1 sthalf-09-nkD 309 M·E-I Sem- Comp 21/5/09

Algorithms and complexity

Con. 3228-09. (1) **BB-5685**

(3 Hours) **[Total Marks : 100**

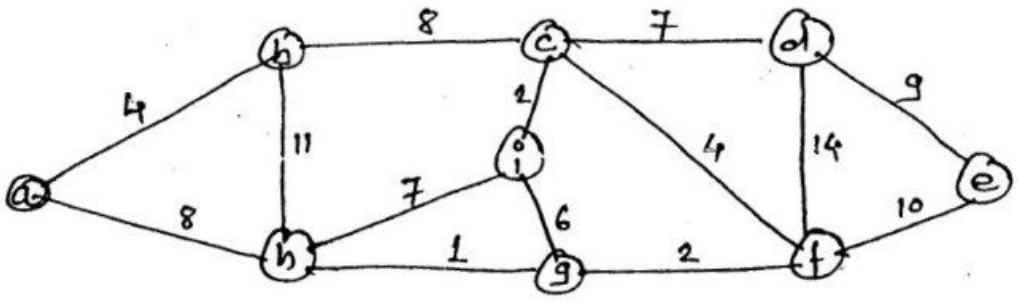
N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

1. (a) Given X = [A, B, C, B, D, A, B] and Y = [B, D, C, A, B, A] Find least common sequence and the length of the sequence. **10**
   (b) Write down the steps for RSA encryption Algorithm. Consider a RSA Key set with p = 11, q = 29, n = 219 and e = 3. What value of 'd' should be stored in secret key ? What is encryption of the message M = 200 ? **10**

2. (a) Prove— 'Clique problem is NP-complete'. **10**
   (b) Insert the keys 6, 3, 91, 42, 62, 89, 55, 32, 98, 1 into hash table of length m = 12, using open addressing with primary hash function h'(k) = K mod m. Show results of inserting keys using **10**
   (i) Linear probing
   and (ii) Quadratic probing with $C_1 = 1$ and $C_2 = 3$

3. (a) Define— 0, θ, Ω and state their interretationship. Explain—Bitonic sorter with example. **10**
   (b) Generate fixed length and variable length Huffman code for following set of frequencies— **10**
   a : 30 b : 5 c : 2 d : 28 e : 13
   f : 10 g : 8 h : 20 i : 6

4. (a) Evaluate minimum spanning tree using Krushkal's Algorithm **10**



   (b) Find solution for following system of different constraints **10**

$x_1 - x_2 \leq 8$
$x_4 - x_5 \leq 10$
$x_2 + x_4 \geq 20$
$x_3 - x_2 \geq 9$
$x_5 - x_3 \geq 5$
$x_4 + x_1 \geq 0$
$x_1 - x_3 \leq 2$
$x_3 - x_4 \leq 5$

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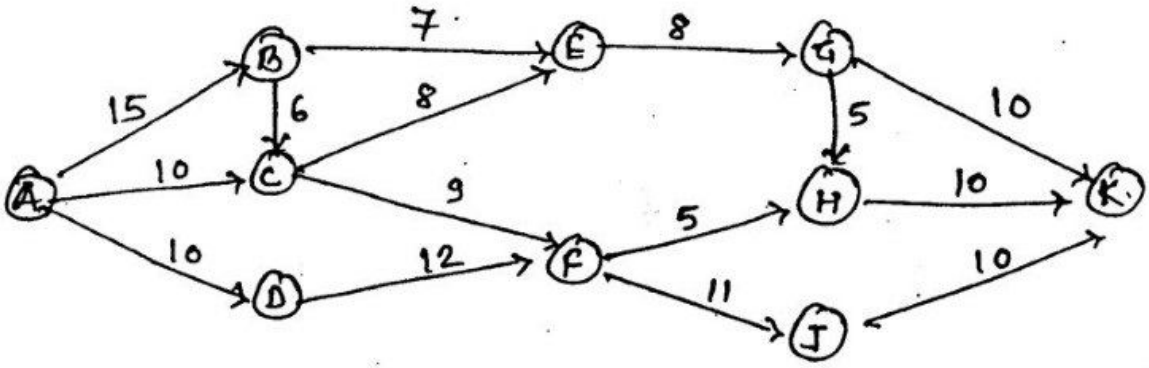
5. (a) Explain class P, NP, NP-Head and NP. Complete.
   (b) Evaluate the maximum flow from mode A to K for given graph. Also Draw Residual N/W and Flow N/W.



6. (a) Find optimal solution for matrix-chain multiplication with dimension sequence. **10**
   < 5, 18, 3, 10, 2, 15, 4 >
   (b) Prove—If x is root of an n-node subtree, then call INORDER_WALK(x) take $\alpha(n)$ time **10**

7. Write short notes on (any **four**) :— **20**
   (a) Chinese-Remainder Theorem
   (b) Greedy Algorithm
   (c) Master method of recurrence
   (d) Dynamic programming
   (e) Vertex-Cover problem.