items in each order.
Question (F)
Develop a SQL query to list the details of items that are present in 25% of the orders.
Question (G)
Develop an update statement to update the value of Ord_amt.
Question (H)
Create a view that keeps track of detail of each customer and number of Order placed.

Assignment – 3:

Q3: Consider the following relational schema
Staff (Staffno number (5), Name varchar2 (30), Dob Date, Gender Char (2), Doj Date, Designation varchar2 (30), Basic_pay number (6), Deptno varchar2 (5));
Gender must take value 'M' or 'F'.
Dept (Deptno varchar2 (5), Name varchar2 (30));

Skill (Skill_code varchar2 (5), Description varchar2 (30), Charge_Outrage number (3)); Staff_skill (Staffno number (5), Skill_code varchar2 (5));
Project (Projectno varchar2 (5), Pname varchar2 (5), Start_Date Date, End_Date Date, Project_Manager_Staffno number (5)); Project Number must start with 'P'.
Works (Staffno number (5), Projectno varchar2 (5), Date_Worked_On Date, Intime Timestamp, Outtime Timestamp);
Primary Key is underlined. Questions
These are questions for assignment 3. The solution is available after the last question.
Question (A)
Develop DDL to implement the above schema specifying appropriate data types for each attributes and enforcing primary key, check constraints and foreign key constraints.
Question (B)
Populate the database with rich data set.
Question (C)
Develop a SQL query to list the departmentno and number of staff in each department,
Question (D)
Develop a SQL query to list the details of staff who earn the AVG basic pay of all staff.
Question (E)
Develop a SQL query to list the details of staff who have more than 3 skills.
Question (F)
Develop a SQL query to list the details of staff who have skills with a charge outrate greater than 60 per hour.
Question (G)
Create a view that will keep track of the department number, department name, the number of employees in the department and total basic pay expenditure for the department.
Question (H)
Develop a SQL query to list the details of Depts which has more than 5 staff working in it.
Question (I)
Develop a SQL query to list the details of staff who have more than 3 skills.

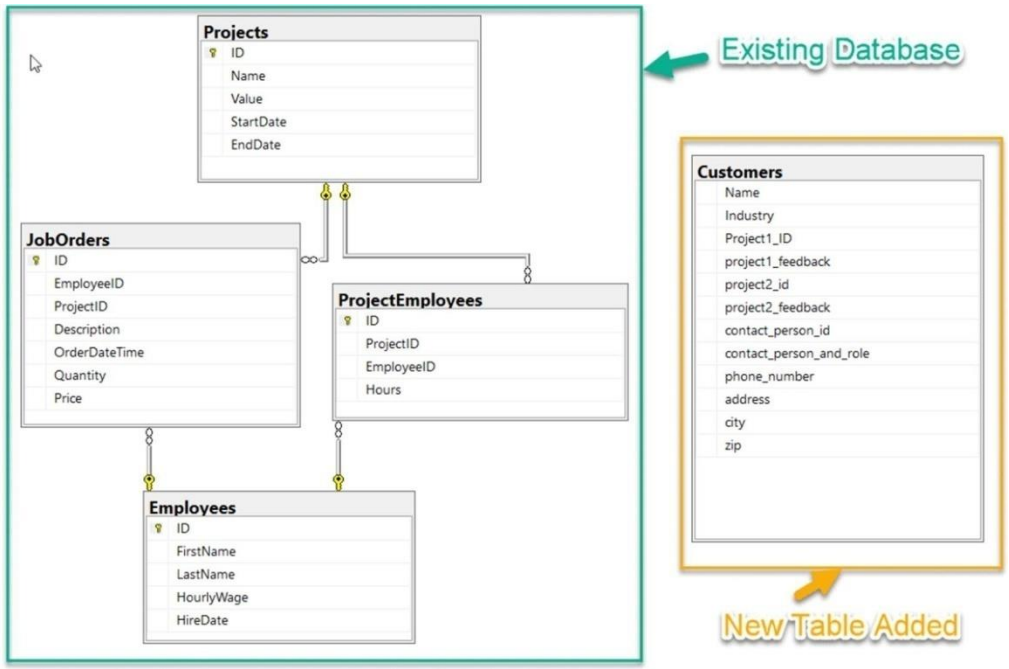
Assignment – 4:

Consider the following relational schema for a banking database application. Customer (Cid, Cname);
Branch (Bcode, Bname);
Account (Ano, Atype, Balance, Cid, Bcode);
An account can be a saving account or a current account. Check Atype in 'S' or 'C'. A customer can have both types of accounts. Transaction (Tid, Ano,

Tttype, Tdate, Tamount);
Ttype can be ‘D’ or ‘W’.
D – Deposit, W – Withdrawal Primary Key is underlined. Questions
These are questions for assignment 4. The solution is available after the last question.
Question (A)
Develop DDL to implement the above schema specifying an appropriate data type for each attribute enforcing primary key, check constraints and foreign key constraints.
Question (B)
Populate the database with a rich data set.
Question (C)
Develop a SQL query to list the details of customers who have a saving account and a current account.
Question (D)
Develop a SQL query to list the details of branches and the number of accounts in each branch.
Question (E)
Develop a SQL query to list the details of branches where the number of accounts is less than the average number of accounts in all branches.
Question (F)
Develop a SQL query to list the details of customers who have performed three transaction on a day.
Question (G)
Create a view that will keep track of branch details and the number of accounts in each branch.

Assignment – 5 :

Let us consider the following database schema. As you can see in below figure, there are four tables (Existing Database)
- Projects, Employees, ProjectEmployees, and JobOrders. Recently, the Customers table has also been added to the database to store the customers' information. As you can see in the diagram below, the Customers table has not been designed in a proper way to support the normal forms, let's go ahead and fix it.



The Customers table in the diagram violates all the three rules of the first normal form.
We do not see any Primary Key in the table.
The data is not found in its most reduced form. For example, the column ContactPersonAndRole can be divided further into two individual columns - ContactPerson and ContactPersonRole.
Also, we can see there are two repeating groups of columns in this table - (Project1_ID, Project1_FeedBack) and (Project2_ID, Project2_Feedback). We

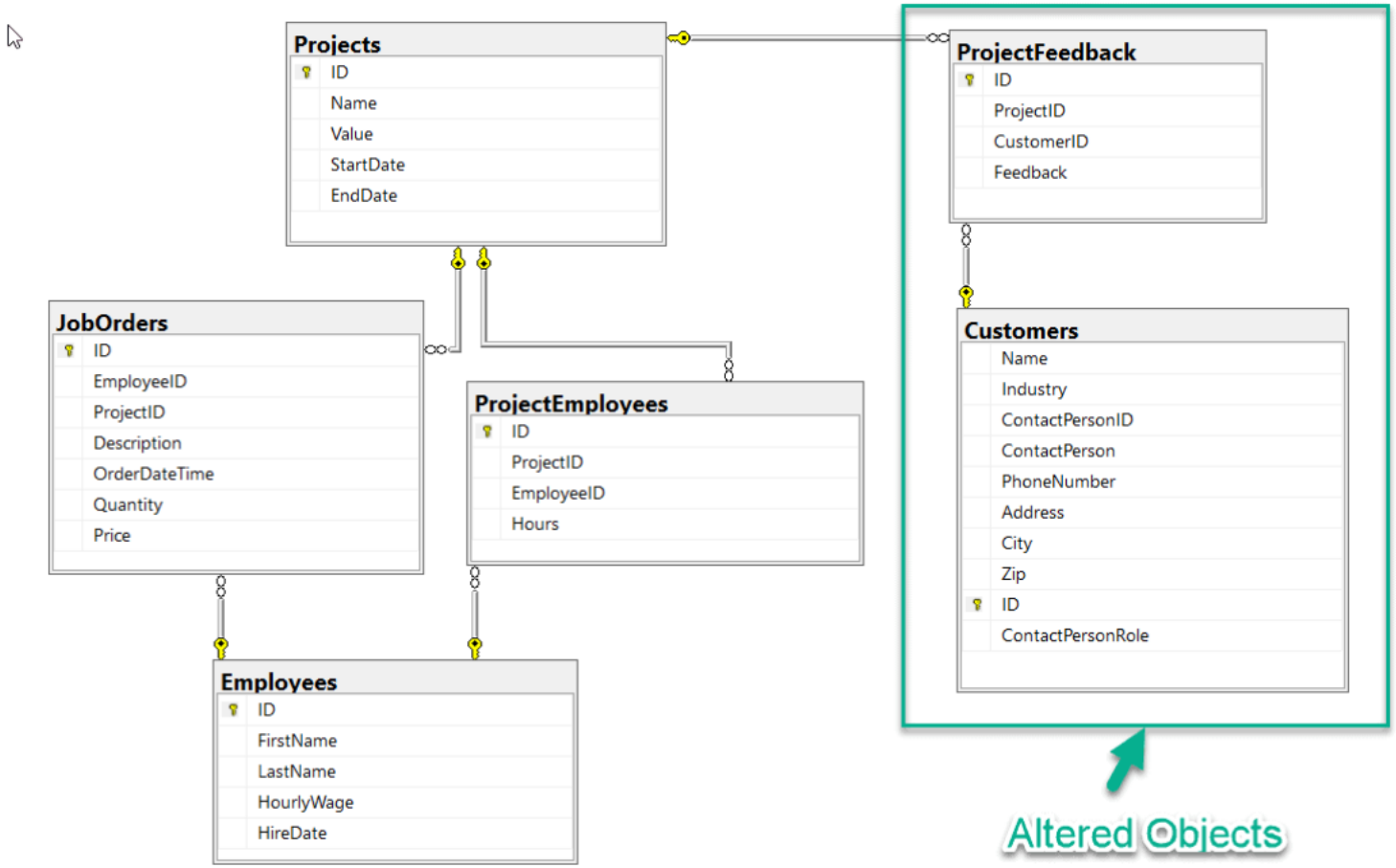
need to get these removed from this table.

The diagram below shows dummy data stored in the Customers table.

Name	Industry	Project1_ID	Project1_Feedback	Project2_ID	Project2_Feedback	ContactPersonID	ContactPersonAndRole	PhoneNumber	Address	City	Zip
Zydus Cadilla	Pharma	2455	Amazing Work!			133	Dave, HoD	555-55-5555	1, Landing Street	York	23456
HDFC	Finance	9855	Nice job!	4924	Fantastic!	146	Mark, Ops Lead	222-22-2222	2, Times Square	London	86421
ICICI	Finance	3965	Well done.			122	Peter, Analyst	444-44-4444	3, Garden Street	Brussels	53864

a. Add a primary key to this table. For this, add a new column *ID* with datatype as *INT* and also assign it as an *Identity* column.
b. split the column ContactPersonAndRole into two individual columns. This can be done in two steps as follows:
    i. Rename the original column from ContactPersonAndRole to ContactPerson.
    ii. Add a new column for ContactPersonRole.
c. Finally, in order to satisfy the third rule of the First Normal Form, move the columns *Project1_ID*, *Project1_Feedback*, *Project2_ID*, and *Project2_Feedback* into a new table. This can be done by creating a new table *ProjectFeedbacks* and link it back with the *Customers* and the *Projects* table which remove the above-mentioned columns from the *Customers* table and create a new table *ProjectFeedbacks* with Foreign Key references to the *Customers* and *Projects* table.

