



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech(CSE)/SEM-1/CST-612/2011-12**

**2011**

**ADVANCED ALGORITHM & DBMS**

Time Allotted : 3 Hours

Full Marks : 70

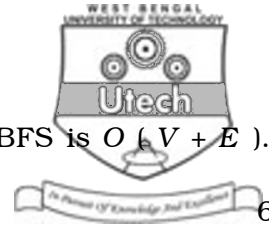
*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

Question No. 1 is compulsory and answer any *two* of the rest.

1. Explain why the statement, "The running time of algorithm A is at least  $O(n^2)$ " is meaningless. 5
2. a) Solve the following Recurrence relation using Master's Theorem : 6
  - i)  $T(n) = 2T(n/2) + n$
  - ii)  $T(n) = 7T(n/3) + n^2$
  - iii)  $T(n) = 4T(n/2) + n$ .
- b) Using the algorithm and mathematical example, prove that Fractional Knapsack problem has the Greedy choice property. 9



3. a) Prove that the total running time of BFS is  $O(V + E)$ .  
Satisfy your answer with example. 6
- b) Show that for each minimum spanning tree  $T$  of  $G$ , there is a way to sort the edges of  $G$  in Kruskal's algorithm so that the algorithm returns  $T$ . 9
4. a) Dijkstra's algorithm always chooses "lightest" and "closest" vertex in  $V-S$  to add to set  $S$ . Explain. 5
- b) Given a weighted, directed graph  $G = (V, E)$  with no negative weight cycles, let  $m$  be the maximum overall pairs of vertices  $u, v \in V$  of the minimum number of edges in a shortest path from  $u$  to  $v$  (shortest path is by weight not the number of edges). Suggest a simple change to the Bellman-Ford algorithm that allows it to terminate in  $m + 1$  passes. 10
5. a) Explain Travelling salesman problem with example. 6
- b) Compare Greedy and Dynamic programming approach with example. 9



**GROUP – B**

Question No. 6 is compulsory and answer any two of the rest.

6. Find the prime and non-prime attributes from the following schema.

Report (S#, C#, StudentName, DateOfBirth, CourseName, PreRequisite, DurationInDays, DateofExam, Marks, Grade).

What do you mean by composite and simple attribute ? 5

7. a) Write ACID properties of Transaction Management System. Write a pair of transaction and check the ACID properties.

- b) Define Homogeneous DDBMS and Heterogeneous DDBMS. 10 + 5

8. a) Differentiate between the following :

Relation satisfying a Functional Dependency and  
Functional Dependency holding on a Relation.

- b) Compute the closure of the following set  $F$  of functional dependencies for relation schema  $R = \{ A, B, C, D, E \}$

$$A \twoheadrightarrow BC$$

$$CD \twoheadrightarrow E$$

$$B \twoheadrightarrow D$$

$$E \twoheadrightarrow A$$

- c) List the candidate keys for  $R$ . Find  $F_c$ . 5 + 5 + 5



9. a) Why is a serializable schedule considered correct ?  
What is the difference between conflict equivalence and view equivalence ?
- b) Every conflict serializable schedule is view serializable schedule. Explain it with an example.
- c) How is precedence graph used for testing Serializability ?  
Explain with an example. 5 + 5 + 5
10. a) Define MVD with suitable example.

- b) Consider the following Employee table :

ENAME	PNAME	DNAME
Kumar	X	Rakesh
Kumar	Y	Rao
Kumar	X	Rao
Kumar	Y	Rakesh

Check the Employee table is in 4NF or not. If yes, write the reason and if not derive the table in 4NF.

- c) What is PJNF ? 5 + 5 + 5

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