S.D.E.

M.B.A. Sem-III (2013 Course) : SUMMER - 2019

SUBJECT: OPERATIONS RESEARCH

Day: Saturday
Date: 18/05/2019

Time: 10.00 AM TO 1.00 PM
Max Marks. 70

S-2019-5029

N.B.

1) Attempt any **FOUR** questions from Section – **I** and any **TWO** questions from Section – **II**.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the sections should be written in **SAME** Answer book.
4) Use of non – programmable calculator is **ALLOWED**.
5) Graph papers and statistical tables will be provided if necessary.

SECTION – I

Q.1 What is simulation? Discuss the advantages and applications of simulation in business and management. **(10)**

Q.2 Factories A, B and C supply to warehouses P, Q R and S. The monthly production capacity (in tons) of each factory and monthly requirements (in tons) for each warehouse and the transportation costs in rupees per ton are given in the following table **(10)**

	Warehouse				
Factories	**P**	**Q**	**R**	**S**	**Production capacity (tons)**
A	4	5	2	5	120
B	3	8	4	8	80
C	7	4	7	5	200
Requirements (tons)	60	50	140	50	

Find initial basic feasible solution using North West Corner rule and check whether it is optimal or not.

Q.3 A project schedule has the following characteristics: **(10)**

Activity	1-2	1-3	1-4	2-4	2-6	3-6	4-5	5-6
Duration	8	8	10	10	16	14	17	9

i) Construct the network
ii) Compute earliest and latest times and
iii) Find the critical path

Q.4 An engineering firm utilizes re-order level system to replenish stock based on average demand. The demand is given as below **(10)**

Demand per week	0	1	2	3	4	5	6
Frequency	2	8	22	34	18	9	7

Generate the demand for next 20 weeks using the random numbers given below and calculate average demand. 68, 46, 87, 32, 78, 72, 27, 60, 06, 40, 83, 39, 97, 11, 06, 77, 49, 31, 71, 92

P.T.O

Q.5 Write short notes on any **TWO** of the following **(10)**

a) Time estimates in PERT
b) Graphical method for solving LPP
c) Applications of assignment problem
d) North west corner rule.

SECTION - II

Q.6 Mr. Rathod requires 10, 12 and 12 units of chemicals A, B, and C respectively for his garden. A liquid product contains 5, 2, and 1 units of chemical A, B, and C respectively per jar. A dry product contains 1, 2 and 4 units of chemical A, B and C per carton. **(15)**

If the liquid product costs Rs. 3 per jar and dry product costs Rs. 2 per carton, find how many of each should be purchased to minimize the cost and meet the requirements? Formulate the above problem as a LPP and solve graphically.

Q.7 A department head has three tasks to be performed with four subordinates. The subordinates differ in efficiency. The estimates of the time in hours each subordinate would take to perform a task is given below. How should the head allocate the tasks to each subordinate so as to minimize the total man hours? **(15)**

Subordinates	Tasks		
	T_1	T_2	T_3
A	10	27	16
B	14	28	7
C	36	21	16
D	19	31	21

Q.8 Following are the activities of a project **(15)**

Activity	**Activity Times in Weeks**		
	Optimistic time	Most likely	pessimistic
1-2	6	7	8
1-3	1	2	9
1-4	4	4	7
2-6	1	2	3
3-5	1	2	9
4-5	1	5	9
4-7	2	2	8
5-6	4	4	4
5-7	4	4	10
6-8	2	5	14
7-8	2	2	8

Calculate the expected times and variance for each activity.
Draw the project network
Identify the critical path and the expected project completion time

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