The database schema after applying all the rules of the first normal form should be as below.



if you see the database schema diagram above, you can see that the *ContactPerson*, *ContactPersonRole* and the *PhoneNumber* do not directly relate to the *ID* of the *Customers* table. That is because the primary key refers to a customer and not to any person or role or the phone number of the contact person.

1. Remove all these columns from the *Customers* table which do not relate to the primary key of the table directly.

2. Once, the columns are removed from the *Customers* table, now create a new table that'll store the data for the contact persons. Let us create a new table *ContactPersons* and relate it to the *Customers* table with a foreign key relation

Assignment – 6:

Implement B+ tree using any Programming Language.

List of Minor Projects Based on SQL

1. Blood Donation Management System
2. Cooking Recipe Website
3. Library Database Management System
4. Online Retail Database Software
5. Inventory Management System
6. Voice Commands Transport Enquiry System
7. Carbon-Emission Calculator
8. Railway Control System Database
9. Student Database Management
10. Hospital Management System
11. Payroll Management System
12. Grocery Store Sales

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University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2025, 2nd Semester

Subject Name: Object-Oriented Programming **Credit: 4**

Subject Code: MCA202 **Lecture Hours: 40**

Name of the Course: Object-Oriented Programming with Java & Object-Oriented Programming with Java Laboratory	
Course Code: MCA202 and MCA292	**Semester: 2nd**
Duration: 40 Hrs.	**Maximum Marks:** 100 + 100
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam:70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
AIM:	
Sl. No.	
1.	To gain the knowledge of basic object-oriented programming techniques.
2.	Learning the underlying concepts of Java Programming.
3.	Get industry ready with the coding skills.

Course Objectives:	
Sl. No.	
1.	To understand the basic concepts and fundamentals of platform independent object-oriented language.
2.	To demonstrate skills in writing programs using exception handling techniques and multithreading.
3.	To understand streams and efficient user interface design techniques.
Pre-Requisite:	
Sl. No.	
1.	Basics of programming language.
2.	Logic building skills.
Course Outcome:	
Sl. No.	
1.	Students should have an idea of how to work with different datatypes, operators, conditional statements and iterative statements in Java.
2.	Students should have an idea of how to work with strings, arrays, and different collection interfaces.
3.	Students should be able to use and design programs using their advanced data structures, I-O Streams, AWT, and GUI Programming using Applets and Swings.
4.	Students will learn to work with object-oriented programming constructs in Java using JDBC, JSP, Servlets and Databases and make small projects based on them.
Relevant Links:	
JAVA Course Material	JAVA NPTEL Link	JAVA Coursera Link	JAVA Linkedin Learning

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

Module Number	Topic	Sub-Topics	Mapping with Industry and Academia	Lecture Hours	Corresponding Lab Assignment
1	**OOPs Concept**	Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic binding	***International Academia:*** First Course in Java – EL ENG X429.9 | UC Berkeley Extension ***AICTE-prescribed syllabus:*** MAKAUT – MCA 2ND SEM SYLLABUS ***Industry Mapping and Gap Analysis:*** Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	1	**Annexure – I (Programming based Lab – Assignments)** Assignment – 1: Basic Programming and Command Line Arguments
	An overview of Java	History of Java, Java features, JVM, Comparison between Java and C++, Idea of Java Development Kit (JDK), learn to run Java program through the command line.		1	
	Data Concept	Data Types, Variables, Arrays and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)		2	
	Control Statements	Simple if statement, if-else statement, Nesting of if-else statement, switch statement		2	Assignment – 2: Constructors & Inheritance
	Iteration Statement	for loop, while loop, do-while loop		1	Assignment – 3: Flow Control
	Classes and Objects	Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing Objects as Parameters, Passing Values to methods and Constructor, Abstract classes		3	

2	**String and String Buffer**	Use of different functions	***International Academia:*** First Course in Java – EL ENG X429.9 | UC Berkeley Extension ***AICTE-prescribed syllabus:*** MAKAUT – MCA 2ND SEM SYLLABUS ***Industry Mapping and Gap Analysis:*** Basic Java programming was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the University of Berkeley. All the basic concepts are as per the industry standards.	2	Assignment – 4: Inheritance and Dynamic Polymorphism
	Inheritance	Basic concepts, types of inheritance, use of super keyword, overriding methods.		2	
	Packages, Interfaces	User-defined package, standard packages, import package, Class path, how to create interface, use and extend interface		3	Assignment – 5: Abstract class & Interface in Java.
	Multithreaded Programming	Overview, Thread Life cycle, Advantages of multithreading over multitasking, Thread Creation, Synchronized threads, Synchronized Methods		3	Assignment – 6: Threads, Multithreading & Thread Synchronization
3	**Exception Handling**	Overview of exception, Compile time errors Run time errors, try-catch, use of multiple catch Blocks, finally block, throwing an exception, using the throw and throws statement.	***International Academia:*** CS – 108 – Object Oriented System Design | Stanford University ***AICTE-prescribed syllabus:*** MAKAUT – MCA 2ND SEM SYLLABUS ***Industry Mapping and Gap Analysis:*** Collection Class is incorporated as per international standards.	3	Assignment – 7: Exception Handling& Collections
	Collections	Collections, Iteration, Set and SortedSet, List, Map and SortedMap, Legacy Collection Types		3	
4	**Stream**	Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with Reader classes (InputStreamReader, BufferedReader)	***International Academia:*** CS – 108 – Object Oriented System Design | Stanford University	3	Assignment – 8: Keyboard input and string handling in Java

			AICTE-prescribed syllabus: MAKAUT – MCA 2ND SEM SYLLABUS		
	Applets	Applet vs. Application, Applet class, Advantages of Applet, Applet		2	
	Abstract Window Toolkit	GUI Components, Interface and Classes of AWT Package, Swings, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event-driven programming with Text Field and Button	***Industry Mapping and Gap Analysis:*** Java applets were deprecated by Java 9 in 2017.Thus, only the basics of the applet are included and Swings, AWT and event handling are taught in detail. Oracle Announces End Of Java Applet Support	3	**Any one web-based project as per Annexure-II.**
5	**JDBC and Web Application Development**	Generic Servlet, HTTP Servlet, Server-Side Include, Overview of JSP, JSP Components, Bean, Session Tracking, Accessing Database with JDBC, Basics, Manipulating Databases with JDBC	***International Academia &AICTE-prescribed syllabus:*** CSE IIT KGP Object Oriented Programming with JAVA ***Industry Mapping and Gap Analysis:*** e-Brochure (cdac.in) Industry requirement for full stack development, previously missing which is partially incorporated.	6	

List of Books			
Text Books			
Name of Author	**Title of the book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
HerbertSchildt	Java: TheCompleteReference	Eleventh Edition	McGraw-Hill
Ken Arnold, David Holmes, James Gosling, Prakash Goteti	The Java Programming Language	Third Edition	Pearson Education
E.Balagurusamy	Programming with Java	Fourth Edition	McGraw-Hill
ReferenceBooks:			
Core Java An IntegratedApproach (BlackBook)	Core Java An Integrated Approach (Black Book)	First Edition	Dreamtech Press
Kogent Learning Solutions	Web Technologies, Black Book	First Edition	Dreamtech Press
Paul Deitel, Harvey Deitel	Java How to Program: Early Objects	Eleventh Edition	Pearson Education
Kathy Sierra, Bert Bates, Trisha Gee	Head First Java: A Brain-Friendly Guide	Third Edition	Shroff/O'Reilly

Annexure – I (Programming based Lab – Assignments)

Assignment – 1: Basic Programming and Command Line Arguments

1. Write a Java Program to print your Name entered through the command line as an argument.
2. Write a Java program to convert Temperature from Fahrenheit to Celsius and vice versa.
3. Write a Java program to add two numbers.
4. Write a Java Program to find the area and Perimeter of a rectangle.
5. Write a program in Java to find the maximum of three numbers.
6. Write a Java Program to check whether a given year is a leap year.
7. Create four different classes with three of them containing the function main.Save the file with a different name than that of the class name and run each of the classes with the main function.
8. Write a Java program to reverse a number entered as a command line argument.
9. Write a Java program to count the number of digits entered through the command line argument.
10. Write a Java program to find all the multiples of 3 within a given range where the starting and ending values are entered through a command line argument.

Assignment – 2: Constructors & Inheritance

1. Write a class, Grader, which has an instance variable, score, an appropriate constructor and appropriate methods. A method, lettergrade (), that returns the letter grade as O/E/A/B/C/F. Now write a demo class to test the Grader class by reading a score from the user, using it to create a Grader object after validating that the value is not negative and is not greater than 100. Finally, call the letterGrade() method to get and print the grade.
2. Write a class, Commission, which has an instance variable, sales; an appropriate constructor; and a method, commission() that returns the commission. Now write a demo class to test the Commissionclass by reading a sale from the user, using it to create aCommission object after validating that the value is not negative.Finally, call the commission() method to get and print the commission. If the sales are negative, your demo should print themessage “Invalid Input”.
3. For a Mobile Shop project, create a “Telephone” class with details like mobile_id, model_name and available_quantity in “Phone” package. Inherit from this class and create a class for“smart_phone” with necessary information like enabled_5G, foldable anddual_screen in package “Smart”. The customer executive tries to display all smart_phone details (mobile_id, model_name, available_quantity, enabled_5G, foldable and dual_screen) and updates the quantity information, whenever the customer purchases the smart_phone. Write the necessary java programs to implement this scenario and test with user inputs.
4. An educational institution maintains a database of its employees. The database is divided into a number of classes whose hierarchical relationships are shown below. Write all the classes and define the methods to create the database and retrieve individual information as and when needed. Write a driver program to test the classes. Stab (code, name), Teacher (subject, publication) is a Staff, Officer (grade) is a Staff, Typist (speed) is a Staff RegularTypist (remuneration) is a Typist, and CasualTypist (daily wages) is a Typist.

Assignment – 3: Flow Control

1. The process of finding the largest value (i.e., the maximum of a group of values) is used frequently in computer applications. For example, a program that determines the winner of a sales contest would input the number of units sold by each salesperson. The salesperson who sells the most units wins the contest. Build a Java application that inputs a series of 10 integers and determines and prints the largest integer. Your program should use at least the following three variables:
   a. counter: A counter to count to 10 (i.e. to keep track of how many numbers have been input and to determine when all 10 numbers have been processed).
   b. number: The inter most recently input by the user.
   c. largest: The largest number found so far.

