Branch : CSE & IT Batch : Hinglish

Algorithms

Greedy Method

DPP

[MCQ]

1. Consider the following statements.

S_1: Given a weighted declared graph with the distinct weights, the shortest path among any two vertices will be unique.

S_2: A minimum spanning tree can contain negative edges.

Choose the correct statements.

(a) Only S_1 is true
(b) Only S_2 is true
(c) Both S_1 and S_2 are true
(d) neither S_1 nor S_2 is true

[MCQ]

2. Which of the statement is/are correct?

(a) First edge added by Kruskal's algorithm can be the last edge added by prim's algorithm
(b) In a graph, if one raises the length of all edge to the power of 3, the minimum spanning tree will stay the same.
(c) The heaviest edge in a graph cannot belong to the minimum spanning tree.
(d) The maximum spanning tree (spanning tree of maximum cost) can be computed by negating the cost of all the edges in the graph and then computing minimum spanning tree.

[NAT]

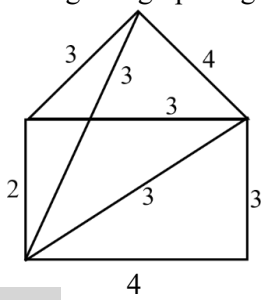
3. Consider the following instantons of the job for-scheduling problem with deadlines (Note: every Job takes one unit time)

Job	J_1	J_2	J_3	J_4	J_5	J_6	J_7
Deadline	1	3	4	3	2	1	2
Profit	3	5	20	18	1	6	30

What is the maximum profit generated by greedy algorithm _____?

[NAT]

4. Consider is the weighted graph G given by



How many MST does G Have?

[MCQ]

5. Let's suppose, we want to merge some sorted files where the number of records in each file is given below. (15, 18, 20, 21, 24, 28, 30, 32, 35, 40, 45, 50) then what is the minimum number of comparisons required to merge the following files?

(a) 1200 (b) 1225
(c) 1251 (d) 1255

[MCQ]

6. Greedy algorithm fails to give an optimal solution to which of the following problems?

(p) Travelling salesman problem
(q) Job scheduling with deadlines and penalty
(r) Shortest path algorithm
(s) optimal merge pattern
(t) Huffman encoding

(a) p, q, r (b) r, s, t
(c) p, q, r, s, t (d) All of the above

Answer Key

1. **(b)**
2. **(a, b, d)**
3. **(74 to 74)**
4. **(4 to 4)**
5. **(c)**
6. **(a)**

Hints & Solutions

1. (b)

(i) multiple spanning trees may exist, we have kirchoff method to count them.

(ii) Spanning tree can't have negative edge, it can have any real value.

2. (a, b, d)

True(a): The graph d(A, B) = 1, d(B, C) = 2 and we start running prim's at 'C'

True (b): The MST algorithm care about relative edge lengths and raising all edge lengths, the 3rd power pressure this relationship.

False(c): This edge may be connecting two otherwise dis-connected sub-graphs.

Ture(d): This work, and none of the proofs on MST algorithm depends on edge weight being non-negative.

3. (74 to 74)

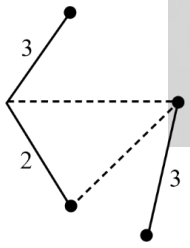
Put earliest deadline schedule with maximum profit first.

J6	J7	J4	J3
1	2	3	4

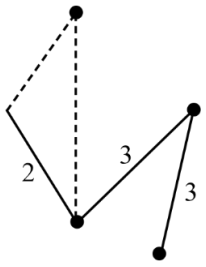
total profit = 6 + 30 + 18 + 20 = 74

∴ 74

4. (4 to 4)



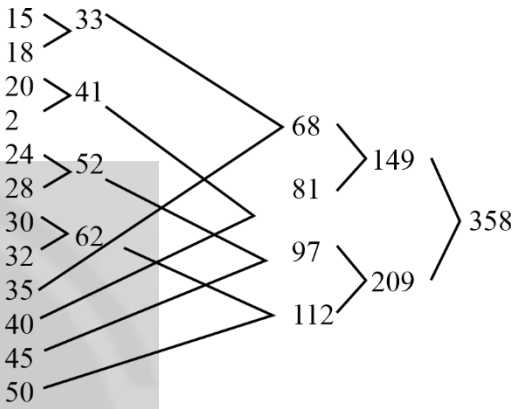
Choose any 1 dotted line here



Choose any one dotted line here

∴ Totals 4 different MST's

5. (c)



Total comparisons = m = n – 1

= 32 + 40 + 51 + 61 + 67 + 80 + 96 + 111 + 148 + 208 + 357

6. (a)

Greedy algorithm fails to give an optimal solution for

(p) travelling salesman problem

(q) Job scheduling with deadline and penalty (Greedy fails when there is infinite number of jobs and jobs are arriving continuously)

(r) Shortest path algorithm in this if we follow the greedy approach, the algorithm fails when there are negative edge weight in the graph.

❑❑❑