Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination

March 2020

Max. Marks: 20 | Duration: 1 Hr.
Class: S.Y. | Semester: IV
Course Code:MCA43 | Branch: M.C.A.
Name of the Course: Design and Analysis of Algorithms

Instruction:
(1) All questions are compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Q. No.		Max. Marks	CO-BL-PI
Q.1	Solve the following recurrence relation using recursion tree method. $T(n)=3T(n/4)+n^2$ Solve the following recurrence relation using master method. $T(n)=4T(n/2)+n$ **OR** Analyze the time complexity of merge sort algorithm.	5	CO1-4-1.1.1 CO1-4-2.4.2
Q. 2	Find the multiplication of matrices using Strassen's algorithm. $A=\begin{bmatrix}2 & 3\\ 1 & 2\end{bmatrix}$, $B=\begin{bmatrix}4 & 1\\ 2 & 5\end{bmatrix}$	5	CO2-3-1.2.1
Q. 3	Find the solution of the fractional knapsack problem for n=4, M=120, (P1, P2, P3,P4) = (40, 20,35,50) and (w1, w2, w3, w4) = (25, 30, 40, 45)	5	CO3-3-2.4.1
Q.4	Find the LCS of the sequences s1: ADCBEJM, S2: BACDEBM	5	CO3-3-2.4.1

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SYNOPTIC

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P.T.O.

Class SY MCA MID SEM A4-19-20

DAA - Sem IV march-20

Synoptic

Solution:

Q.1 a) Recurrence tree-05 mark
Cost of each level-05 mark
Depth of tree-05 mark
Total cost-05 mark
} 2.5

b) Masters method formula - 05 mark
Identification of variables-05 mark
Identification of correct case-1 mark
} 2.5

OR

a) Explanation of merge sort algorithm- 1 mark
Analysis of all the cases – 1mark each

Q2) $A=36, B=12, C=-8, D=-4, E=25, F=-5, G=7.$

$C_{11}=14, C_{12}=17, C_{21}=8, C_{22}=11$

$$R=\begin{bmatrix}14 & 17\\ 8 & 11\end{bmatrix}$$

Q.3. $\left(\frac{P_1}{w_1}, \frac{P_2}{w_2}, \frac{P_3}{w_3}, \frac{P_4}{w_4}\right) = (1.6, 0.66, 0.875, 1.11)$

$x_1=1, \quad x_2=\frac{1}{3}, \quad x_3=1, \quad x_4=1$

$\sum w_i x_i = 120, \quad \sum P_i x_i = 131.88.$

Q.4.

Solution: The contents of the array c for the above sequences are shown in *Figure 7.20.*

We see that the length of the longest common subsequence is $c[7][7]$, i.e. 4.

		B	A	C	D	E	B	M
	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
A 1	0	0	1	1	1	1	1	1
D 2	0	0	1	1	2	2	2	2
C 3	0	0	1	2	2	2	2	2
B 4	0	1	1	2	2	2	3	3
E 5	0	1	1	2	2	3	3	3
J 6	0	1	1	2	2	3	3	3

length of LCS = 4

LCS = ACEM
= ADBM
= ACBM