   Note: Every time the sales figure of one employee is entered, the application should ask the user if they want to enter any more sales figures of a salesperson!
2. Write an application that prompts the user to enter the size of the side of a square, and then displays a hollow square of that size made of asterisks. Your program should work for squares of all side lengths between 1 and 20.
3. Write a program to compute the following formula.

   e= 1/0!+ 1/1! +½! + ⅓!+.....+ 1/n!
4. Using an enhanced for (for-each) loop, copy the content of one 3-dimensional array to another 3-dimensional array and display its contents.
5. Create the following vase pattern using a loop:

```
**********
 \        /
 /        \
 \        /
 /        \
 \        /
 /        \
**********
```

Assignment – 4: Inheritance and Dynamic Polymorphism

1. Create a general class ThreeDObject and derive the classes Box, Cube, Cylinder and Cone from it. The class ThreeDObject has methods wholeSurfaceArea( ) and volume( ). Override these two methods in each of the derived classes to calculate the volume and whole surface area of each type of three-dimensional object. The dimensions of the objects are to be taken from the users and passed through the respective constructors of each derived class. Write a main method to test these classes.
2. Create a base class Building that stores the number of floors of a building, the number of rooms and its total footage. Create a derived class House that inherits the Building and also stores the number of bedrooms and bathrooms. Demonstrate the working of the classes.
3. In the earlier program, create a second derived class Office that inherits the Building and stores the number of telephones and tables. Now demonstrate the working of all three classes.
4. Create a base class Distance which stores the distance between two locations in miles and a method travelTime(). The method prints the time taken to cover the distance when the speed is 60 miles per hour. Now in a derived class DistanceMKS, override travelTime() so that it prints the time assuming the distance is in kilometres and the speed is 100 km per second. Demonstrate the working of the classes.
5. Create a base class called "vehicle" that stores the number of wheels and speed. Create the following derived classes –"car" that inherits "vehicle" and also stores the number of passengers.

"truck" that inherits "vehicle" and also stores the load limit.
Write a main function to create objects of these two derived classes and display all the information about "car" and "truck". Also, compare the speed of these two vehicles - car and truck and display which one is faster.

Assignment – 5: Abstract class & Interface in Java.

1. Design an abstract class having two methods. Create Rectangle and Triangle classes by inheriting the shape class and override the above methods to suitably implement for Rectangle and Triangle class.
2. Write a program to create a class named Vehicle having protected instance variables regnNumber, speed, colour, ownerName and a method showData( ) to show "This is a vehicle class". Inherit the Vehicle class into subclasses named Bus and Car having individual private instance variables route Number in Bus and manufacturer Name in Car and both of them having showData( )method showing all details of Bus and Car respectively with the content of the super class's showData ( ) method.
3. Create an interface Department containing attributes deptName and deptHead. It also has abstract methods for printing the attributes. Create a class hostel containing hostelName, hostelLocation and numberofRooms. The class contains methods for getting and printing the attributes. Then write a Student class extending the Hostel class and implementing the Department interface. This class contains attributes studentName, regdNo, electiveSubject andavgMarks. Write suitable getData and printData methods for this class. Also, implement the abstract methods of the department interface. Write a driver class to test the Student class. The program will be menu driven containing the options:
   i) Admit new student
   ii) Migrate a student
   iii) Display details of a student

For the third option, a search is to be made on the basis of the entered registration number.

4. Create an abstract class Accounts with the following details:

Data Members:

(a) Balance
(b) accountNumber
(c) accountHoldersName
(d) address

Methods:

(a) withdrawl()- abstract
(b) deposit()- abstract
(c) display() to show the balance of the account number

Create a subclass of this class SavingsAccount and add the following details:

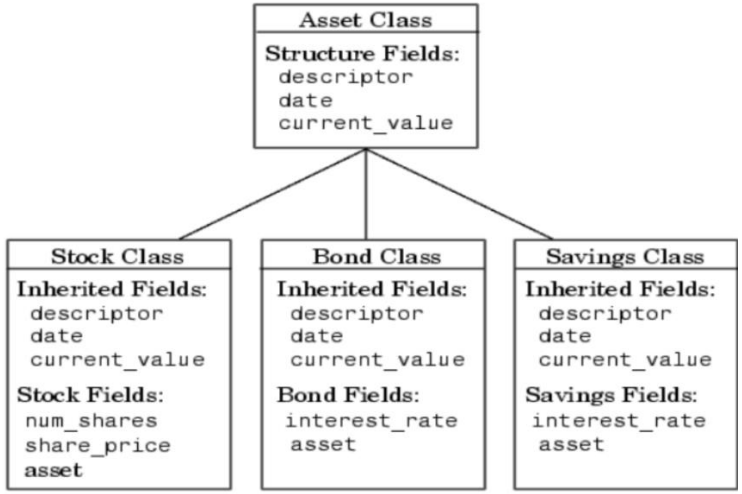
Data Members:

(a) rateOfInterest

Methods:

(a) calculateAount()

5. Implement the below Diagram.



Here, Asset class is an abstract class containing an abstract methoddisplayDetails() method. Stock, bond and Savings class inherit the Asset class and displayDetails() method is defined in every class.

Assignment – 6: Threads, Multithreading & Thread Synchronization

1. Write a Java program in which a total of 4 threads should run. Set different priorities for the thread.
2. Write a Java Program to Create a Thread that Implements the Runnable Interface.
3. Write a Java Program to Check the Priority Level of a Thread.
4. Write a Java Program Defining Thread by Extending the Thread class.
5. Write a Java Program to Get the Name of a Running Thread.
6. Write a Java Program to Stop a Thread.
7. Write a Java Program to Check Whether Define a Thread Class Without Defining run() Method in the Class.
8. Write a Java Program to Show that Method Will be Verified Whether it is Synchronized or Not.
9. Create 4 threads with priority 1,3,5,7 respectively. Update a counter in each of the threads for 10 ms. Print the final value of the count for each thread.
10. Write a Java Program to Use Method Level Synchronization.

Assignment – 7: Exception Handling& Collections

1. Write a Java program using try and catch to generate Array Index Out of Bound Exception and Arithmetic Exception.
2. Write a class that keeps a running total of all characters passed to it(one at a time) and throws an exception if it is passed a non-alphabetic character.
3. Write a program that takes a value at the command line for which the factorial is to be computed. The program must convert the string toits integer equivalent. Three possible user input errors can prevent the program from executing normally.
   - The first error occurs when the user provides no argument while executing the program, and an arrayIndexOutOfBoundsException is raised. You must write a catch block for this.
   - The second error is NumberFormatException which is raised in case the user provides a non-integer (float double) value at the command line.
   - The third error is IllegalArgumentException. This needs to be thrown manually if the value at the command line is 0.
4. Create a user-defined exception named CheckArgument to check the number of arguments passed through the command line. If the number of arguments is less than 5, throw the CheckArgumentexception, and print the addition of all the five numbers.
5. Write a Java program to create a custom Exception that would handle at least 2 kinds of Arithmetic Exceptions while calculating a given equation (e.g. X+Y*(P/Q)Z-I).
6. Given an element write a program to check if an element(value) exists in ArrayList.
7. Write a program to convert LinkedList to ArrayList.
8. Write a program to iterate TreeMap in java.

Assignment 8: Keyboard input and string handling in Java

1. Write a Java program for calculating Factorial. Number should be taken through user input (Using Scanner, BufferedReader both).
2. Write a Java program to reverse a string. (String will be taken as user input through the console).
3. Write a Java Program to Find the Length of the String.
4. Write a Java Program to Remove the White Spaces from a String.
5. Write a Java Program to Use the Equals Method In a String Class.
6. Write a Java Program to Count and Replace the First Occurrence of a String.
7. Write a Java Program to Validate an Email Address Format.
8. Write a Java Program to Access the Index of the Character or String.
9. Write a Java Program to Find First and Last Occurrence of a given character in a String.
10. Write a Java Program to Store String Literals Using String Buffer.

Annexure – II (Java based minor project – As per Software Development Life Cycle)

1. E-commerce project in java using JDBC and MYSQL
2. Online Pharmacy Management System using JDBC and MYSQL
3. Home Improvement System Using JDBC and MYSQL
4. Jewellery Shop Management Using JDBC and MYSQL
5. Student Management System Using JDBC and MYSQL
6. Hotel Management Project Using JDBC and MYSQL
7. Hospital Management System Using JDBC and MYSQL
8. Online Bike Service Booking Using JDBC and MYSQL
9. Online Food Delivery Using JDBC and MYSQL
10. Online Movie Ticket Booking Using JDBC and MYSQL
11. Bank management system Using JDBC and MYSQL

University of Engineering and Management

Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester

Subject Name: Data Communication & Computer Networks **Credit: 4**

Subject Code: MCA203 **Lecture Hours: 40**

Name of the Course: **Data Communication & Computer Networks**	
Course Code: MCA203	**Semester: 2nd**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 0	Practical Sessional Internal Continuous Evaluation: NA
Credit: 4	Practical Sessional External Examination: NA

Aim:	
Sl. No.	
1	To gain Knowledge of uses and services of Computer Network
2	To enhance Ability to identify types and topologies of network.
3	To gain Understanding of analog and digital transmission of data.
Objective:	
Sl. No.	
1	To deliver comprehensive view of Computer Network.
2	To enable the students to understand the Network Architecture, Network type and topologies
3	To understand the design issues and working of each layer of OSI model.
4	To familiarize with the benefits and issues regarding Network Security.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of basic data communication & network security.

Course Outcome:	
1.	Identify the different components in a Communication System and their respective roles.
2.	Describe the technical issues related to the Networks
3.	Defining the standard model and protocols of networking
4.	Understand the basics of data communication, networking, internet and their importance.
Relevant Links:	
DCCN Study Material	DCCN NPTEL LINK DCCN Coursera Link DCCN Linkedin Learning Link

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

Module number	**Topic**	**Sub-topics**	**Mapping with Industry and International Academia**	**Lecture Hours**
1	**Introduction to Networks & Network Model**	Introduction to communication systems, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks:Classification, Components and Topology, categories of network[LAN, MAN,WAN];Internet: brief history, internet today;	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf	7

		Protocolsand standards; OSI and TCP/IP model	***Industry Mapping and Gap Analysis:*** Basic data communication & network system was previously available in the MCA syllabus and is in sync with the syllabus of AICTE and the Stanford University. All the basic concepts are as per the industry standards.	
2	**Physical Layer**	**Data, signal and Transmission: Analog and Digital, Transmission modes,Overview of data[analog & digital], signal[analog & digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch,TDM bus; Telephone Network.**	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping& Gap Analysis:*** Practical knowledge on digital electronics circuit related to signal oscillation and transmission as well as various types of transmission media should be incorporated as per industry standard.	6
3	**Data Link Layer**	**Data link layer:** Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ **Medium access sub layer:** Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: ALOHA, CSMA,FDMA, TDMA, CDMA; Ethernet	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping and Gap Analysis:*** Needs to add practical exposure to design and implement various error detection and correction methods using any programming paradigm.	6

4	**Network Layer**	Concepts of Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; **Addressing**: Internet address, classful address, **Routing:** techniques, static vs. dynamic **routing Protocols:** IP, IPV6.	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping and Gap Analysis:*** Needs to incorporate hands-on training on network hardware devices and should have some programming knowledge on routing strategies as per industry requirement.	6
5	**Transport Layer**	**Process to process delivery; Details of UDP; Details of TCP;Congestion control algorithm: Leaky bucket algorithm, Tokenbucket algorithm, Quality of services [QoS]**	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping and Gap Analysis:*** Needs to add practical exposure to design and implement various transport layer protocols using any programming paradigm which is the key requirement of IT industry.	6
6	**Application Layer**	**Details of Application Layer protocols/services such as** **HTTP, FTP, Telnet, SMTP & WWW and other**	***International Academia:*** https://online.stanford.edu/courses/cs144-introduction-computer-networking ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf	5

			Industry Mapping and Gap Analysis: Needs to introduce various applicationlayer protocols using any programming paradigm which is the key requirement of IT industry as well as academia.	
7	**Cryptography & Satellite Communication**	Introduction to data security & cryptography (private key, public key, ISO standards), Digital Signature, Firewalls [technology & applications] **Brief concepts of Satellite Communication such as LEO, GEO.**	***International Academia:*** https://online.stanford.edu/courses/soe- y0001-cryptography-i ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping and Gap Analysis:*** Needs to incorporate in-depth details of cryptography and related algorithms and should facilitate such programming environment to implement these algorithms as per industry requirements.	4

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Behrouz A Forouzan	Data Communication & Networking	4th Ed	TMH
Andrew S. Tannenbaum	Computer Networks	6th Ed	PHI
Reference Books:			
William Stallings	Data & Computer Communications	10th Ed	PHI
Douglas E. Comer	Computer Networks and Internets with Internet Applications	4th Ed	Pearson
Jean Warland	Communication Networks: A First Course	2nd Ed	TMH
Ed Title	Schaum's Outline of Computer Networking	2nd Ed	TMH

University of Engineering and Management

Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester

Subject Name: Advanced Data Structure **Credit: 4**

Subject Code: MCA204 **Lecture Hours: 36**

Name of the Course: **Advanced Data Structure**	
Course Code: MCA204 & MCA294	**Semester: 2nd**
Duration: 40 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 1	Continuous Assessment: 30
Practical: 2	Practical Sessional Internal continuous evaluation: 40
Credit: 4+2	Practical Sessional external examination: 60
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 and limitations.
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 structures and 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 life software problem.
Relevant Links:	
Adv. DS Study Material	Adv. DS NPTEL LINK	Adv. DS Coursera Link	Adv. DS Linkedin Learning Link

CO-PO 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	**Non-Linear Data Structure-Tree**	Basic Tree Terminologies. Different types of Trees: General Trees, Forests, Binary Tree, Binary Search Tree, Expression Tree. Tree operations on each of the trees and their algorithms with complexity analysis. Tree traversal algorithms (pre-order, post-order, in-order, level-order). Constructing a Binary Tree from traversal results. Huffman's Tree Applications of Tree	***International Academia:*** https://web.stanford.edu/class/cs166/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** Unstructured Data [Trie (Prefix Tree), Splay Trees, Suffix Trees]	8	1. Implementation of Binary Tree and its various operations in Python 2. Traversing a Tree using pre-order, post-order, in-order traversal 3. Implementing Huffman tree in Python
2	**Non-Linear Data Structure-**	Binary Search Tree (BST). Operations on BST, Threaded Binary Tree, AVL Tree, B Tree, B+Tree,	***International Academia:*** https://web.stanford.edu/class/cs97si/03-data-	6	1. Implementation of Binary Search Tree and its various operations in Python

	Efficient Binary Tree	Trie	structures.pdf ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** Unstructured Data [Trie (Prefix Tree), Splay Trees, Suffix Trees]		2. Implementation of AL Tree in Python 3. Implementation of B Tree/B+ Tree in Python
3	**Non-Linear Data Structure-Graph**	Graph Terminology, Types ofGraphs(Undirected, Directed), Representation of graphs (Adjacency Matrix, Adjacency List), Graph Traversal Algorithms (BFS-Breadth First Search,,DFS-Depth First Search), Application of Graphs	***International Academia:*** https://web.stanford.edu/class/cs166/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** Shortest Path Algorithms (Dijkstra's, Bellman-Ford)	8	1. For a given graph, to identify all simple paths from one vertex to another vertex 2. Calculate the degree of a given node in a graph 3. From a given Adjacency matrix, to construct the weighted or unweighted graph (as the case may be) 4. From a given Adjacency list, to construct the weighted or unweighted graph (as the case may be) 5. To write program to implement BFS-Breadth First Search 6. To write program to implement DFS-Depth First Search
4	**Shortest path Algorithms**	Shortest Path Algorithms-Minimum Spanning Tree (MSP), Kruskal'sAlgorithm,Prim's Algorithm, Dijkstra's Algorithm,	***International Academia:*** https://web.stanford.edu/class/cs166/	8	1. To write program to implement Minimum Spanning Tree (MSP) 2. To determine shortest path using Dijkstra's Algorithm

		Warshalll's Algorithm, Modified Warshal's Algorithm	***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** Shortest Path Algorithms (Dijkstra's, Bellman-Ford)		
5	**Hashing**	Hashing- definition, Hash Tables, Different Hash Functions (Division, Multiplication, Mid-Square, Folding), Collision, Collision Resolution Techniques in Hashing by Open Addressing (Linear Probing, Quadratic Probing, Double Hashing, Rehashing), Chaining, Application of Hashing	***International Academia:*** https://web.stanford.edu/class/cs166/ ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** Universal Hashing, Cuckoo Hashing	6	1. To calculate Hash Functions using various techniques Functions (Division, Multiplication, Mid-Square, Folding) 2. To resolve Collision using various Open Addressing techniques (Linear Probing, Quadratic Probing, Double Hashing, Rehashing),

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Tenenbaum	Data Structure Using C & C++	2nd Ed	PEI
Reference Books:			
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
Reema Thareja	Data Structure Using C	s2nd Ed	Oxford

University of Engineering and Management

Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 2nd Semester

Subject Name: General Studies & Current Affairs – II **Credit: 0.5**

Subject Code: MCA(GS)201 **Lecture Hours: 48**

Module number	Topic	Sub-topics	Mapping with International/ National/ State Level Exams	Lecture Hours	Corresponding Assignment
1	**GK, Current Affairs and Economics**	GK and Current Affairs – Based on Monthly Magazines provided and recent news of national and international importance. Newspaper Reading: The Economic Times. 1. **Basic economics** -Types of Economy, Feature of Indian Economy (**BECC-101, Block-1, Unit-1,Unit-2, Unit-3)** 2. HDI(BECC111, Block-2 http://egyankosh.ac.in//handle/123456789/81256 3. **Sectors of the economy and their analysis: Primary (Agriculture, Mining, etc), Secondary**	***International Exams*** ***1. 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*** 2. ***UPSC Combined Defense Services (https://upsc.gov.in/sites/defa***	48	1. **Basic economics**: Compose an assignment on "Impact of COVID-19 Pandemic on Human Development in India"- analyze how the pandemic has affected healthcare, education, employment and socioeconomic disparities in the country. 2. **Sectors of the economy and their analysis:** Group Discussion on " Impact of LPG Reforms and FDI on Indian Industrial Sector: Economic Transformation, Challenges and Growth

		(Industry, various policies), Tertiary (services, etc.) (Textbook: Indian Economy: Misra & Puri, Chapter- 30,32) 4. Liberalisation, Privatisation and Globalisation (LPG)(IGNOU, BECC-114, Block- 6) http://egyankosh.ac.in//handle/123456789/90547 5. **RBI & Its Function**- Board of Governance, Operation. Credit control policies- CRR, SLR, Bank rate, Repo rate, Reverse Repo rate, Prime lending rate, MSF, LAF, FERA, FEMA. **(BECC-113, Unit-1)** http://egyankosh.ac.in//handle/123456789/89589 6. **Budget (Union, Railway),** Concept of revenue, expenditure & different types of deficit. (BECC-109, Block- 3, Unit-9) http://egyankosh.ac.in//handle/123456789/76561	***ult/files/Notif-CDS-I-Exam-2023-Engl-211222.pdf), pg 20-21*** ***3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/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 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***		Prospects 3. **RBI & Its Function:** Group discussion on "Analyzing India's Monetary Policy: Implication, Challenges and Economic Stability 4. **Budget:** An assignment on the "Understanding India's Union Budget: A Comprehensive Analysis ** All the assignments are in line with entrance exams for premier B-Schools and GS Paper-I of UPSC CSE.

			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/Downloa)***		

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, 2nd Semester

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

Subject Code: MCA(GS)281 **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 for Competitive Examination **Author:** R.S Agarwal **Publishing House:** S.Chand Average- Concept on average, different missing numbers in average estimation, shortcuts & their application. Mixture & Allegation – Proportion & mixtures in percentages, populations & liquids, shortcuts & their application. Number System- concept of different numbers, remainder theorem, factors. Time & Work	***International Exams*** ***1. GRE (https://www.ets.org/pdfs/gre/g re-math-review.pdf)*** ***2. GMAT (https://downloads.mba.com/do wnloads/gmat-handbook.pdf)*** ***National Exams:*** ***1. UPSC Civil Services Exam*** **(https://upsc.gov.in/sites/defau lt/files/Notif-CSP-23-engl- 010223.pdf),** pg 25-26 ***UPSC Combined Defence Services (https://upsc.gov.in/sites/defa ult/files/Notif-CDS-I-Exam- 2023-Engl-211222.pdf), pg 20-21*** ***3. RBI Grade B (https://rbidocs.rbi.org.in/rdo cs/Content/PDFs/DADVTGR B09052023FA65E4FB1C2C***	12	

		and Pipe & Cistern- Basic concept, Different problems & their shortcut tricks.Time, Speed & Distance Boat & Stream	***F473396B4FD7E5F69CDDE .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_0304 2023.pdf) pg. 20-22*** ***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***		

University of Engineering and Management

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

3rd Semester Syllabus for MCA Admission Batch 2024

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: 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 2024, 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, Jira software,Axosoft.	8	1. Make a comparative studies of different models of software development process.
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 2024, 3rd Semester

Subject Name: Data Science and Data Analytics **Credit: 04**

Subject Code: MCA306 & MCA395 **Lecture Hours: 40 Hrs.**

Name of the Course: Data Science and Data Analytics	
Course Code: MCA306 & MCA395	**Semester: 3rd**
Duration: 40Hrs.	**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 data science and data analytics.
2	To enhance the ability to identify qualities of a good solution of AI, Big Data, Data Mining etc.
3	To implement learned analytical techniques and data science to solve problems.

Objective:	
Sl.No.	
1	Provide you with the knowledge and expertise to become a proficient data scientist.
2	Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
3	Produce Python code to statistically analyze a dataset.
4	Critically evaluate data visualizations based on their design and use for communicating stories from data.
Pre-Requisite:	
Sl.No.	
1.	Proficiency in data related to AI,ML,Big Data etc.
Course Outcome:	
1.	Explain how data is collected, managed and stored for data science.
2.	Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists.
3.	Implement data collection and data mining techniques using database.
4.	Understand handling of big data.
Relevant Links:	
DSDA Study Material	DSDA NPTEL LINK DSDA Coursera Link DSDA 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	Introduction to Data Management:	Brief idea about Data Warehousing, Architecture and Data Flows, Data pre-processing before analysis, Data preparation, OLAP & OLTP, Case study.	***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	Introduction to Data Mining:	Brief idea about Data Mining, It's goals and techniques, Architecture and KDD Process, Knowledge representation methods.	***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	Statistics and Analytics:	Data Visualization, Summarize and describe data sets using a measures such as Central tendency and variability, Learn probability, Central Limit Theorem and much more to draw inferences	***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	Introduction to Big Data Analytics:	Understand the basic concepts of Big Data and Hadoop as processing platforms for Big Data, Managing Big Data - Learn and Use Hadoop Ecosystem tools for data ingestion, extraction and management. Introduction to Hive.	***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	

5	Cloud Computing:	Introduction to Cloud Computing, types, services, applications, Security & research scope. Internet of Things:	***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	Introduction to IOT and WSN:	Introduction to IOT and WSN, Basic concepts of Robotics Using Arduino & Rasberry Pi Programming.	***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	https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf
7.	Introduction to NLP & AI	Introduction to artificial intelligence, Brief idea about Natural Language Processing.	***International Academia:*** https://ocw.mit.edu/courses/6-034-artificial-intelligence-fall-2010/	4	Python lab for text analysis 1. Choose some book-length document and download it. 2. Count its characters, lines and words.

			AICTE-prescribed syllabus: https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards		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.
8.	Basic concepts of Machine Learning	To implement linear regression, Data classification, Data clustering – To learn how to create segments based on similarities using K-Means and Hierarchical clustering, Case study using Python.	***International Academia:*** **https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/about** ***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.
9.	Applications of Machine Learning.	Time series, Decision trees, Support Vector Machine, Neural Networks, Case Study Using MATLAB.	***International Academia:*** **https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/about** ***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/CourseStructure/MCA21.pdf	6	1. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. 3. Write a program to implement k-Means clustering algorithm to cluster the set of data stored in .CSV file.

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

List of Books Textbooks :			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Jiawei Han and Micheline Kamber	"Data Mining : Concepts and Techniques"	4th Edition	"Morgan Kaufman"
Amit Konar	"Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain"		CRC Press
Anil Maheshwari	"Big Data"	2nd Edition	Tata McGraw Hill
Rajkumar Buyya	"Mastering Cloud Computing : Foundations and Applications Programming"		"Morgan Kaufman"
Steven Bird, Ewan Klein and EdwardLoper	"Natural Language Processing with Python"		O'Reilly
Martin C. Brown	"The Complete Reference Python"		Tata McGraw Hill
L.Fausett	"Fundamentals of Neural Networks:" Architectures, Algorithms and Applications		Pearson

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: 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=fa lse 2. **Concept of tax,** objective of tax, Direct & IndirectTax, Progressive,Regressive & Proportional tax. 3. **Textbook: Principles of**	***International Exams*** ***1.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***	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-market transactions. **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

		Microeconomis: NGregory 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) 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 MonthlyMagazines provided	***3. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/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 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/)***		promote tax compliance. **3. Inflation & Deflation** Write a report on the causes of 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.

		andrecent news of national and international importance. **Newspaper Reading:** TheEconomic 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, important national parks, Minister &portfolio & constituencies,Population census, Persons in news -most famous,popular recent only, Important dances & festivals of Indian states,International Head Quarters & world organization, Importantpresident & pm electedfrom various countries, Important about banks likepayment banks, smallbanks & license system, Awards, Sports, Books & author, National & International affairs	***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/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1*** **2. Miscellaneous Services Recruitment Examination** ***(file:///C:/Users/UEMK/Downloads/2707970_2019.pdf),pg 1***		

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: Environment and Ecology **Credit: 03**

Subject Code: MCA383 **Lecture Hours: 36 Hrs.**

Name of the Course: **ENVIRONMENT AND ECOLOGY**	
Course Code: MCAN383	**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 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	***International Academia:*** https://ocw.mit.edu/courses/1-84j-atmospheric-chemistry-fall-2013/pages/lecture-notes/ ***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf***	6

		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)	***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 used for waste water treatment plant(WWTP).*	6
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,	***International Academia:*** ***https://ocw.mit.edu/courses/1-34-waste-containment-and-remediation-technology-spring-2004/***	6

		composting, recycling. Solid waste management and control (hazardous and biomedical waste).(2L)	***AICTE-prescribed syllabus:*** ***https://old.aicte-india.org/downloads/Environmental_Studies_curriculum.pdf*** ***Industry Mapping:*** ***https://www.wasteworksonline.com/***	
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 2024, 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***		

University of Engineering and Management

Institute of Engineering & Management, New Town Campus

University of Engineering & Management, Jaipur

4th Semester Syllabus for MCA Admission Batch 2024

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Distributed Database Management **Credit: 03**

Subject Code: MCA401A **Lecture Hours: 40 Hrs.**

Name of the Course: Distributed Database Management	
Course Code: MCA401A	**Semester:**
Duration: 40 hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Develop a deep understanding of distributed database architecture and design principles.
2	Equip students with skills for optimizing distributed query processing and managing transactions.
3	Enable application of data warehousing, OLAP, and data mining techniques for real-world problem-solving.
Objective:	
Sl. No.	
1	Understand the architecture and design of distributed database systems.

2	Apply techniques for distributed query processing and optimization.
3	Master the concepts of distributed transaction processing and data warehousing.
4	Utilize data mining methods such as association analysis, classification, and clustering.
Pre-Requisite:	
Sl. No.	
1.	Fundamentals of Database Management Systems, Basic Knowledge of Computer Networks, Programming Skills & Operating systems
Course Outcome:	
1.	Understand and explain the architecture and design principles of distributed database systems.
2.	Apply methods and techniques for distributed query processing and optimization.
3.	Understand the concepts of distributed transaction processing, data warehousing, and OLAP technology.
4.	Apply methods and techniques for data association analysis, classification, and clustering.
Relevant Links:	
DDBMS Study Material	DDBMS NPTEL LINK DDBMS Coursera Link DDBMS LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Introduction to Distributed Database Management System**	Distributed DBMS features and needs. Reference architecture. Levels of distribution transparency, and replication. Distributed database design – fragmentation, allocation criteria. Storage mechanisms. Translation of global queries. / Global query optimization. Query execution and access plan. Concurrency control – 2 phases locks. Distributed deadlocks. Time-based and quorum-based protocols. Comparison. Reliability- non-blocking commitment protocols.	https://online.stanford.edu/courses/cs244b-distributed-systems	12
2	**Partitioned Networks**	Partitioned networks. Checkpoints and cold starts. Management of distributed transactions- 2-phase unit protocols. Architectural aspects. Node and link failure recoveries.	https://online.stanford.edu/courses/cs244b-distributed-systems	8
3	**Distributed Database Administration**	Distributed data dictionary management. Distributed database administration. Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled. Alternative architecture. Development tasks, Operation- global task management. Client-server databases- SQL server, open database connectivity. Constructing an application.	https://online.stanford.edu/courses/cs244b-distributed-systems	10

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Stefano Ceri & Giuseppe Pelagatti	Distributed Databases: Principles and Systems	**978-0070265110**	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 2024, 4th Semester

Subject Name: Image Processing **Credit: 03**

Subject Code: MCA401B **Lecture Hours: 32 Hrs.**

Name of the Course: Image Processing	
Course Code: MCA401B	**Semester:**
Duration: 32 hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Equip students with a solid understanding of the core principles and techniques used in image processing.
2	Enable students to apply image processing methods to analyze, enhance, and manipulate digital images for various applications.
3	Prepare students to solve complex real-world problems related to image analysis, computer vision, and pattern recognition.

Objective:	
Sl. No.	
1	Understand the fundamental principles and techniques of image processing.
2	Apply methods to enhance and manipulate digital images.
3	Develop skills in image analysis and computer vision.
4	Solve real-world problems using image processing techniques.
Pre-Requisite:	
Sl. No.	
1.	Fundamentals of Database Management Systems, Basic Knowledge of Computer Networks, Programming Skills & Operating systems
Course Outcome:	
1.	To study the image fundamentals and mathematical transforms necessary for image processing.
2.	To study the image enhancement techniques
3.	To study image restoration procedures
4.	To study the image compression procedures
Relevant Links:	
Image Study Material	Image NPTEL LINK Image Coursera Link Image LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Introduction and Digital Image Fundamentals** **Image enhancement in the Spatial domain**	Digital Image Fundamentals, Human visual system, Image as a 2D data, Image representation – Grayscale and Colour images, image sampling and quantization Basic grey level Transformations, Histogram Processing Techniques, Spatial Filtering, Low pass filtering, High pass filtering	https://stanford.edu/class/ee368/	6
2	**Filtering in the Frequency Domain** **Image Restoration and Reconstruction**	Preliminary Concepts, Extension to functions of two variables, Image Smoothing, Image Sharpening, Homomorphic filtering. Noise Models, Noise Reduction, Inverse Filtering, MMSE (Wiener) Filtering	https://stanford.edu/class/ee368/	6
3	**Colour Image Processing** **Image Compression**	Colour Fundamentals, Color Models, Pseudo colour image processing Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, LZW coding, JPEG Compression standard	https://stanford.edu/class/ee368/	6
4	**Morphological Image Processing**	Erosion, dilation, opening, closing, Basic Morphological Algorithms: hole filling, connected components, thinning, , skeletons	https://stanford.edu/class/ee368/	6
5	**Image Segmentation** **Object Recognition and Case Studies Object Recognition**	point, line and edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection, Hough transform patterns and pattern classes, recognition based on decision-theoretic methods, structural methods, case studies – image analysis Application of Image processing in process industries	https://stanford.edu/class/ee368/	8

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Chandra& Majumder	Digital Image Processing &Analysis	2nd Edition	PHI
Anil K. Jain	Fundamentals of Digital Image Processing	1st Edition	Pearson

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Parallel Programming **Credit: 03**

Subject Code: MCA401C **Lecture Hours: 36 Hrs.**

Name of the Course: Parallel Programming	
Course Code: MCA401C	**Semester:**
Duration: 40 hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	

Aim:	
Sl. No.	
1	Equip students to write efficient parallel programs for faster computation.
2	Prepare students for industry applications in high-performance and big-data computing.
3	Foster critical thinking and innovation in solving computational challenges with parallel techniques.

Objective:	
Sl. No.	
1	Understand the fundamentals of parallel computing architectures and models.
2	Develop skills to design, implement, and debug parallel algorithms.
3	Gain proficiency in using parallel programming languages and tools.
4	Analyze the performance and scalability of parallel applications.
Pre-Requisite:	
Sl. No.	
1.	Basic knowledge of programming, data structures, and algorithms.
Course Outcome:	
1.	Understand the evolution of High-Performance Computing (HPC) with respect to lawsand the contemporary notion that involves mobility for data, hardware devices and software agents
2.	Understand, appreciate and apply parallel and distributed algorithms in Problem Solving.
3.	Evaluate the impact of network topology on parallel/distributed algorithm formulationsand traffic their performance.
4.	Gain hands-on experience with agent-based and Internet-based parallel and distributed programming techniques.
Relevant Links:	
PP Study Material	PP NPTEL LINK PP Coursera Link PP LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Fundamentals of Parallel Programming**	Processes and processors. Shared memory. Fork. Join constructs. Basic parallel programming techniques- loop splitting, spin locks, contention barriers and row conditions. Variations in splitting, self and indirect scheduling.	https://web.stanford.edu/class/cs315b/	12
2	**Data Dependency and Scheduling Techniques**	Data dependency-forward and backward block scheduling. Linear recurrence relations. Backward dependency.	https://web.stanford.edu/class/cs315b/	12
3	**Advanced Performance Tuning and Parallel Programming Techniques**	Performance tuning overhead with a number of processes, effective use of cache. Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation. Parallel Programming Constructs in HPF, FORTRAN 95. Parallel programming under Unix.	https://web.stanford.edu/class/cs315b/	12

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Quinn	Parallel Computing	2nd Edition	TMH

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Cloud Computing **Credit: 03**

Subject Code: MCA401D **Lecture Hours: 40 Hrs.**

Name of the Course: Cloud Computing	
Course Code: MCA401D	**Semester:**
Duration: 40 hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	Analyze the Evolution and Impact of Cloud Computing
2	Evaluate Cloud Computing Service Models and Deployment Strategies
3	Investigate Security Challenges and Solutions in Cloud Computing
Objective:	
Sl. No.	
1	To understand the fundamental concepts of cloud computing.

2	To explore different cloud service models and cloud deployment models.
3	To gain practical knowledge on cloud storage, virtualization, and cloud security.
4	To comprehend the economic, organizational, and technological aspects of cloud computing and development of applications leveraging cloud-based services and APIs.
Pre-Requisite:	
Sl. No.	
1.	Basic understanding of computer networks, operating systems, and internet technologies.
Course Outcome:	
1.	Understand and explain the key concepts and principles of cloud computing, including its architecture, components, and models.
2.	Differentiate between various cloud service models (IaaS, PaaS, SaaS) and deployment models (public, private, hybrid, community), and assess their suitability for different scenarios.
3.	Apply virtualization techniques and cloud storage solutions to design and manage scalable and efficient cloud-based systems.
4.	Analyse cloud security mechanisms and issues, and implement strategies to safeguard data and applications in the cloud environment.
Relevant Links:	
Cloud Study Material	Cloud NPTEL LINK Cloud Coursera Link Cloud LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction to Cloud Computing and Cloud Service Models	Definition and Essential Characteristics of Cloud Computing, History and Evolution of Cloud Computing, Benefits and Challenges of Cloud Computing, Cloud Computing Architecture, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Function as a Service (FaaS)	MIT's "Cloud Computing" course, Stanford University's "CS240A: Cloud Computing and Big Data" course University of California Berkeley's "Cloud Computing Concepts" course	6
2	Cloud Deployment Models	Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud	Industry: IBM Cloud, AWS, Google Cloud Platform Academia: University of Illinois Urbana-Champaign's "CS498: Cloud Computing" course, Carnegie Mellon University's "Cloud Infrastructure" course	6
3	Virtualization	Concepts of Virtualization, Types of Virtualization (Server, Network, Storage), Virtual Machines (VMs), Containers and Docker	Industry: VMware, Docker, Kubernetes Academia: Stanford University's "CS240: Advanced Topics in Operating Systems" course, University of Washington's "CSE 599: Virtualization Technologies" course	6
4	Cloud Storage	Storage as a Service (STaaS), Cloud Storage Architectures, Storage Types: Block, File, and Object Storage, Examples: Amazon S3, Google Cloud Storage	Industry: Amazon S3, Google Cloud Storage, Microsoft Azure Blob Storage Academia: University of California Berkeley's "CS162: Operating Systems and Systems Programming" course, Princeton University's "COS 518: Advanced Operating Systems" course	6

5	Cloud Security and Cloud Networking	Security Issues in Cloud Computing, Identity and Access Management (IAM), Data Protection and Encryption, Regulatory and Compliance Issues, Networking Basics for Cloud, Software-Defined Networking (SDN), Network Function Virtualization (NFV), Cloud Load Balancing	Industry: AWS Security, Google Cloud Security, Microsoft Azure Security, Cisco, AWS VPC, Google Cloud VPC Academia: Georgia Tech's "CS 6262: Network Security" course, University of Maryland's "ENPM693: Cloud Security" course Stanford University's "CS244: Advanced Topics in Networking" course, MIT's "6.829: Computer Networks" course	8
6	Cloud Application Development and Future Trends	Developing Cloud-Native Applications, Microservices Architecture, DevOps and CI/CD Pipelines, Example Platforms: AWS Lambda, Google Cloud Functions Edge Computing, Serverless Computing, Quantum Cloud Computing, AI and Machine Learning in the Cloud	Industry: AWS Lambda, Google Cloud Functions, Microsoft Azure DevOps, IBM Quantum Experience, AWS DeepRacer, Google AI Academia: UC Berkeley's "CS169: Software Engineering" course, University of Michigan's "EECS 485: Web Systems" course MIT's "6.S191: Introduction to Deep Learning" course, Stanford's "CS221: Artificial Intelligence" course	8

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 1: Introduction Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 3: Virtualization Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 4: Cloud Computing Architecture Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 9: Cloud Platforms in Industry Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 10: Cloud Applications Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Rajkumar Buyya, Christian Vecchiola, Sb Thamarai Selvi	Chapter 5: Virtual Machines Provisioning and Migration Services Mastering Cloud Computing	1st / 978-1259029950	Mc Graw Hill
Arshdeep Bahga, Vijay Madisetti	Chapter 12: Cloud Security Cloud Computing A Hands-On Approach	1st / 9788173719233	University Press
Reference Books:			
Thomas Erl, Zaigham Mahmood, Ricardo Puttini	Cloud Computing: Concepts, Technology & Architecture	1st / 978-0133387520	Prentice Hall
Michael J. Kavis	Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)	1st / 978-1118617618	Wiley
Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi	Mastering Cloud Computing: Foundations and Applications Programming	1st / 978-0124114548	Morgan Kaufmann

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Compiler Design **Credit: 03**

Subject Code: MCA402A **Lecture Hours: 40 Hrs.**

Name of the Course: **Compiler Design**	
Course Code :MCA402A	**Semester:4th**
Duration: 40Hrs.	**MaximumMarks:100**
Teaching Scheme	**Examination Scheme**
Theory:3	EndSemesterExam:100
Tutorial: 1	ContinuousAssessment:100
Practical:0	PracticalSessionalinternalcontinuousevaluation:0
Credit:3+0	PracticalSessionalexternalexamination:0
Aim:	
Sl.No.	
1	To gain Knowledge of Various aspects of a Compiler.
2	To enhance Ability to identify qualities of a good solution of NFA, DFA etc.
3	To implement NFA to DFA conversion techniques and different parsing methods to solve problems.

Objective:	
Sl.No.	
1	Provide you with the knowledge and expertise to become a proficient compiler design.
2	Demonstrate an understanding of parsing and polishing expression concepts that are vital for compiler design.
3	To produce DFA from an NFA to understand a basic compiler.
4	Critically evaluate NFA based on their design and create DFA from that.
Pre-Requisite:	
Sl.No.	
1.	Proficiency in data structure, graph theory, automata theory and C programming.
Course Outcome:	
1.	Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
2.	Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
3.	Analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.
4.	Use modern tools and technologies for designing new compiler.
RelevantLinks:	
Study Material	NPTELLINK Coursera Link LinkedIn Learning Link

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

Module number	Topic	Sub-topics	MappingwithIndustry and International Academia	Lecture Hours	CorrespondingLabAssignment
1	Context Free Grammars	Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA Scanners. Top down parsing, LL grammars. Bottom up parsing.	***International Academia:*** ***AICTE-prescribed syllabus:*** ***IndustryMapping:***The concepts delivered are in sync with the industry standards	15	NA
2	Polishing Expressions	Polishing expressions, Operator precedence grammar, IR grammars, Comparison of parsing methods. Error handling.	***International Academia:*** ***AICTE-prescribed syllabus:*** ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	15	NA
3	Symbol table handling techniques	Symbol table handling techniques. Organization for non-block and block-structured languages. Run time storage administration. Static and dynamic allocation. Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation. Code optimization, folding, and redundant sub-expression evaluation. Optimization within iterative loops.	***International Academia:*** ***AICTE-prescribed syllabus:*** ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	10	NA

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Aho, Lam, Sethi, Ullman	Compilers – Principles, Techniques & Tools	2nd Edition	Pearson
Holub	Compiler Design in C	2nd Edition	Prentice Hall
Mishra, Chandrasekaran	Theory of Computer Science: Automata, Languages and Computation	3rd Edition	PHI

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Mobile Computing **Credit: 03**

Subject Code: MCA402B **Lecture Hours: 40 Hrs.**

Name of the Course: Mobile Computing	
Course Code: MCA402B	**Semester:**
Duration: 40	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	To understand the fundamental concepts and technologies driving mobile computing
2	To understand Mobile Networking and Connectivity
3	To address challenges in mobile security and optimization

Objective:	
Sl. No.	
1	Gain a foundational understanding of mobile communication systems, including cellular networks and their evolution.
2	Grasp the core concepts of mobile networking protocols, covering aspects like network layers and routing in unique mobile environments.
3	Explore the various mobile communication technologies and protocols.
4	Develop critical knowledge of security challenges and solutions for mobile computing devices and applications.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of computer fundamentals and networking concepts.
Course Outcome:	
1.	Define mobile technologies in terms of hardware, software, and communications.
2.	Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures.
3.	Evaluate the effectiveness of different mobile computing frameworks.
4.	Describe how mobile technology functions to enable other computing technologies.
Relevant Links:	
MC Study Material	MC NPTEL LINK MC Coursera Link MC LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Introduction: Wireless Transmission: Access Control:	Introduction and Application of Mobile Computing Wireless Transmission: Frequency for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems, Medium Access Control: Motivation for a specialised MAC: Hidden and Exposed terminals. Near and Far terminals; SOMA, FOMA; TOMA: Fixed TOM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, PRMA packet reservation multiple access, reservation TOMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4
2	**CDMA:** GSM:	CDMA: Spread Aloha multiple access Telecommunication Systems: GSM: Mobile Services, System Architecture, radio interface, Protocols, Localization and Calling, Handover, Security, New Data Services, DECT, Systems Architecture Protocol Architecture: TETRA I, UMTS and IMT-2000, UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8

3	**Satellite Systems:** Wireless LAN: IEEE 802.11: Bluetooth:	Satellite Systems: History, Applications, Basics: GEO, LEO, MEO, Routing, Localization. Handover Examples: Broadcast Systems: Overview, Cyclic Repetition, Digital Audio; broadcasting: Multimedia object transfer Protocol; Digital Video Broadcasting Wireless LAN: Infrared vs. Radio Transmission, Infrastructure and Ad Hoc networks, IEEE 802.11: System Architecture, Protocol Architecture, Physical Layer, Medium Access Control Layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical Layer Channel access control. Sub layer, Medium Access control sub layer, Information bases and networking; Bluetooth: User Scenarios, Physical Layer, MAC layer, Networking, Security, Link management. Wireless ATM: Motivation for WATM, Wireless ATM working group, WATM services, Reference model: Example configurations, Generic reference model;	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8
4	**Handover:** **Location management:** **Mobile Network Layer:**	Handover: Handover reference model, Handover requirements, Types of handover, Handover scenarios, Backward handover, Forward handover; Location management: Requirements for location management, Procedures and Entities; Addressing, Mobile quality of service, Access point control protocol. Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration,	***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf*** ***Industry Mapping: The concepts delivered are in sync with the industry standards***	

5		Tunnelling and Encapsulation, Optimizations, Reverse Tunnelling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics. Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, mobile RCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. Support for Mobility:	***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf*** ***Industry Mapping: The concepts delivered are in sync with the industry standards***	7
6	**File systems:** **Wireless application protocol:**	File systems: Consistency, Examples; World Wide Web: Hypertext transfer protocol, Hypertext markup language, Some approaches that might help wireless access, System architectures; Wireless application protocol: Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language; WML script, Wireless telephony application, Examples "Stacks with WAP, Mobile databases, Mobile agents. Security and privacy aspects of Mobile	***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.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 with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Jochen Schiller	Mobile Communications (Chapters: 1, 2, 3, 4, 5, 7, 8, 9, 10)	2nd Edition	Pearson
Reference Books:			
William Stallings	Wireless Communications and Networks		PHI
Rappaport	Wireless Communications Principals and Practices	2nd Edition	Pearson
Ashoke Talukder	Mobile Computing	2nd Edition	TMH

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Embedded Systems **Credit: 03**

Subject Code: MCA402C **Lecture Hours: 40 Hrs.**

Name of the Course: Embedded Systems	
Course Code: MCA402C	**Semester:**
Duration: 40	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	
Aim:	
Sl. No.	
1	To understand the fundamental concepts and technologies driving mobile computing
2	To understand Mobile Networking and Connectivity
3	To address challenges in mobile security and optimization

Objective:	
Sl. No.	
1	Gain a foundational understanding of mobile communication systems, including cellular networks and their evolution.
2	Grasp the core concepts of mobile networking protocols, covering aspects like network layers and routing in unique mobile environments.
3	Explore the various mobile communication technologies and protocols.
4	Develop critical knowledge of security challenges and solutions for mobile computing devices and applications.
Pre-Requisite:	
Sl. No.	
1.	Knowledge of computer fundamentals and networking concepts.
Course Outcome:	
1.	Understand the concept of embedded systems, microcontroller, different components of microcontroller and their interactions.
2.	Get familiarized with the programming environment to develop embedded solutions.
3.	Program ARM microcontroller to perform various tasks.
4.	Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.
Relevant Links:	
ES Study Material	ES NPTEL LINK ES Coursera Link ES LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Introduction to Embedded Systems:** **Embedded Processors:**	Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Relation between Microcontroller and Embedded System, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems Types of Embedded Processors, Microprocessors, Microcontrollers, DSP, Embedded Processors from Future Electronics, Applications for embedded processors, Choosing the Right Embedded Processor.	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	4
2	**Embedded Systems**	Application- and Domain-Specific: Washing Machine-Application Specific Example of Embedded System, Automotive- Domain Specific Example of Embedded System. The core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Embedded	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts	8

		Memories: Scratchpad Memories, Cache Memories, Flash Memories, Memory according to the type of Interface, Memory Shadowing and memory selection for Embedded Systems, Sensors and Actuators. Communication Interface: Onboard and External Communication Interfaces.	delivered are in sync with the industry standards	
3	**Embedded Firmware:** **RTOS-Based Embedded System Design:**	Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages. Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	8
4	**Task Communication:** **Task Synchronization:** **Trends in Embedded Industry:**	Shared Memory, Message Passing, Remote Procedure Call and Sockets Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS. Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends	***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/bvoc/Mobile%20Communication.pdf*** ***Industry Mapping: The concepts delivered are in sync with the industry standards***	

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Shibu K. V	Introduction to Embedded Systems	2nd Edition	Mc Graw Hill
Raj Kamal	Embedded Systems	4th Edition	TMH
Reference Books:			
Frank Vahid	Embedded System Design	1st Edition	John Wiley
Lyla B Das	Embedded Systems	1st Edition	Pearson
David E. Simon	An Embedded Software Primer	1st Edition	Pearson Education

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Natural Language Processing **Credit: 03**

Subject Code: MCA402D **Lecture Hours: 40 Hrs.**

Name of the Course: Embedded Systems	
Course Code: MCA402D	**Semester: 4**
Duration: 40	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 100
Tutorial: 1	Continuous Assessment: 100
Credit: 3	

Aim:	
Sl. No.	
1	To enable computers to understand, interpret, and generate human language to bridge the gap between human communication and machine processing.
2	To allow NLP for the creation of systems that can perform tasks like answering questions, translating languages, summarizing documents, and conversing with users, as well as improving data analysis from text and speech.
3	To create systems that can produce coherent and natural-sounding text or speech from structured data.

Objective:	
Sl. No.	
1	To teach the fundamentals of NLP, and also to make them for understanding CFG, PCFG in NLP.
2	To know the role of semantics of sentences and pragmatic.
3	To teach the basic concepts of speech processing along with analysis and modeling.
Pre-Requisite:	
Sl. No.	
1.	Strong programming skills (especially in Python), a solid foundation in mathematics and statistics (including linear algebra and probability) and knowledge of machine learning concepts.
Course Outcome:	
1.	learn the fundamentals of natural language processing
2.	understand the use of CFG and PCFG in NLP
3.	understand the role of semantics of sentences and pragmatic
4.	Introduce Speech Production and Related Parameters of Speech.
5.	Show the computation and use of techniques such as short time fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	**Introduction**	Origins and challenges of nlp – language modeling: grammar-based lm, statistical lm – regular expressions, finite-state automata – english morphology, transducers for lexicon and rules, tokenization, detecting and correcting spelling errors, minimum edit distance	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	8
2	**Word Level Analysis**	Unsmoothed n-grams, evaluating n-grams, smoothing, interpolation and backoff – word classes, part-of-speech tagging, rule-based, stochastic and transformation-based tagging, issues in pos tagging – hidden markov and maximum entropy models.	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	4
3	**Syntactic Analysis**	Context free grammars, grammar rules for english, treebanks, normal forms for grammar – dependency grammar – syntactic parsing, ambiguity, dynamic programming parsing – shallow parsing – probabilistic cfg,	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	8

		probabilistic cyk, probabilistic lexicalized cfgs – feature structures, unification of feature structures.		
4	**Semantics And Pragmatics**	Requirements for representation, first-order logic, description logics – syntax-driven semantic analysis, semantic attachments – word senses, relations between senses, thematic roles, selectional restrictions – word sense disambiguation, wsd using supervised, dictionary & thesaurus, bootstrapping methods – word similarity using thesaurus and distributional methods.	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	6
5	**Basic Concepts of Speech Processing**	Speech fundamentals: articulatory phonetics – production and classification of speech sounds; acoustic phonetics – acoustics of speech production; review of digital signal processing concepts; short-time fourier transform, filter-bank and lpc methods.	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	6
6	**Speech-Analysis, Speech Modelling**	Features, feature extraction and pattern comparison techniques: speech distortion measures– mathematical and perceptual – log–spectral distance, cepstral distances, weighted cepstral distances and filtering, likelihood distortions, spectral distortion using a warped frequency scale, lpc, plp and mfcc coefficients, time alignment and normalization – dynamic time warping, multiple time – alignment paths. Hidden markov models: markov processes, hmms – evaluation, optimal state sequence – viterbi search, baum-welch parameter re-estimation, implementation issues.	https://onlinecourses.nptel.ac.in/noc19_cs56/preview	8

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Daniel Jurafsky, James H. Martin	Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech		Pearson Publication
Steven Bird, Ewan Klein and Edward Loper	Natural Language Processing with Python		OReilly Media
Lawrence Rabiner And Biing-Hwang Juang	Fundamentals Of Speech Recognition		Pearson Education
Daniel Jurafsky And James H Martin	Speech And Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, And Speech Recognition		Pearson Education
Reference Books:			
Frederick Jelinek	Statistical Methods Of Speech Recognition		MIT Press
Breck Baldwin	Language Processing with Java and LingPipe Cookbook		Atlantic Publisher
Richard M Reese	Natural Language Processing with Java		OReilly Media

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Values and Ethics **Credit: 03**

Subject Code: MCA403 **Lecture Hours: 40 Hrs.**

Name of the Course: Values and Ethics		
Course Code: MCACC403		**Semester: 4th**
Duration: 40 Hrs.		**Maximum Marks: 100**
Teaching Scheme		**Examination Scheme**
Theory: 1		End Semester Exam: 100
Tutorial: 1		Continuous Assessment: 100
Credit: 1		
Aim:		
Sl. No.		
1	To gain knowledge of various aspects general ethics and energy in life.	
2	To get ability to identify relations among technology, engineering and human aspects	
3	To implement values in various aspects of life with morality.	

Objective:	
Sl. No.	
1	An ability to analyze a problem, then identify and formulate the computing requirements appropriate to its solution
2	Development of Solutions- An ability to design, implement and evaluate a Computer based problems with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
3	Conduct investigations of complex problem – An ability to design and conduct experiments, as well as to analyze and interpret data to reach valid conclusions.
Pre-Requisite:	
Sl. No.	
1.	Knowledge in General Studies, Fundamentals of Computers, Proficiency in Communication Skills.
Course Outcome:	
1.	Understanding the importance and role of science, technology and engineering as knowledge and social-professional world, know the technological growth
2.	To realize the importance of energy as resource and crisis in energy, understand the effect of degradation and pollution of environment, introduce eco-friendly technology.
3.	To choose the appropriate technology for development, understand the transfer, assessment and impact of technology, learn the role of human resource in engineering , man-machine interaction, impact of automation, introduce human-centric technology..
4.	To determine the relation between profession and human values like value crisis in society, life, personality and mental health. know the role/importance of values in law, justice in Indian perspective, know the aesthetic values, learning the relation between morality and ethics and virtue ethics.
Relevant Links:	
VE Study Material	VE NPTEL LINK VE Coursera Link VE LinkedIn Learning Link

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

Module number	Topic	Subtopics	Mapping withIndustry and International Academia	Lecture Hours
1	**Introduction and Relation with Energy**	. Science, Technology and Engineering as Knowledge and as Social and Professional Activities Effects of Technological Growth Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth. Energy Crisis; Renewable Energy Resources Environmental degradation.	***International Academia:*** (https://ocw.mit.edu/courses/211-450-literature-and-ethical-values-fall-2002/pages/syllabus/) ***AICTE-prescribed syllabus:*** (https://www.aicte-india.org/downloads/mcadegree.pdf) ***Industry Mapping: Case Studies, Fieldwork***	12
2	**Human, Technology and Engineering Ethics**	Technologies. Environmental Regulations. Environmental Ethics Appropriate Technology Movement of Schumacher Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Engineering profession: Ethical issues in engineering practice.	International Standards (https://ocw.mit.edu/courses/211-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: (https://www.aicte-	12

		Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists	india.org/downloads/mcadegree.pdf) Industry Mapping: Case Study based, Field analysis, CSR	
3	**General Values**	Nature of values: Value Spectrum of a 'good' life Psychological values: Integrated personality; mental health	International Standards : (https://ocw.mit.edu/courses/211-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: (https://www.aicte-india.org/downloads/mcadegree.pdf) Industry Mapping: Case studies, GAP analysis, Ethical audit	8
4	**Other Types of Values and Morality**	The modern search for a 'good' society, Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility	International Standards: (https://ocw.mit.edu/courses/211-450-literature-and-ethical-values-fall-2002/pages/syllabus/) AICTE prescribed syllabus: (https://www.aicte-india.org/downloads/mcadegree.pdf) Industry Mapping: Case study, organization visits, HR Policies.	8

List of Books Text Books:			
Name of Author	**Title of the Book**	**Edition**	**Name of the Publisher**
S.K. Sarangi	Values & Ethics of Profession & Business(Chapter No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 16)	2nd edn	Asian Books
Reference Books:			
Manna, Chakraborti	Values and Ethics in Business and Profession (Chapter No. 4, 5, 6)	1st edn	PHI
Chattopadhyay, Singh	Ethics & Values for Engineers & Managers (Chapter No. 3, 4)	1st edn	HPH

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

Subject Name: Management and Accounting **Credit: 03**

Subject Code: MCA405 **Lecture Hours: 21 Hrs.**

Name of the Course: Management and Accounting	
Course Code: MCA405	**Semester:**
Duration: 21	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 2	End Semester Exam: 100
Tutorial:	Continuous Assessment: 100
Credit: 2	

Aim:	
Sl. No.	
1	To gain Knowledge of basic aspects of Management
2	To enhance Ability to identify qualities of a good Management Control and Strategy
3	To implement learned Concept of Financial and Cost Accounting to solve problems

Objective:	
Sl. No.	
1	The fundamental in basic in Management
2	Basic concepts in the Management control and strategy
3	Principles of Financial Accounting
4	Significance of Cost Accounting in the Accounting field
Pre-Requisite:	
Sl. No.	
1.	Proficiency in Basic of Management and Accounting
Course Outcome:	
1.	On completion of this course students are expected to learn various Concept of Planning, scheduling, organizing, staffing, directing, controlling Managerial economics
2.	On completion of this course students are expected to design Management Control system.
3.	On completion of this course students are expected to do a comparative analysis among different Financial statement and Financial accounting used in a given scenario.
4.	On completion of this course students are expected to acquire adequate knowledge and skills to solve a real-life Cost Volume Profit analysis and budgeting
Relevant Links:	
MA Study Material	MA NPTEL LINK MA Coursera Link MA LinkedIn Learning Link

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

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Basics of management	Planning, scheduling, organizing, staffing, directing, controlling Managerial economics and financial management, productivity management Human resource development and management, selection, training and role of IT	***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	Management Control Systems	Introduction to management control systems: goals, strategies; Performance measures	***AICTE-prescribed syllabus:*** https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf ***Industry Mapping:*** The concepts delivered are in sync with the industry standards	3
3	Strategy	Firm and its environment, strategies and resources, industry structure and analysis, corporate strategies and its evaluation, strategies for growth and diversification, strategic planning	***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
4	Financial Accounting	Financial statements and analysis Conceptual framework of cost accounting. Financial accounting computer packages.	***AICTE-prescribed syllabus:*** ***https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf*** ***Industry Mapping: The concepts delivered are in sync with the industry standards***	5
5	Cost Accounting	Cost-volume profit (CVP) relationship, budgeting, cost accumulation system, variable and absorption costing system	***AICTE-prescribed syllabus:*** ***https://makautexam.net/aicte_details/Syllabus/MCA/sem221.pdf*** ***Industry Mapping: The concepts delivered are in sync with the industry standards***	5

List of Books Text Books:			
Name of Author	**Title of the Book with Book Chapter**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Khan & Jain	Management Accounting	8th Edition	Mc Graw Hill
Harold Koontz	Essentials of Management	11th Edition	Mc Graw Hill
Reference Books:			
Ramchandran	Accounting for Management (Management Accounting)	2nd Edition	Scitech Publications

University of Engineering and Management
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

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

Subject Code: MCA(GS)401 **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**	**Textbook: IGNOU** **1. Balance of Payment**(BECC-106, Block-3, Unit-8) http://egyankosh.ac.in//handle/123456789/75074 **2. Poverty (BECC-112, Block-3, Unit-9)** http://egyankosh.ac.in//handle/123456789/83224 **3. Unemployment-(related to schemes) (BECC-106, Block-2,**	***International Exams*** ***1.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 Defence Services (https://upsc.gov.in/sites/def***	48	1. **Balance of Payments**: Write a case study on the BoP crisis India faced in 1991.. 2. **Poverty and Unemployment-** Compare and contrast two major poverty alleviation schemes in India. Discuss their methodologies, target groups, and effectiveness in addressing poverty. 3. **Different types of Goods** Write an essay on the role of different types of goods in daily life. **4. Fiscal Policy of India.** Research the fiscal policy measures taken by the Indian government during recent economic crises, such

		Unit-6) http://egyankosh.ac.in//handle/123456789/75067 **4. Different types of Goods (BECC-101, Block-6, Unit-16)** http://egyankosh.ac.in//handle/123456789/67496 **5. Fiscal Policy of India.(BECC-109, Block-3, Unit-9)** http://egyankosh.ac.in//handle/123456789/76562 **GK and Current Affairs** – Based on Monthly Magazines provided and recentnews of national and international importance. **Newspaper Reading:** The Economic Times.**Traditional GK and CA**: Capitals of countries, currency of countries, important dates,	***ault/files/Notif-CDS-I- Exam-2023-Engl-211222.pdf), pg 20-21*** ***2. RBI Grade B (https://rbidocs.rbi.org.in/rdocs/Content/PDFs/DADVTGRB09052023FA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23*** ***3. IBPS Probationary officer(https://www.ibps.in/wp-content/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg 7.*** ***4. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22*** ***5. Intelligence Bureau ACIO (https://www.pw.live/exams/wp-content/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***6. XAT (https://xat.org.in/xat-syllabus/)***		as the 2008 global financial crisis or the COVID-19 pandemic. 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.

		Sports football, hockey, recent events & awards etc. Important books & authors, Important Hydropower dams, atomic power plant s, important national parks,Minister & portfolio & constituencies, Population census, Persons in news -most famous,popular recent only, Important dances & festivals of Indian states,International Head Quarters & world organization, Important president & pm elected from various countries, Important about banks like payment banks, small banks& license system, Awards, Sports, Books & author, National & International affairs	***7. GATE (https://gate2024.iisc.ac.in/papers-and-syllabus/)*** ***8. CAT https://iimcat.ac.in/per/g01/pub/756/ASM/WebPortal/1/index.html?756@@1@@1*** ***State Level Exams:*** ***9. Civil Services Executive Exam (WBCS) (https://wbpsc.gov.in/Download?param1=20230225142430_Syllabus.pdf&param2=advertisement, pg 1*** ***10.* Miscellaneous Services Recruitment Examination (file:///C:/Users/UEMK/Downloads/2707970_2019.pdf), pg 1***		

References

1. Indian Economy-Ramesh Singh

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Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur
Syllabus for MCA Admission Batch 2024, 4th Semester

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

Subject Code: MCA(GS)481 **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 Permutation & Combination: Numbers, Alphabets, Linear arrangement, Circular arrangement, Repetition, Selection based Probability: Coins, Dices, Drawing of balls, Cards, Numbers, Miscellaneous.	***International Exams*** ***1. 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 ***2. UPSC Combined Defence Services***	12	1. Permutation & Combination a. How to arrange different numbers in different sequences. b. Questions based on Alphabet arrangements. c. Problems based on linear and circular arrangements. d. Problems based on garlands and Necklaces. e. Problems based on selection of things and persons. 2. Probability a. Problems based on different numbers of coin tossed. b. Problems based on rolling dices.

		Mensuration – Rectangle, Square, Triangle, Rhombus, Parallelogram, Cylinder, Cone, Sphere, Hemisphere Geometry-. Lines, Angles, Triangles, Quadrilateral and circles.	***(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/rdocs/Content/PDFs/DADVTGRB09052023EA65E4FB1C2CF473396B4FD7E5F69CDDE.PDF), pg 22-23*** ***4. IBPS Probationary officer(https://www.ibps.in/wp-ontent/uploads/Detailed-Advt.-CRP-PO-XII.pdf) , Pg7.*** ***5. Combined Graduate Level conducted by SSC (https://ssc.nic.in/SSCFileServer/PortalManagement/UploadedFiles/notice_CGLE_03042023.pdf) pg. 20-22*** ***Intelligence Bureau ACIO (https://www.pw.live/exams/wp-ontent/uploads/2023/11/IB-ACIO-Recruitment-2023-Notification-Emp-News.pdf)*** ***7. XAT (https://xat.org.in/xat-syllabus/)*** ***8. GATE***		c. Problems based on forming of committees based on selection. 3. Problems based on drawing of cardsMensuration. a. Problems based on 2D and 3D shapes. b. Finding area based on mixed shapes. c. Finding the volume based on different shapes. d. Problems based on Prism Pyramid. 4. Geometry: a. Problems based on Lines and Angles. b. Problems based on complementary, supplementary, corresponding, alternative angles. c. Problems based on acute, right, obtuse, scalene, equilateral, isosceles triangles. d. Basis problems based on Quadrilaterals. e. Basic Problems based on chords and tangents. d. ** All the assignments are in line of GSPaper I of UPSC CSE Mains Examination

			(https://gate2024.iisc.ac.in/papers-and-syllabus/) *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/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: Verbal and Non Verbal reasoning** **Author: R.S Agarwal** **Publishing House: S.Chand** **1) Calendar** **2) Analogy & Classification** **3) Dice & Cube, Puzzles and Sitting Arrangement**	***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)***	12	**1. Calendar** **a. Problems based basic structure of a calendar and a concept of an odd day.** **b. Problems based on leap year in centuries.** **c. Problems based on exact day and comparison of day.** **d. Finding the day when another day is given or not given.**

			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/UEM*		**2. Analogy & Classification** **a. Problems based on letter or word based analogy.** **b. Problems based on Number based analogy.** **c. Problems based on Mixed analogy.** **d. Problems based on image analogy.** **3. Dice & Cube** **a. Problems based on standard dice and ordinary dice.** **b. Problems based on single dice.** **c. Problems based on two or more dices.**

			K/Downloads/2707970_2019.pdf), pg 1		
3	**Verbal English- 2**	**Textbook: Objective General English** **Author: R.S Agarwal** **Publishing house: S.Chand** **1) Application of Adverbs** **2) Active Passive Voice** **3) Direct and Indirect Speech** **4) Reading Comprehension** **5) Email Blogs**	***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/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*** ***4. Intelligence Bureau ACIO***	12	**1. Application of Adverbs Practice set based on Spotting the Error.** **2. Active Passive Voice Practice set based on conversion of active sentences to passive and vice-versa** **3. Direct and Indirect Speech Practice set based on conversion of direct speech to indirect speech and vice-versa** **4. Reading Comprehension Reading unseen passages and answering questions based on the same** **5. Technical Report Writing Need to submit assignment with one report written on each type of technical report namely White paper,**

			(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*		**Case Studies, Technical Proposals, SDK Documentation**