August-2021 PG Examinations

USN | | | | | | | | | | |

18MCE12

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU, Belagavi)

I Semester Master of Technology (Computer Science and Engineering)

ADVANCES IN ALGORITHMS AND APPLICATIONS

Time: 03 Hours ***Maximum Marks: 100***

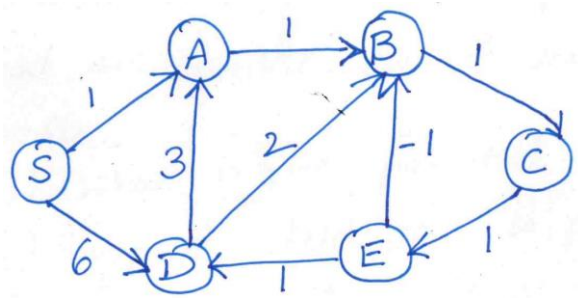
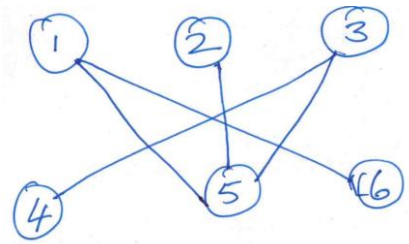
Instructions to candidates:

1. Each unit consists of two questions of 20 marks each.
2. Answer FIVE full questions selecting one from each unit.

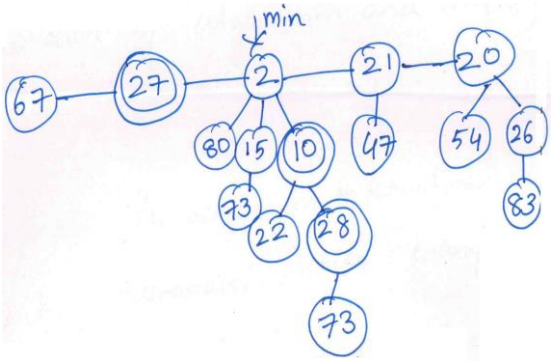
UNIT-1

1	a	Solve the equation $\left[T(n) = T\left(\frac{n}{3}\right) + T\left(\frac{2n}{3}\right) + C_n\right]$ using recurrence method.	08
	b	What is the running time of insertion sort on an array A of length n that is already sorted in increasing order? Given example.	08
	c	Solve the following using Master's theorem. i) $T(n) = 7T\left(\frac{n}{3}\right) + n^2$ ii) $T(n) = 4T\left(\frac{n}{2}\right) + n^2$	04
		OR	
2	a	Illustrate the counting sort on the array $A =< 6,0,2,0,1,3,4,6,1,3,2 >$ and mention time complexity.	10
	b	Prove that $T(n) = 2T\left(\frac{n}{2}\right) + n = 0(n\ logn)$ using substitution method.	10
		UNIT-2	
3	a	Find the longest common sub-sequence for the given strings and trace back the solution. $X = abcaabcba$ $Y = acbabcb$ Calculate time complexity.	08
	b	What is Activity Selection Problem? Find the solution of Activity Selection problem for the following set of activities. What is the time complexity? i: 1 2 3 4 5 6 S_i: 1 3 0 5 8 5 F_i: 2 4 6 7 9 9	08
	c	Explain potential method of amortized analysis.	04
		OR	
4	a	What is matrix chain multiplication problem? Write the algorithm for matrix chain multiplication. Find $'m'$ and $'s'$ table computed by the algorithm for the following matrix dimension. A_1: 30×35 A_2: 35×15 A_3: 15×5 A_4: 5×10 A_5: 10×20 A_6: 20×25	10
	b	Explain Accounting method for stack operations.	05
	c	Discuss elements of greedy strategy with example.	05

UNIT-3

5	a	Apply Bellmanford algorithm on the given graph in Fig. 5.a with source vertex S with all the iterations. What is the complexity of the algorithm?  Fig. 5.a	08
	b	Write Ford-Fulkeroon algorithm and its complexity.	08
	c	Apply maximum matching algorithm to the following bipartic graph in Fig. 5.c.  Fig. 5.c	04
		OR	
6	a	Write Johnson algorithm and discuss its complexity. Write the importance of Dijkstra algorithm in Johnson method.	10
	b	Draw finite automata table and diagram for the pattern $ACACAGA$. Write the complexity.	10

UNIT-4

7	a	Consider the Fibonacci heap given in Fig. 7.a. Nodes that are double circled are marked nodes. i) What is the potential of the heap? ii) Suppose delete_min is performed, show the resulting heap after consolidation.  Fig. 7.a	10
	b	Explain Knuth-Morris-Pratt (KMP) string matching algorithm and show its complexity.	10
		OR	

8	a	Explain operation on disjoint_sets and its union find problem.	10
	b	Write algorithm and give complexity of finite automata string matcher.	07
	c	Generate prefix table for pattern $P = ababaca$.	03

UNIT-5

9	a	Explain the working of the following keywords with respect to parallel programming: i) Parallel ii) Spawn iii) Sync.	08
	b	Compare merge sort algorithm with parallel merge sort algorithm with illustration of algorithm and complexity.	12
		OR	
10	a	Explain dynamic multithreading with Fibonacci series example.	10
	b	Illustrate working of multithreaded matrix multiplication with an example.	10