Con. 3484-10.

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[Total Marks : 100

a & c

N.B. 1. Question No. **1** is **compulsory**.
2. Attempt any **Four** out of remaining. Algorithms & Complexity
3. Assume suitable data if **necessary** and **justify** the assumptions.
4. Figures to the **right** indicate full marks.

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Q1.A. Write a function for Bubble sort and show computation of its space and time complexity. [10]

B. Give a dynamic-programming solution to the 0-1 Knapsack Problem that runs in O(nW) [10]
Times. where n is the number of items and W is the maximum weight of items that the thief can put in his knapsack.

Q2.A. Prove that Clique is NP-Complete. [10]

B. Compute Longest common subsequence for A = 0001101100 and B = 1110010010. [10]

Q3.A. Find a feasible solution or determine that no feasible solution exists for the following [10]
systems of difference constraints. Write the algorithm for the same and give its complexity.

$$x_1 - x_2 \leq 4$$
$$x_1 - x_5 \leq 5$$
$$x_2 - x_4 \leq -6$$
$$x_3 - x_2 \leq 4$$
$$x_4 - x_1 \leq 3$$
$$x_4 - x_3 \leq 5$$
$$x_4 - x_5 \leq -3$$
$$x_5 - x_3 \leq -4$$
$$x_5 - x_4 \leq -8$$

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B. Discuss the Bitonic Sorting Technique. [10]

Q4.A. Insert the following keys 5, 6, 9, -3, 28, 89, 50, 32, 96, 0 in a hash table of [10]
length m=13 using open addressing with primary hash function h(k) = k mod m. show results
inserting keys using
   i.   Linear probing
   ii.   Quadratic probing with $C_1 = 1$ and $C_2 = 3$.

B. Give RSA encryption algorithm. [10]
Consider a RSA key set with p=29, q=11, n = 319 and e=3.
What value of 'd' should be stored in secrete key ?
What is the encryption of the message M = 100 ?

Q5.A. Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions [10]
is <5 10 3 5 15 30 6>.

B. Given Below is the weight matrix W for the graph consisting of five nodes {S, B, C, D, E}.
Find the shortest path from node S to all other nodes. [10]

	S	B	C	D	E
S	0	10	∞	∞	5
B	∞	0	1	∞	2
C	∞	∞	0	-4	∞
D	7	∞	6	0	∞
E	∞	-3	9	2	0

Weight matrix W =

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[TURN OVER

Q6·A. Find the maximum flow for the network given below.   [20
Give the algorithm and complexity
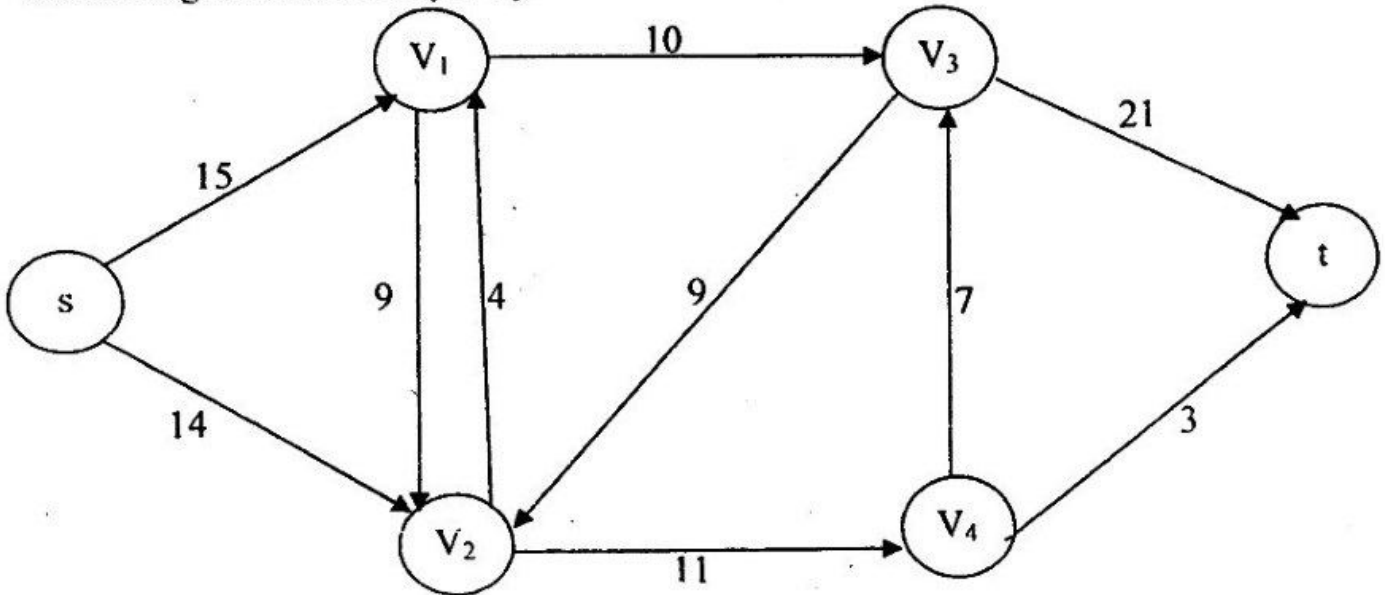
Q7. Write a short note on any **four** of the following.   [2(
   (a) Discuss the various models of computation.
   (b) B' Tree with operations insertion and deletion
   (c) Versions of Problems.
   (d) Master method for recurrences
   (e) RB Tree with operation insertion
   (f) Chinese Reminder Theorem.