

Code: 9A03701
R09

B.Tech IV Year I Semester (R09) Regular & Supplementary Examinations December 2015

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

 Answer any FIVE questions
 All questions carry equal marks

- 1 A company is manufacturing two products A and B. The net profit for these products is Rs 60 and Rs 50 respectively. These products require working in two departments C and D. The available hours per month in these departments are 150 each. Product A requires 2 hours in department C and 3 hours in department D. Product B requires 3 hours in department C and 2 hours in department D. The production of the products A and B cannot exceed 40 units each because of marketability constraints. Formulate the L.P model and solve it by simplex method.
- 2 Find the optimal solution for the following transportation problem. Cell entries represent unit transportation cost in rupees.

From/TO Plants	Warehouses				Capacity
	P	Q	R	S	
A	5	1	3	3	34
B	3	3	5	4	15
C	6	4	4	3	12
D	4	1	4	2	19
Demand	21	25	17	17	80

- 3 In a machine shop, 8 different products are being manufactured each requiring time on two machines A and B as given below.

Product	Time (in min) on Machine A	Time (in min) on Machine B
1	30	20
2	45	30
3	15	50
4	20	35
5	80	36
6	120	40
7	65	50
8	10	20

- (i) Determine the optimum sequence of processing of different products in order to minimize the total manufacturing time for all the products. (ii) The total minimum elapsed time. (iii) Idle time for machine A and machine B. (iv) Name and discuss the scheduling model used.

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4 Solve the following game.

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	5	2	6

5 Telephone users arrive at a booth following a Poisson distribution with an average time of 5 min between one arrival and the next. The time taken for a telephone call is on an average 3 min and it follows an exponential distribution. What is the probability that the booth is busy? How many more booths should be established to reduce the waiting time to less than or equal to half of the present waiting time?

6 What are costs associated with inventory? Determine EOQ for inventory model with uniform demand.

7 Solve the following L.P model by using dynamic programming approach.

$$\begin{aligned} \text{Maximize } z &= 2x_1 + 5x_2 \\ \text{Subjected to } 2x_1 + x_2 &\leq 43 \\ 2x_2 &\leq 46 \\ x_1 &\geq 0 \\ x_2 &\geq 0 \end{aligned}$$

8 What is simulation? Write uses of simulation.
