



Shri Shankaracharya Institute of Professional Management and Technology, Raipur

Department of Computer Science and Engineering

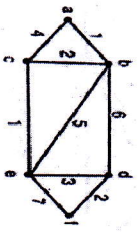
Class Test – II Session: January - June 2023 Month - June 2023

Semester: 4th [A & B] Subject: Discrete Mathematics Code: B022411(014)

Time Allowed: 2 Hours

Max Marks: 40

Note: - Attempt any THREE from Unit – III, IV. Attempt any two from Unit V.

Q. N.	Question	Marks	Unit – III, IV	
			Levels of Bloom's Taxonomy	COs
1.	a) Show that maximum number of edges in simple graph with n vertices is $\frac{n(n-1)}{2}$ b) Give an example of graph which is Hamiltonian but not Eulerian.	8	Applying	CO4
2.	Apply Dijkstra's algorithm to graph and find shortest path from a to f 	8	Evaluating	CO4
3.	Show that set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \frac{(ab)^2}{2}$	8	Applying	CO3
4.	a) Define Euler and Hamiltonian graph. b) Draw the undirected graph G corresponding to adjacency matrix $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 2 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$	8	Applying	CO4
Unit – V				
1	a) State Pigeon hole principle b) Show that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$	8	Applying	CO5
2.	a) Explain Generating Functions. b) Use generating function to solve recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0, a_0 = -3, a_1 = -10$	8	Evaluating	CO5



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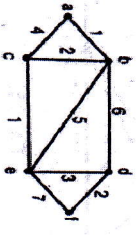
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Max Marks: 40

Note: - Attempt any THREE from Unit – III, IV. Attempt any two from Unit V.

Q. N.	Question	Marks	Unit – III, IV	
			Levels of Bloom's Taxonomy	COs
1.	c) Show that maximum number of edges in simple graph with n vertices is $\frac{n(n-1)}{2}$ d) b) Give an example of graph which is Hamiltonian but not Eulerian.	8	Applying	CO4
2.	Apply Dijkstra's algorithm to graph and find shortest path from a to f 	8	Evaluating	CO4
3.	Show that set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \frac{(ab)^2}{2}$	8	Applying	CO3
4.	c) Define Euler and Hamiltonian graph. d) Draw the undirected graph G corresponding to adjacency matrix $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 2 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$	8	Applying	CO4
Unit – V				
1	c) State Pigeon hole principle d) Show that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$	8	Applying	CO5
2.	c) Explain Generating Functions. d) Use generating function to solve recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0, a_0 = -3, a_1 = -10$	8	Evaluating	CO5



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Class Test – II Session: January - June 2023 Month - June 2023

Semester: 4th [C] Subject: Discrete Mathematics Code: B022411(014)

Time Allowed: 2 Hours

Max Marks: 40

Note: - All Questions Compulsory.

Q. N.	Question	Marks	Levels of Bloom's Taxonomy	COs
Q 1	Define equivalence relation. If R is an equivalence relation in the set A , then prove that R^{-1} is also an equivalence relation.	[2+6]	Apply	CO2
Q 2	If $f: X \rightarrow Y$ and $g: Y \rightarrow Z$ be one-one onto mapping, then prove that the mapping $g \circ f: X \rightarrow Z$ is also one-one onto and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.	[8]	Apply	CO2
Q 3	Explain the concept of mathematical induction apply to prove $P(n) = \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \dots + \frac{1}{2^n} = 1 - \frac{1}{2^n}$	[2+6]	Apply	CO3
Q 4	Find all the solution by recurrence relation: $a_n = 5a_{n-1} - 6a_{n-2} + 2^n + 3n$	[8]	Apply	CO3
Q 5	Write Pigeon Hole principle. What is the minimum number of students required in a class to be sure that at least five will receive the same grade if there are four possible grades A, B, C and D.	[2+6]	Apply	CO3



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Class Test – II Session: January - June 2023 Month - June 2023

Semester: 4th [C] Subject: Discrete Mathematics Code: B022411(014)

Time Allowed: 2 Hours

Max Marks: 40

Note: - All Questions Compulsory.

