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22MCA15

First Semester MCA Degree Examination, Dec.2023/Jan.2024 Design and Analysis of Algorithm

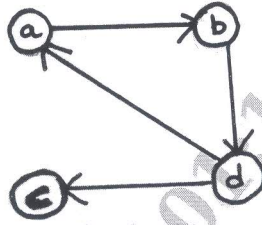
Time: 3 hrs.

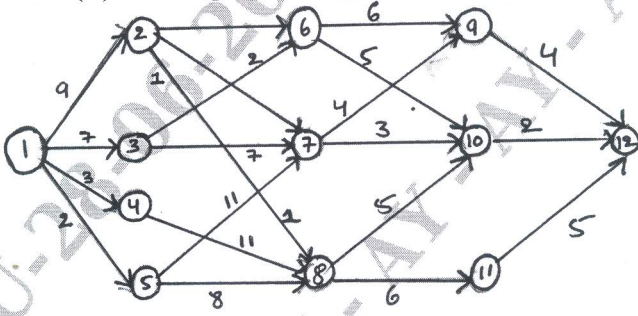
Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

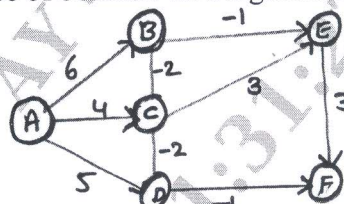
Module – 1			M	L	C												
Q.1	a.	Explain the mathematical analysis of recursive algorithm with an example of finding the factorial of 'n' number.	10	L2	CO1												
	b.	Explain asymptotic notation with example.	10	L2	CO1												
OR																	
Q.2	a.	What is an algorithm? Explain algorithm specification and analysis framework with example.	10	L2	CO1												
	b.	Explain the mathematical analysis of non recursive algorithm with an example.	10	L2	CO1												
Module – 2																	
Q.3	a.	Write an algorithm for merge sort, find the time complexity of merge sort.	10	L2	CO1												
	b.	Explain divide and conquer, explain maximum and minimum using divide and conquer technique.	10	L2	CO1												
OR																	
Q.4	a.	Write an algorithm for quick sort and analyze its efficiency.	10	L2	CO1												
	b.	Write an algorithm for heap sort with example.	10	L2	CO2												
Module – 3																	
Q.5	a.	Write the Prim's algorithm, apply this algorithm to following graph in Fig.Q.5(a) to construct minimum spanning tree.	10	L2	CO1												
	<p style="text-align: center;">Fig.Q.5(a)</p>																
b.	Explain Dijkstra's algorithm with example.		10	L2	CO1												
OR																	
Q.6	a.	Explain knapsack problem by greedy method with example.	10	L2	CO1												
	b.	Find the Huffman code for the following data by obtaining Huffman tree.	10	L2	CO1												
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">Character</td> <td style="padding: 2px;">A</td> <td style="padding: 2px;">B</td> <td style="padding: 2px;">C</td> <td style="padding: 2px;">D</td> <td style="padding: 2px;">E</td> </tr> <tr> <td style="padding: 2px;">Probability</td> <td style="padding: 2px;">0.11</td> <td style="padding: 2px;">0.40</td> <td style="padding: 2px;">0.16</td> <td style="padding: 2px;">0.09</td> <td style="padding: 2px;">0.24</td> </tr> </table>	Character	A	B	C	D	E	Probability	0.11	0.40	0.16	0.09	0.24			
Character	A	B	C	D	E												
Probability	0.11	0.40	0.16	0.09	0.24												

Module - 4

Q.7	<p>a. Write an algorithm to complete transitive closure for the given graph, and obtain the transitive closure for the given graph show in Fig.Q.7(a) using Warshall's algorithm.</p>  <p>Fig.Q.7(a)</p>	10	L2	CO2
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	<p>b. Define multistage graph problem, determine the minimum cost path form source (s) to sink (T) for the graph in Fig.Q.7(b) using forward approach.</p>  <p>Fig.Q.7(b)</p>	10	L2	CO1
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OR

Q.8	<p>a. Solve the below instance of bellmen-ford algorithm.</p>  <p>Fig.Q.8(a)</p>	10	L2	CO1
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	<p>b. Explain travelling sales person problem with example.</p>	10	L2	CO1
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Module - 5

Q.9	<p>a. Explain N-Queue problem using back-tracking method.</p>	10	L2	CO3
	<p>b. Define the following: i) Class P ii) Class NP.</p>	10	L2	CO3

OR

Q.10	<p>a. Apply back tracking technique to solve the below instance of the subset sum problem. $S = \{1, 3, 4, 6\}$ $d = 7$.</p>	10	L2	CO3
	<p>b. Define the following: i) NP complete problem ii) NP hard problem.</p>	10	L2	CO3
