Total No. of Questions : 8] May - 2016

SEAT No. :

P3552

[Total No. of Pages : 3

[4959] - 1151
B.E. (Computer Engineering)
Design & Analysis of Algorithms
(2012 Pattern)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8., Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State which algorithmic strategy is used by Quick sort and Merge sort algorithm? Though they follow same algorithmic strategy their worst case complexities are different? Why (Justify your answer with example). **[8]**

b) What are the general characteristics of branch and bound approach? **[4]**

c) Find an optimal solution for the following knapsack instance using greedy method: **[8]**

Number of objects n = 5, capacity of knapsack m = 100, profits = (10, 20, 30, 40, 50), weights = (20, 30, 66, 40, 60).

OR

Q2) a) Write a short note on use of dynamic programming for Optimal Binary search tree (OBST) for the instance of following example. **[8]**

Example for OBST:

Consider 5 keys with these search probabilities:

$p_1 = 0.25$, $p_2 = 0.2$, $p_3 = 0.05$, $p_4 = 0.2$, $p_5 = 0.3$.

P.T.O.

b) Write control abstraction for Greedy approach. [4]

c) Solve the following recurrence equations using Master theorem. [8]

i) $T(n) = 4T(n/2) + n$.

ii) $T(n) = 4T(n/2) + n^2$.

Q3) a) Explain the concept of Randomized algorithm and Approximation algorithm in brief with example. [8]

b) What is SAT and 3-SAT problem? Prove that the 3-SAT problem is NP complete. [8]

OR

Q4) a) Write one example each of deterministic and nondeterministic algorithm for searching. [8]

b) What are P and NP classes? What is their relationship? Give examples of each class. [8]

Q5) a) Explain parallel computing models in brief. [8]

b) Write an odd-even merge sort algorithm and explain with the following example: [8]

11, 4, 30, 11, 20, 5, 8, 2.

OR

Q6) a) How parallel algorithms can be used to solve graph problems? [8]

b) Use Amdahl's Law : Recent advances in process technology have quadrupled the number transistors you can fit on your die. [8]

- Currently, your key customer can use up to 4 processors for 40% of their application.
- You have two choices:
  - i) Increase the number of processors from 1 to 4.
  - ii) Use 2 processors but add features that will allow the applications to use them for 80% of execution.

Q7) a) Define Internet of Things (IoT). Explain elements of IoT. **[9]**

b) Discuss and analyze Bully algorithm for dynamically selecting a coordinator in distributed system along with its complexity of execution. **[9]**

OR

Q8) a) State different software engineering algorithms and explain in brief. **[9]**

b) Compare KMP and Boycc-Moore algorithm for their complexities and explain any one of the algorithm and analyze it. **[9]**