

R24

MCA I SEM

REGULAR EXAMINATIONS

JAN./FEB. 2025

END EXAMINATION QUESTION PAPERS

I MCA I Semester Regular Examinations, January-2025

Sub Code: R24MCA101

DATA STRUCTURES

R24

Time: 3 hours

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M	
1	Unit-I				
	a	i) Write a C program to check whether the given number is prime or not?	L3	1	6M
		ii) Define loop? Explain the working of 'exit control loop' with suitable example?	L2	1	6M
	OR				
	b	i) What is an array? Briefly explain any two ways of initializing two dimensional arrays with an example?	L2	1	6M
	ii) Distinguish among <i>Array</i> , <i>Structure</i> and <i>Union</i> .	L4	1	6M	
2	Unit-II				
	a	i) Distinguish between "call by value" and "call by reference" ? Illustrate with an example.	L4	2	6M
		ii) Define Recursion? What are the essential characteristics of any recursive function? Briefly explain.	L1, L2	2	6M
	OR				
	b	i) Write a C program to create a text file, store information in it and read the contents from file?	L3	2	6M
	ii) What is pointer? Illustrate the process of declaring a pointer and accessing the value of a variable using that pointer?	L1, L2	2	6M	
3	Unit-III				
	a	i) Write short note on the asymptotic notations that are used to represent Worst Case and Best Case run time complexity of an algorithm ?	L1	3	6M
		ii) Define Data Structure ? Distinguish between 'linear' and 'non linear' data structures? Give an example to each category of Data Structures	L2	3	6M
	OR				
	b	i) Briefly discuss the advantages and limitations of Linked List representation as compared to Array representation.	L2	3	6M
	ii) Design an algorithm to reverse the double linked list.	L6	3	6M	
4	Unit-IV				
	a	i) Illustrate the application of Stack in expression evaluation with an example.	L2	4	6M
		ii) Define Stack. Write algorithms to perform PUSH and POP operations on Stacks.	L1	4	6M
	OR				
	b	i) Create the Hash table with the following list of numbers using "%11" as hash function and follow 'linear probing' method to handle collisions: 23, 12, 40, 75, 78, 90, 35, 30, 10	L3	4	6M
	ii) What is hashing ? Explain about <i>separate chaining</i> collision resolution technique.	L2	4	6M	
5	Unit-V				
	a	i) Sort the following list of numbers using Selection Sort method and clearly show the sequence of steps/iterations : 5,7,1,2,3,55,32,22,19,10	L3	5	6M
		ii) Design an algorithm to merge two sorted lists into a single sorted list	L6	5	6M

	OR			
b	i) Define Binary Search Tree? Construct a Binary Search Tree with the following numbers and traverse it in Inorder. 27,10,24,37,18,59,20,51,63,2	L1, L3	5	6M
	ii) Define AVL tree? Briefly explain different kinds of Rotations needed to balance the AVL tree with examples.	L1, L2	5	6M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I MCA I Semester Regular Examinations, January-2025

Sub Code: R24MCA102

COMPUTER ORGANIZATION

R24

Time: 3 hours

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M	
1	Unit-I				
	a	i) Explain the functional units of Computer with neat sketch	2	1	6M
		ii) Explain the parameters to measure the performance of computer	2	1	6M
	OR				
	b	i) Compare and Contrast RISC and CISC	4	1	6M
		ii) Compare and Contrast multi processors and multi computers	4	1	6M
2	Unit-II				
	a	i) Perform the arithmetic operations below with binary numbers and with negative numbers in signed 2's complement. Use seven bit to accommodate each number together with its sign. i) -35 + -40 ii) -35 + +40	3	2	6M
		ii) Perform the following: i) $(110.101)_2 = ()_{10}$ ii) $(1.10101)_2 = ()_{10}$ iii) $(11010.1)_2 = ()_{10}$	3	2	6M
	OR				
	b	i) Explain the different types of addressing modes in detail	2	2	12M
	3	Unit-III			
a		i) Explain the interrupts for handling multiple device	2	3	6M
		ii) Explain the method of DMA transfer. How does a DMA controller improve the performance of a computer	2	3	6M
OR					
b		i) Discuss about ARM interrupt structure	2	3	6M
		ii) Explain about standard interfaces	2	3	6M
4	Unit-IV				
	a	i) Explain ROM and RAM with respect to their block diagrams	2	4	6M
		ii) How to map a virtual address to physical address? Explain address mapping with pages and associative memory page table	2	4	6M
	OR				
	b	i) The access time of a cache memory is 100 ns and that of main memory 1000 ns. It is estimated that 80 percent of the memory requests are for read and the remaining 20 percent for write. The hit ratio for read accesses only is 0.9. A Write-through procedure is used i) What is the average access time of the system considering only memory read cycle? ii) What is the average access time of the system for both read and write requests? iii) What is the hit ratio taking into consideration the write cycles?	3	4	12M
	5	Unit-V			
a		i) Discuss about multistage interconnection networks	2	5	6M
		ii) Explain the instruction pipeline with neat sketch	2	5	6M
OR					
b		i) Explain the solutions of cache coherence problem	2	5	12M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I MCA I Semester Regular Examinations, January-2025

