

Total No. of Pages: **3**

**6994**

Register Number:

Name of the Candidate:

**M.B.A. DEGREE EXAMINATION, May 2015**

**(MANAGEMENT PRACTICES)**

**(FIRST YEAR)**

**180: OPERATIONS RESEARCH**

Time: Three hours

Maximum: 75 marks

**SECTION - A**

**Answer any FIVE questions**

**(5 × 3 = 15)**

1. List the characteristics of operations research.
2. State the managerial applications of decision theory.
3. What are the applications of queuing theory in industrial problems?
4. Differentiate PERT and CPM
5. How do you calculate time cost trade off in CPM?
6. Mention the characteristics of game theory.
7. Write the uses of simulation in managerial decision.
8. What is cluster analysis?

**SECTION - B**

**Answer any THREE questions**

**(3 × 10 = 30)**

9. A manufacturing unit has three products on their production line. The production capacity for each product is 50, 30 and 45 respectively. The limitation is the of 300 man hours as total availability and the manufacturing time required per product is 0.5,1.5 and 2.0 man hours. The products are priced to result in profits of ₹10,15 and 20 respectively. If the company has a daily demand of 25 units, 20 units and 35 units for respective products formulat the problem as LP model so as to maximize the total profit.
10. Assign workers 1,2,3,4 to jobs A,B,C,D time take by the workers for different jobs are given in the matrix.

Workers	Jobs			
	A	B	C	D
1	45	40	51	67
2	55	40	61	53
3	49	52	48	64
4	41	45	60	55

11. Arrivals of customers to a payment counter (Only one) in a bank follow Poisson distribution with an average of 10 per hour. The service time is an average of 9 minuts per customer.
  - a) What is the average number of customers in the queue?

- b) The bank will open one more counter when the waiting time of customer is atleast 10 minutes. By how much the flow of arrivals should increase in order to justify the second counter?
12. Solve the following game to determine optimal strategies and the value of the game.

		<b>Player B</b>		
		B1	B2	B3
<b>Player A</b>	A1	-5	-3	1
	A2	2	-1	2
	A3	-2	3	4

13. In a replacement problem, the cost of machine is ₹6,100 and its scrap value is only ₹100. The maintenance costs are as follows:

<b>Years:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Costs:</b>	100	250	400	600	900	1250	1600	2000

When should the machine be replaced?

### SECTION - C

**Answer any ONE question**

**(1 × 15 = 15)**

14. Solve the LP problem by simplex method.

$$\begin{aligned} \text{Maximization} \quad & z = 30x_1 + 40x_2 \\ \text{Subject To} \quad & 60x_1 + 12x_2 \leq 12,000 \\ & 8x_1 + 5x_2 \leq 600 \\ & 3x_1 + 4x_2 \leq 500 \\ & x_1, x_2 \geq 0 \end{aligned}$$

15. Find the optimum decision on following contingency table.

<b>Type of Biscuits</b>	<b>Profits (in laks) for quantities</b>		
	5,000	10,000	20,000
Cream	15	25	45
Coconut	20	55	65
Glucose	25	40	70

- a) Maximin  
 b) Minimax  
 c) Hurwicz ( $\alpha = 0.8$ )  
 d) Regret criterion
16. Find the sequence and total elapsed time of the following machines.

<b>Machines</b>	<b>Jobs</b>					
	1	2	3	4	5	6
X	18	12	29	35	43	37
Y	7	12	11	2	6	12
Z	19	12	23	47	28	36

**SECTION - D**  
**COMPULSORY**

**(1 × 15 = 15)**

17. A project Schedule has the following characteristics.

<b>Activity</b>	<b>Time (mins)</b>	<b>Activity</b>	<b>Time (mins)</b>
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

- a) Construct the network.
- b) Compute the time estimates (ES, ET, LS,LF)
- c) Find the critical path.
- d) Calculate the total, free floats.

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