Q. N.	Question	Marks	Levels of Bloom's Taxonomy	COs
Q 1	Define equivalence relation. If R is an equivalence relation in the set A , then prove that R^{-1} is also an equivalence relation.	[2+6]	Apply	CO2
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Note: - All Questions are compulsory.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
1.	Calculate the Following problems using Booth's Algorithm: a) $(+13) \times (-6)$ b) $(-13) \times (+6)$	[8]	Apply	CO2
2.	With the help of schematic diagram, explain how virtual memory can be realized.	[8]	Understanding	CO3
3.	With a neat sketch explain the working principle of DMA.	[8]	Understanding	CO4
4.	The access time of cache memory is 100 ns and that of main memory 1000 ns. It is estimated that 80% of the memory request for read and remaining for write. The hit ratio for read access only is 0.9 A write through procedure is used 1. What is the average access time of system considering only memory read? 2. What is the average access time of system for both read and write required?	[8]	Apply	CO3
5.	Consider the execution of the program 15000 instruction a linear pipeline processor with a clock rate of 25MHz. Assume that the instruction pipeline has 5 stages and that one instruction is issued per clock cycle. Calculate 1.Speed up factor 2.Efficiency 3.Throughout	[8]	Apply	CO5



Note: - All Questions are compulsory.

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1.	Calculate the Following problems using Booth's Algorithm: a) $(+13) \times (-6)$ b) $(-13) \times (+6)$	[8]	Apply	CO2
2.	With the help of schematic diagram, explain how associative memory can be realized.	[8]	Understanding	CO2
3.	With a neat sketch explain the working principle of DMA.	[4]	Understanding	CO4
4.	An instruction in pipeline has five stages without any branch prediction and these stages are Instruction Fetch (IF), Instruction Decode (ID), Operand Fetch (OF), Execute (EX) and Operand Write (OW). The stage delays for IF, ID, OF, EX and OW phases are 5 nsec, 7 nsec, 10 nsec, 8 nsec and 6 nsec, respectively.	[8]	Apply	CO5
5.	There are intermediate storage buffers after each stage and the delay of each buffer is 1 nsec. A program consisting of 12 instructions I1, I2, ..., I12 is executed in the pipelined processor. Instruction I4 is the only branch instruction and its branch target is I9. If the branch is taken during the execution of this program, the time needed to complete the program is?	[8]	Apply	CO3
5.	Consider a cache of 256 blocks in size, each block has 2 ⁴ words. The main memory size is 2 ¹² blocks, each block has 2 ⁴ words. How many bits are required for each of the TAG, SET/BLOCK, WORD fields for different mapping techniques? Wherever needed, assume that there are 8 ways in each set.	[8]	Apply	CO3

Note: - All Questions are compulsory.

Q.N	Questions	Marks	Levels of Bloom's taxonomy	COs
1.	Calculate the Following problems using Booth's Algorithm: a) $(+13) \times (-6)$ b) $(-13) \times (+6)$	[8]	Apply	CO2
2.	With the help of schematic diagram, explain how associative memory can be realized.	[8]	Understanding	CO2
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Sri Shankaracharya Institute of Professional Management & Technology

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Class Test – II Session- Jan-June, 2023 Month-June

Sem- 4th (A B & C) Subject- Database Management System Code-B022413(022)

Time Allowed: 2 hrs

Max Marks: 40

Note: - All questions are compulsory.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
Q1	Illustrate the basic steps of query processing with neat diagram	[8]	Apply	CO3
Q2	Demonstrate the different approaches of storage strategies in DBMS	[8]	Apply	CO3
Q3	Evaluate how view serializability is different from conflict serializability in database transaction	[8]	Evaluate	CO4
Q4	Describe Multi-version and Concurrency control scheme	[8]	Analyze	CO4
Q5	Compare DAC, MAC and RBAC the three pillars of security in detail	[8]	Analyze	CO5



