**BSC-INFORMATION TECHNOLOGY YEAR 3 SEM I**

**CIT 3106- DESIGN AND ANALYSIS OF ALGORITHMS-PRACTICE QUESTIONS**

a) Define the following terms as used in design and analysis of algorithms.

i. Optimal substructure

ii. Greedy choice property

iii. Base case

b) Construct a Huffman tree and find the Huffman codes for the alphabet below (6 marks)

| Symbol | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Frequency | 15 | 20 | 12 | 28 | 19 | 6 |

i) Encode AFBDEECA using the codes in c

ii) 001000011011

c) Solve the following instance of the knapsack fractional problem algorithm Knapsack capacity. Weight= 10 kg. (6 marks)

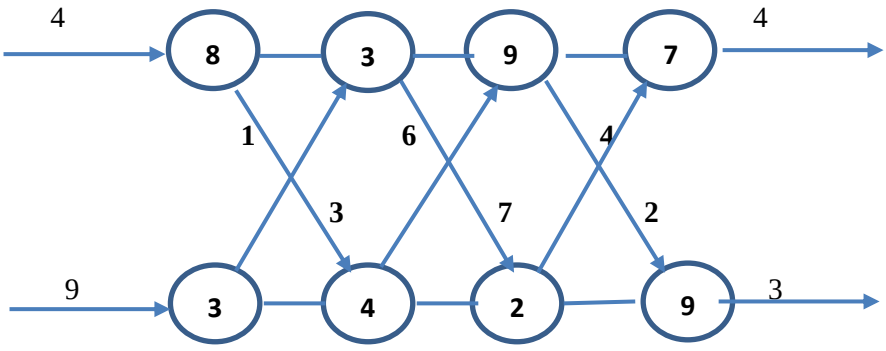
| Item | weight | Value |
|---|---|---|
| 1 | 4 | $60 |
| 2 | 5 | $50 |
| 3 | 3 | $18 |
| 4 | 7 | $21 |

d) Find the longest common subsequence of string Y and X below and give its time complexity. (6 marks)

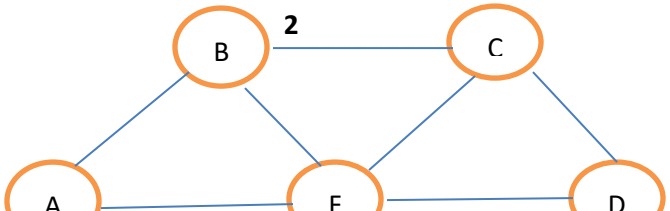
Y: CCABDMFGNH

X: ABCVDEFGH

e) Find the fastest way through the assembly line below clearly showing the for step of solving dynamic programming problems (6 marks)




f) Search the graph below by applying the breadth first search.



**4** **3** **6** **5**

**6** **8**

**5** **7** **9**