

Jagan Institute of Management Studies
End-Term Examination, April, 2017
Trimester III – PGDM (IB) 2016-18

Operations Research
ET_IB_OR_1704

Time: 3 Hrs.

M. Marks: 70

INSTRUCTIONS: Attempt any SEVEN questions. Attempt any TWO from SECTION A and FIVE questions from SECTION B.

SECTION A

- Q 1** Discuss the significance and scope of operations research in modern day management. Also explain various types of models in operations research with suitable examples. **10**
- Q 2** Give a detailed discussion on game theory. State and explain business situations along with different methods of solving zero-sum games. Give a brief discussion on following as well:
- i) Mixed strategy.
 - ii) Pure strategy.
 - iii) Zero-sum and non-zero-sum game.
 - iv) Pay off matrix.
 - v) Value of a game. **10**
- Q 3** Discuss various forecasting models. Give a detailed discussion on Delphi method of forecasting. Also discuss regression and trend methods of forecasting. **10**

Section B

- Q 4** Old hens can be bought for Rs 2 each but young ones can be bought for Rs 5 each. The old hens lay 3 eggs per week while the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen costs Rs 1 per week to feed. If a person has only Rs. 80 to spend on the hens, how many of each kind should he buy to get a profit of more than Rs. 6 per week assuming that he cannot house more than 20 hens? Formulate the problem as LPP and solve graphically. **10**
- Q 5** Following is the transportation cost matrix of shipping a particular product from four factories to five warehouses. Find the optimum transportation plan that minimizes the total transportation cost.

		Warehouses					Availability
		1	2	3	4	5	
Plants	A	4	3	1	2	6	80
	B	5	2	3	4	5	60
	C	3	5	6	3	2	40
	D	2	4	4	5	3	20
Requirement		60	60	30	40	10	

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Q 6 A small garment making unit has five tailors stitching five different types of garments. All five tailors are capable of stitching all the five types of garments. The output per day per tailor and the profit (Rs.) for each type of garment are given below:

Tailors	Garments				
	1	2	3	4	5
A	7	9	4	8	6
B	4	9	5	7	8
C	8	5	2	9	8
D	6	5	8	10	10
E	7	8	10	9	9
Profit (Rs.) per garment	2	3	2	3	4

- i) Which type of garment should be assigned to which tailor in order to maximize profit assuming that there are no other constraints?
- ii) If tailor D is absent for a special period and no other substitute tailor is available, what should be the optimal assignment?

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Q 7 A machine operator has to perform three operations; turning, threading and Knurling on a number of different jobs. The time required to perform these operations for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all jobs. Also find the idle time for the three operations. If by outsourcing machines A, B and C one can earn Rs 500, Rs. 450 and Rs. 300 respectively. What is possible amount the operator can make by outsourcing all three machines without hampering his own production process?

Job	Time for Turning (minutes) (A)	Time for threading (minutes) (B)	Time for Knurling (minutes) (C)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

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Q 8 Workers come to tool store room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be Poisson distributed. The average service time (of the tool room attendant) is 40 second. Determine

- i) Average queue length.
- ii) Average number of customers in the system.
- iii) Mean waiting time of a customer in the queue.
- iv) Mean waiting time of customer in the system probability that the tool room attendant remains idle.

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Q 9 The utility data for a project network is as given below. Crash the network to minimum project duration and determine the project cost for that duration

Activity	Normal		Crash	
	Time (Weeks)	Cost (Rs)	Time (Weeks)	Cost (Rs)
0 -1	1	8000	1	5000
1 -2	3	5000	2	12000
1 -3	7	11000	4	17000
2 -3	5	10000	3	12000
2 -4	8	8500	6	12000
3 -4	9	8500	2	16000
4 -5	1	5000	1	5000

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Q 10 Solve following game for A's pay off given below:

		B			
		3	2	4	0
A	3	3	2	4	0
	3	3	4	2	4
	4	4	2	4	0
	0	0	4	0	8

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