S.D.E.

M.B.A. (I.T.) Sem-III (2013 Course) : WINTER - 2018

SUBJECT : OPERATIONS RESEARCH

Day Saturday | **W-2018-4695** | Time 10.00 AM TO 1.00 PM

Date 08/12/2018 | Max. Marks : 70

N.B.

1) Attempt any **FOUR** questions from Section – I and any **TWO** questions from Section – II.
2) Answer to both the sections should be written in the **SAME** answer book.
3) Figures to the right indicate **FULL** marks.
4) Graph Papers will be provided if necessary.
5) Use of Non-programmable Calculator is allowed.

SECTION – I

Q.1 What is Operations Research? Discuss the significance and scope of Operations Research? **(10)**

Q.2. Given the following network details **(10)**

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration	15	15	3	5	8	12	1	14	3	14

i) Draw a network diagram.
ii) Find critical path and total project duration.

Q.3. A departmental head has four subordinates and four tasks for completion. The subordinates differ in their capabilities and four tasks differ in their work contents and intrinsic difficulties. His estimate of time for each subordinate and each task is given in matrix below. **(10)**

Task	**Subordinates**			
	I	II	III	IV
A	17	25	26	20
B	28	27	23	25
C	20	18	17	14
D	28	25	23	19

How should the tasks be assigned to minimize requirements of man hours?

Q.4 A food-food outlet observes the pattern of daily demand for burgers with associated probabilities as given: **(10)**

Daily Demand (No.)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days. Also find out average demand per day.
Random Numbers – 25 39 65 76 12 05 73 89 19 49.

Q.5 Write short notes **ANY TWO:** **(10)**

a) Components of LPP
b) Vogel's Approximation Method
c) PERT Calculations
d) Importance of Simulation

P.T.O.

SECTION II

Q. 6 The Agricultural Research Institute suggested to a farmer to spread out at least 4800 kg of a special phosphate fertilizer and not less than 72000 kg of a special nitrogen fertilizer to raise productivity of crops in his fields. There are two sources for obtaining these - mixtures A and B. Both of these are available in bags weighing 100 kg each and they cost Rs. 40 and Rs. 24 respectively. Mixture A contains phosphate and nitrogen equivalent of 20 kg and 80 kg respectively. While mixture B contains these ingredients equivalent of 50 kg each. Write linear programming problem and determine graphically, how many bags of each type should the farmer buy in order to obtain the required fertilizer at minimum cost ? **(15)**

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Q.7 A company has three plants A, B and C with capacity of 30, 40 and 30 units of a single product per month. It markets its product through three warehouses P, Q and R with requirements of 45, 35 and 20 units per month respectively. The cost of transporting one unit of product from any plant A, B and C to any warehouse is as follows: **(15)**

Plants	**Warehouse**		
	P	**Q**	**R**
A	13	11	8
B	14	16	13
C	12	10	12

How should the units be transported to minimize cost? Find optimal solution

Q.8 A research project consists of eleven activities identified by their beginning (i) and ending (j)nodes as under. The three time estimates are specified against each activity. **(15)**

Activity (i-j)	Time Estimates		
	Optimistic (a)	Most likely (m)	Pessimistic (b)
1-2	6	7	8
1-3	4	5	12
1-4	2	10	12
2-5	3	7	11
3-6	10	20	48
3-7	6	9	18
4-6	3	3	9
5-8	3	3	9
6-9	8	18	40
7-8	2	6	10
8-9	2	5	14

a) Determine expected time for each activity.
b) Construct a network diagram for above.
c) Which is the critical path?
d) What is the total project duration?

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