Sub Code: R24MCA103

DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

Max. Marks: 60

R24

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M
Unit-I				
1	a i) Explain in-detail about three levels of architecture With neat diagram and example	2	1	6M
	ii) What is an ER diagram? Draw an ER diagrams for the entity set, relationship set and a ternary relationship set?	2	1	6M
	OR			
	b i) List and explain different database languages in-detail. ii) Construct an ER diagram for banking enterprise	2	1	6M
Unit-II				
2	a i) What are the integrity constraints over relations? Explain briefly with suitable examples.	2	2	6M
	ii) With a suitable example, explain the division and set operator of Relational algebra	2	2	6M
	OR			
	b i) Differentiate between Procedural and Declarative Query languages with suitable examples. ii) What is JOIN operator in DBMS? Explain all the variations of the JOIN operation in relational algebra with a suitable example	2	2	6M
Unit-III				
3	a i) What are triggers in DBMS? How triggers are used to enforce complex integrity constraints in DBMS?	2	3	6M
	ii) Distinguish working principles of 3NF and BCNF in normalization.	2	3	6M
	OR			
	b i) What are the aggregate operations used in SQL? Explain with suitable queries? ii) What is dependency preservation property for decomposition? Explain why it is important	2	3	6M
Unit-IV				
4	a i) Explain the steps followed for schema refinement in database design?	2	4	6M
	ii) Explain the Two-Phase Locking protocol and its variants	2	4	6M
	OR			
	b i) Explain various anomalies that arise due to interleaved execution of transactions with suitable examples ii) Explain the need of commit, rollback and save point operations in transaction management.	2	4	6M
Unit-V				
5	a i) Discuss briefly about primary and secondary indexes? Explain their role in indexing the tables with suitable example.	2	5	6M
	ii) Write the significant differences between B-Trees and B+ Trees for creating dynamic indexes in DBMS.	2	5	6M
	OR			
	b i) How to use hash-based indexing? Explain briefly and differentiate it from other indexing mechanisms. ii) Discuss in-detail about Indexed Sequential Access Method	2	5	6M

I MCA I Semester Regular Examinations, January-2025

R24

Sub Code: R24MCA104

OPERATING SYSTEMS

Max. Marks: 60

Time: 3 hours

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M			
Unit-I							
1	a	i) Explain different types of operating systems			2	1	6M
		ii) What is an Operating system? Describe the Operating-System Functions?			2	1	6M
	OR						
	b	i) Explain different categories of System calls with suitable examples			2	1	12M
Unit-II							
2	a	i) What are the advantages of inter-process communication? How communication takes place in a shared-memory environment? Explain.			2	2	6M
		ii) Explain the steps involved in process creation and process termination.			2	2	6M
	OR						
		b	i) Write about i) Process Control Block ii) CPU scheduling algorithm evaluation			2	2
	ii) Explain the Round Robin and priority scheduling algorithm with a suitable example			3	2	6M	
Unit-III							
3	a	i) Give a solution to Readers-Writers problem using Monitors			3	3	6M
		ii) What are the semaphores? How do they implement mutual exclusion?			2	3	6M
	OR						
		b	i) What is a deadlock? How deadlocks are detected? Explain			2	3
	ii) Explain how to recover the system from a deadlock.			2	3	6M	
Unit-IV							
4	a	i) Explain various types of memory Allocation techniques with advantages and disadvantages			2	4	6M
		ii) Explain the concept of demand paging in detail with neat diagram			2	4	6M
	OR						
	b	i) Explain FCFS and SSTF Disk Scheduling schemes and also Discuss the Indexed File allocation method with an example			2	4	12M
Unit-V							
5	a	i) Explain the kernel modules and process management in Linux system			2	5	12M
	OR						
	b	i) Explain the system components in Windows7			2	5	12M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

