



P-1697
M. Sc. (I.T.) (Sem. VII) Examination
March/April – 2014
Optimization Technique

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

<p>નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.</p> <p>Name of the Examination : <input style="width: 90%;" type="text" value="M. Sc. (I.T.) (Sem. VII)"/></p> <p>Name of the Subject : <input style="width: 90%;" type="text" value="Optimization Technique"/></p> <p>Subject Code No. : <input style="width: 20px;" type="text" value="1"/> <input style="width: 20px;" type="text" value="6"/> <input style="width: 20px;" type="text" value="9"/> <input style="width: 20px;" type="text" value="7"/> Section No. (1, 2,...): <input style="width: 40px;" type="text" value="Nil"/></p>	<p>Seat No. : <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/></p> <div style="border: 1px solid black; border-radius: 15px; height: 80px; margin-top: 10px; display: flex; align-items: center; justify-content: center;"> <p>Student's Signature</p> </div>
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- (2) There are five questions in this question paper
 (3) Answer all questions
 (4) Figure to the right indicates marks of the questions.
 (5) Follow usual notation

1 Attempt any two

14

- A Define optimization technique and also discuss the scope of optimization
- B A manufacturer produces two types of models M1 and M2. Each model of the type M1 requires 4 hrs of grinding and 2 hours of polishing; whereas each model of the type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturers have 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M1 model is Rs.3.00 and on model M2, is Rs.4.00. Whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models, so that he may make the maximum profit in a week?
- C $\text{Max}(Z) = 200x_1 + 500x_2$
 subject to
- | | | |
|-------------------|----------|-----|
| x_1 | \leq | 400 |
| x_2 | \leq | 300 |
| $0.2x_1 + 0.4x_2$ | \leq | 160 |
| x_1, x_2 | ≥ 0 | |
- solve the problem graphically

2 Attempt any two

14

A Define predecessor activity, successor activity and dummy activity

B A television is manufactured in six steps, labeled A through F. Because of its size and complexity, the television is produced one at a time. The production control manager thinks that network scheduling techniques might be useful in planning future production. He recorded the following information

A is the first step and precedes B and C, C precedes D and E, B follows D and precedes E, D, E is successor of F. draw the network diagram and also give the event number.

C A project consist of eight activities with the following relevant information

Activity	Immediate predecessor	Estimated duration (days)		
		Optimistic	Most likely	Pessimistic
A	-	1	1	7
B	-	1	4	7
C	-	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D, E	3	6	15
H	F, G	1	2	3

(2) draw the network and find out the expected project completion time

(3) find the critical path of the network

(4) calculate the earliest start time and earliest finish time for each activity

(5) find the total float and free float for each activity

(6) find the variance of the each activity

3 Attempt any two

14

A We have 4 jobs each of which has to go through the machines M_j ($j = 1, 2, \dots, 4$) in the order M_1, M_2, \dots, M_4 . Processing time (in hours) is given below.

	Machines			
	M_1	M_2	M_3	M_4
Job-1	20	3	3	25
Job-2	12	5	1	11
Job-3	18	4	2	10
Job-4	17	2	4	28

B A manufactured company processes 6 different jobs on two machine A and B. Number of unit of each job and its processing time on A and B are given solve the sequencing problem and find the optimum elapse time, optimum elapse time for all machine.

Job	Unit of each job	Processing time	
		Mach. - A	Mach. - B
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

C Write an algorithm for n machine m job sequencing problem

4 Attempt any two

14

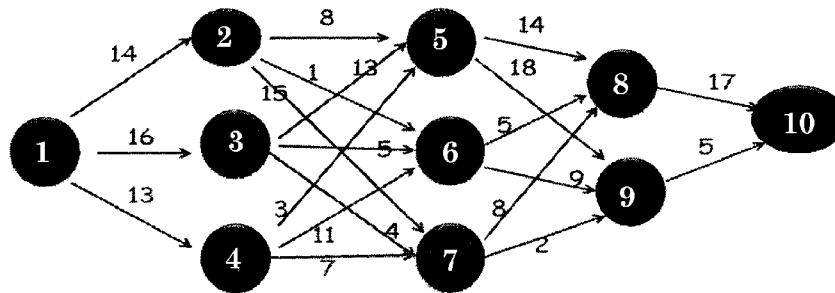
A Determine the value u_1, u_2, u_3 so as to maximize $z = u_1 u_2 u_3$

subject to constraints

$$u_1 + u_2 + u_3 = 10$$

$$u_1, u_2, u_3 \geq 0$$

- B A salesman located in a city A decided to travel to city B. He know that the distances of alternative routes form city A to city B. He then draw a highway network map as shown in figure. The city of origin A is 1. The destination city B, is city 10. Other cities through which the salesman will have to pass through are numbered 2 to 9. The arrow representing routes between cities and distances in kilometers are indicated on each route. The salesman's problem is to find the shortest route that covers all the selected cities form A and B



- C Discuss the difference between simulation and analytic solution

5 Attempt any two

14

- A A book store wishes to carry a particular book in stoke. Demand is not certain and there is 2 days for stoke replenishment. The prob. Of demand
- | | | | | | |
|---------------|------|-----|-----|------|-----|
| • Demand : | 0 | 1 | 2 | 3 | 4 |
| • Probability | 0.05 | 0.1 | 0.3 | 0.45 | 0.1 |
- Each time an order is placed, the store incurs an ordering cost of 10 per order. The store also incurs a carrying cost or Rs. 0.5 per book par day. The inventory carrying cost is calculated on the basis of stoke at the end of the day. Order 5 books when the present inventory plus any outstanding order falls below 8 books. Currently the tore has a stoke of 8 books plus 6 books ordered 2 days ago and are expected to arrive next day. Carrying the simulation run for 10 days and find the effective cost of the inventory.
- B A television repairman finds that the time spent on his jobs has an exponential distribution with mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follow a Poisson distribution approximately with an average rate of 10 par 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just bought in?
- C A super market has two sales girls at the sales counters. It the service time for each customer is exponential with a mean of 4 minutes, and if people arrive in a Poisson fashion at the rate of 10 an hour, then calculates the
- probability that a customer has to wait for service?
 - Expected percentage of idle time for each sales girl?
 - If a customer has wait, what is the expected length of his waiting time?