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Department of Computer Science and Engineering

Class Test – II Session- Jan-June, 2023 Month-June

Sem- 4th (A B & C) Subject- Database Management System Code-B022413(022)

Time Allowed: 2 hrs

Max Marks: 40

Note: - All questions are compulsory.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
Q1	Illustrate the basic steps of query processing with neat diagram	[8]	Apply	CO3
Q2	Demonstrate the different approaches of storage strategies in DBMS	[8]	Apply	CO3
Q3	Evaluate how view serializability is different from conflict serializability in database transaction	[8]	Evaluate	CO4
Q4	Describe Multi-version and Concurrency control scheme	[8]	Analyze	CO4
Q5	Compare DAC, MAC and RBAC the three pillars of security in detail	[8]	Analyze	CO5

Note: - All the questions are compulsory.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
Q1	Explain the Byte stream and Character stream with suitable program.	8	Apply	CO3
Q2	Explain life cycle of thread . Write programs for - 1- Thread creation using Runnable interface 2- Thread creation using thread class	8	Apply	CO3
Q3	Describe four types of JDBC driver. Write a program to explain the steps of database connectivity .	8	Apply	CO4
Q4	Illustrate socket and serversocket. Write a program to show the client server communication.	8	Apply	CO4
Q5	Illustrate generic method and class with suitable example.	8	Apply	CO5

Note: - All the questions are compulsory.

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Department of Computer Science & Engineering
Class Test – II Session- Jan-June, 2023 Month- June

Sem- B, Tech-IVth Subject-Design and Analysis of Algorithms Subject Code- B022415(022)

Time Allowed: 2 hrs

Max Marks: 40

Note: - Attempt All Questions. All carry equal marks.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
Q1	Using the KMP algorithm find out the pattern in the Text. T=abbababacadba P=acadba	[8]	Applying	CO3
Q2	Apply Longest Common subsequence algorithm and find out the LCS of X and Y, Where: X= A, B, C, B, D, A, B and Y= B, D, C, A, B, A.	[8]	Applying	CO3
Q3	Write the rules of 8-queen problem. Find any one solution of 8-queen problem by using backtracking.	[8]	Applying	CO4
Q4	What is the Subset problem? Given set S= {3,4,5,6} and x=9 obtain the subset sum problem using backtracking approach?	[8]	Applying	CO4
Q5	Solve the 0/1 knapsack problem using Branch and Bound algorithm with following data: Items Weight Value 11 3 4 12 4 5 13 5 6 where W= 7.	[8]	Applying	CO5



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Class Test – II Session- Jan-June, 2023 Month- June

Sem- B, Tech-IVth Subject-Design and Analysis of Algorithms Subject Code- B022415(022)

Time Allowed: 2 hrs

Max Marks: 40

Note: - Attempt All Questions. All carry equal marks.

Q.N.	Questions	Marks	Levels of Bloom's taxonomy	COs
Q1	Using the KMP algorithm find out the pattern in the Text. T=abbababacadba P=acadba	[8]	Applying	CO3
Q2	Apply Longest Common subsequence algorithm and find out the LCS of X and Y, Where: X= A, B, C, B, D, A, B and Y= B, D, C, A, B, A.	[8]	Applying	CO3
Q3	Write the rules of 8-queen problem. Find any one solution of 8-queen problem by using backtracking.	[8]	Applying	CO4
Q4	What is the Subset problem? Given set S= {3,4,5,6} and x=9 obtain the subset sum problem using backtracking approach?	[8]	Applying	CO4
Q5	Solve the 0/1 knapsack problem using Branch and Bound algorithm with following data: Items Weight Value 11 3 4 12 4 5 13 5 6 where W= 7.	[8]	Applying	CO5