I MCA I Semester Regular Examinations, January-2025

R24

Sub Code: R24MCA105 MATHEMATICAL & STATISTICAL FOUNDATIONS

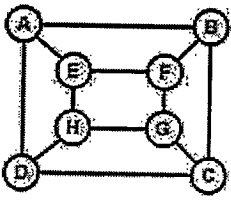
Time: 3 hours

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M																
1	Unit-I																			
	a	i) A five figure number is formed by the digits 0, 1, 2, 3, 4 without repetition. Find the probability that the number formed is divisible by 4.	3	1	6M															
		ii) A problem in mechanics is given to three students A, B and C whose chances of solving it are 1/2, 1/3 and 1/4 respectively. What is the probability that the problem will be solved.	2	1	6M															
	OR																			
	b	A random variable X has the following probability function: <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">X</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">3</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">6</td> </tr> <tr> <td style="padding: 5px;">P(x)</td> <td style="padding: 5px;">K</td> <td style="padding: 5px;">3k</td> <td style="padding: 5px;">5k</td> <td style="padding: 5px;">7k</td> <td style="padding: 5px;">9k</td> <td style="padding: 5px;">11k</td> <td style="padding: 5px;">13k</td> </tr> </table> Determine i) k ii) $p(x < 4)$, $p(x \geq 4)$, $p(0 < x < 5)$ and $p(0 \leq x \leq 4)$ iii) the distribution function of x iv) mean v) variance	X	0	1	2	3	4	5	6	P(x)	K	3k	5k	7k	9k	11k	13k	3	1
X	0	1	2	3	4	5	6													
P(x)	K	3k	5k	7k	9k	11k	13k													
	ii) A die is tossed thrice. A success is getting 1 or 6 on a toss. Find the mean and variance of the number of successes.	4	1	6M																
2	Unit-II																			
	a	A population consists of five numbers 2,3,6,8,11. Consider all possible samples of size two which can be drawn with replacement from this population. Identify a) the mean of the population b) the standard deviation of the population c) the mean of the sampling distribution of means d) the standard deviation of the sampling distribution of means	4	2	12M															
	OR																			
	b	i) In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails.	3	2	6M															
	ii) Find 99% confidence limits for the mean of a normality distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14	3	2	6M																
3	Unit-III																			
	a	i) The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5cm.	4	3	6M															
		ii) A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 0.05 level.	3	3	6M															
	OR																			
b	i) In a random sample of 60 workers, the average time taken by them to get to the work is 33.8 minutes with a standard deviation of 6.1 minutes. Inspect can we reject the null hypothesis $\mu = 32.6$ minutes in favour of alternative hypothesis $\mu > 32.6$ at $\alpha = 0.05$ level of significance.	5	3	6M																

		ii) Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level	3	3	6M
4	Unit-IV				
	a	i) Find the values of u and v such that $\gcd(24,36)=24u+36v$	3	4	6M
		ii) Using prime factorisation find the gcd, lcm (35,46)	2	4	6M
	OR				
b	i) Show that the set of all fourth roots of unity forms an abelian group with respect to the binary operation of multiplication	4	4	6M	
	ii) Find the prime numbers less than or equal to 100.	3	4	6M	
5	Unit-V				
	a	i) Show that the following graph is Hamiltonian Graph. Verify if it is Eulerian.	2	5	6M
					
		ii) Give an example of a graph which is both Hamiltonian and Eulerian	1	5	6M
	OR				
b	i) Define the necessary and sufficient conditions to specify that two graphs are isomorphic? Explain with an example.	1	5	6M	
	ii) Give an example of a graph which is Eulerian but not Hamiltonian.	4	5	6M	

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks
