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S. No. of Question Paper : 149

Unique Paper Code : 236551

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Name of the Paper : Network Analysis and Theory of Sequencing

Name of the Course : B.A. (Programme)

Semester : V

Duration : 3 Hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Attempt any five questions.

All questions carry equal marks.

1. (a) Describe various elements that characterize sequencing problem. Also explain the principal assumptions made while dealing with sequencing problem. 6
- (b) How will you solve the sequencing of  $n$  jobs on three machines.

We have 5 jobs, each of which must go through machines A, B and C in the order A B C. Processing times (in hours) are given in the following table : 9

Jobs	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

Determine the optimal sequence of jobs that minimizes the total elapsed time.

P.T.O.

2. (a) Define the following terms :

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(i) Network and flow in network

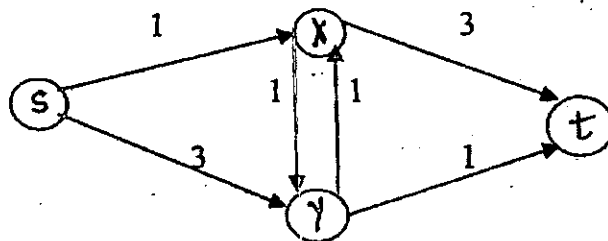
(ii) Path and chain

(iii) Cut and minimal cut

(iv) Flow augmenting path.

(b) Find the maximal flow in the following network by matrix method :

6



3. (a) What do you understand by Minimal spanning tree in a network ? Explain, by giving its real life application. And also describe the procedure of finding Minimal spanning tree in a network.

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(b) Solve the travelling salesman problem given by the following data :

$$C_{12} = 20, C_{13} = 4, C_{14} = 10, C_{23} = 5, C_{24} = 6, C_{25} = 10, C_{35} = 6, C_{45} = 20,$$

where  $C_{ij} = C_{ji}$  and there is no route between cities  $i$  and  $j$  if the values of  $C_{ij}$  are not shown.

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4. (a) Define different types of floats and their implications. 6
- (b) Give mathematical formulation of the shortest path problem. Describe the Dijkstra's algorithm to solve the shortest path problem. 9
5. (a) State the objectives, advantages and disadvantages of network analysis. 5
- (b) Find the optimal schedule and optimal project duration for the given project, with overhead cost of Rs. 75 per day. 10

Activity	Immediate Predecessor	Duration (in days)		Increase in cost (in Rs.) For crashing by one day
		Normal time	Crash time	
A	—	3	2	150
B	—	4	3	100
C	A	5	4	200
D	A	7	5	300
E	B, C	3	3	0
F	B, C, D	6	2	75

6. A project is consisting of the following activities :

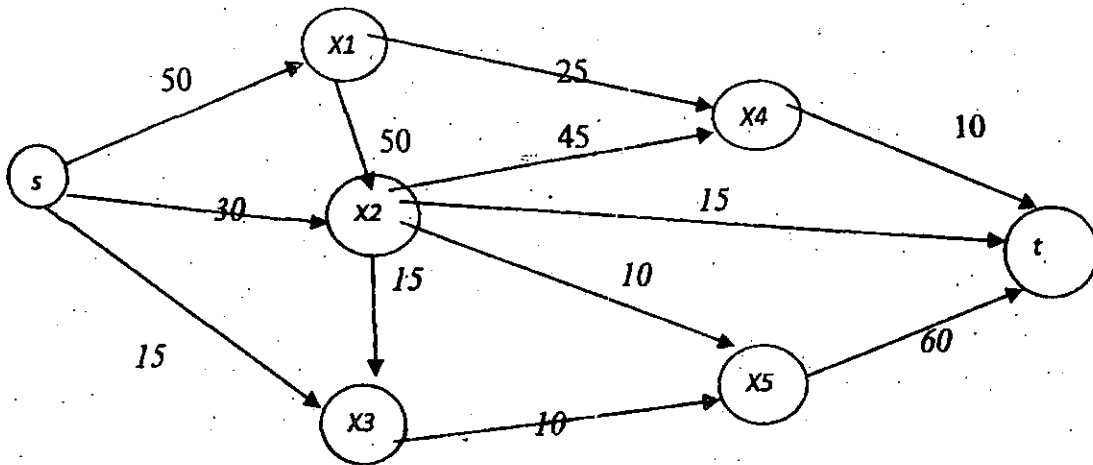
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Duration (in days)			
Activity	Optimistic	Pessimistic	Most likely
1—2	7	17	9
1—3	10	60	20
1—4	5	15	10
2—5	50	110	65
2—6	30	50	40
3—6	50	90	55
3—7	1	9	5
4—7	40	68	48
5—8	5	15	10
6—8	20	52	27
7—8	30	50	40

(a) Draw the project network.

(b) Find the expected duration and variance of each activity. What is expected project length and critical path of the network.

- (c) Calculate the standard deviation of project length.
  - (d) What is the probability of completing the project in 130 days ?
  - (e) Which due date has 98% chance of being met ?
7. (a) Find the shortest path for the following network from origin  $s$  to sink  $t$  by complete enumeration method. Determine the shortest distance also. 7



- (b) Describe the algorithm to solve 2 jobs m machine job shop problem. 8