

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.TECH (CSE)/SEM-1/CST-612/2012-13  
2012**

**ADVANCED ALGORITHM & DBMS**

Time Allotted : 3 Hours

Full Marks : 70

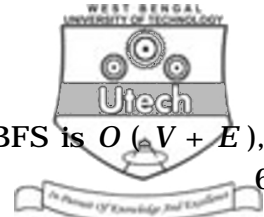
*The figures in the margin indicate full marks.*

*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. Is  $2^{n+1} = O(2^n)$ ? Is  $2^{2n} = O(2^n)$ . 5
  
2. a) Solve the following Recurrence relation using Master's Theorem. 6
  - i)  $T(n) = 2T(n/2) + n$
  - ii)  $T(n) = 7T(n/3) + n^3$
  - 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

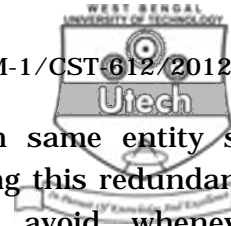


3. a) Prove that the total running time of BFS is  $O(V + E)$ , satisfy your answer with example. 6
- b) Suppose that the Graph  $G = (V, E)$  is represented as an adjacency matrix. Give a simple implementation of Prim's algorithm for this case that runs in  $O(V^2)$  time. 9
4. a) In place of  $while (Q \neq \phi)$  if we write  $while (|Q| > 1)$  in Dijkstra's algorithm. This change causes to execute  $|V| - 1$  times instead  $|V|$  times. Is this proposed algorithm correct, explain. 6
- b) Using a suitable example prove that Bellman-Ford algorithm runs in time  $O(VE)$ . 9
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. Prove that any relation schema with two attribute is in BCNF. 5
7. a) Consider the following proposed rule for functional dependencies :  
If  $\alpha \rightarrow \beta$  and  $\gamma \rightarrow \beta$ , then  $\alpha \rightarrow \gamma$ .  
Prove that this rule is not sound by showing a relation  $r$  that satisfies  $\alpha \rightarrow \beta$  and  $\gamma \rightarrow \beta$ , but does not satisfy  $\alpha \rightarrow \gamma$ . 5
- b) Explain why 4 NF is a normal form more desirable than BCNF. 5



- c) Consider the E-R diagram in which same entity set appears several times. Why is allowing this redundancy a bad practice that one should avoid whenever possible. 5
8. a) Draw the precedence graph for the following Schedule. Test the Schedule whether it is conflict or serial schedule. If conflict then wire down the equivalent serial schedule. 5

T1	T2	T3
—	—	Read( y )
—	—	Read( z )
Read( x )	—	—
—	—	Write( y )
Write( x )	—	Write( y )
—	Read( z )	—
Read( y )	—	—
—	Read( y )	—
Write( y )	Write( y )	—
—	Read( x )	—
—	Write( x )	—

- b) Why is a serializable schedule considered correct ? 5
- c) Most implementations of database system use strict two phase locking. Suggest three reasons for the popularity of this protocol. 5
9. a) Discuss the relative advantages of centralized and distributed databases. 7
- b) When is it useful to have replication or fragmentation of data ? Explain your answer ? 4
- c) Can we call procedure inside a function in PL/SQL ? 4



10. a) Explain “Every conflict serializable schedule is view serializable schedule” with an example. 5
- b) Prove that the following schedule consisting two transactions with deadlock : 4

Consider the following two transactions :

$T_1$  :    write(  $X$ )                       $T_2$  :    write(  $Y$ )  
           write(  $Y$ )                                      write(  $X$ )

<b>T1</b>	<b>T2</b>
Lock-x ( $X$ )	—
Write( $X$ )	—
—	Lock-x ( $Y$ )
—	Write( $X$ )
—	Lock-x ( $X$ )
Lock-x ( $Y$ )	—

- c) Explain the Thomas’s Write Rule. 6
11. a) Why are entity integrity and referential integrity important in a database ? 5
- b) Finding the names of everybody who works in the same department as a person called Jones. Use Oracle default table EMP. 4
- c) What is the difference between conflict equivalence and view equivalence ? 6

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