M.B.A. (GEN.) / M.B.A. (IT) SEM- III (2012 COURSE)(CHOICE BASED CREDIT SYSTEM) /M.B.A. (FM) SEMESTER - III (2013 (CHOICE BASED CREDIT SYSTEM) : SUMMER - 2018

SUBJECT: OPERATIONS RESEARCH

Day: **Tuesday** Time: **10.00 AM TO 01.00 PM**

Date: **08/05/2018** Max. Marks: 100

S-2018-1872

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) Answers to both the sections should be written in the **SEPARATE** answer book.
4) Use of non-programmable **CALCULATOR** is allowed.
5) Graph papers will be provided on request.

SECTION-I

Q.1 Define Operations Research. Explain the applications of Operations Research. **(15)**

Q.2 A company can produce two products A and B. Each product has to be processed by three machines X, Y and Z. Machine X can be operated for a total time of 2700 minutes and it takes 11 minutes for an item A and 5 minutes for an item B. Machine Y can be operated for 2000 minutes and it takes 5 minutes for an item A and 10 minutes for item B. Machine Z can be operated for total time of 450 minutes and it takes 1 minute for A and 2 minutes for B. The profit per item of A is Rs. 10 and per item of B is Rs. 15. Find the number of units of A and B to be produced so as to maximize the profit. **(15)**

Formulate the problem as LPP.

Use Graphical method to solve this LPP.

Q.3 A marketing manager has five salesmen and five sales districts. Considering the capabilities of salesmen and the nature of districts, the marketing manager estimates sales per month (in hundred rupees) for each salesman in each district would be as follows: **(15)**

	Districts				
Salesman	**A**	**B**	**C**	**D**	**E**
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment of salesmen to districts that will result in maximize sales.

Q.4 A company has factories at F_1, F_2 and F_3 which supply to warehouses at W_1, W_2 and W_3. Weekly factory capacities are 200, 160 and 90 units respectively. Weekly warehouse requirements are 180, 120 and 150 units respectively. Unit shipping costs (in rupees) are as follows: **(15)**

	Warehouse			
Factory	**W_1**	**W_2**	**W_3**	**Supply**
F_1	16	20	12	200
F_2	14	8	18	160
F_3	26	24	16	90
Demand	180	120	150	450

P. T. O.

Determine the optimal distribution for this company to minimize total shipping cost.

Q.5 Write short notes on any **THREE** of the following: **(15)**

a) Network Analysis
b) Limitations of Operations Research
c) Monte Carlo Simulation Technique
d) Degeneracy in Transportation Problem

SECTION-II

Q.6 A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) node numbers. **(20)**

	Estimated Duration (weeks)		
Activity (i-j)	**Optimistic**	**Most Likely**	**Pessimistic**
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

a) Draw a project network
b) Find the critical path and expected duration
c) Variance of project length
d) Standard deviation

Q.7 In a management institute the first lecture starts at 9 a.m. Following is the probability distribution regarding late comers for the first lecture each day. **(20)**

Late by minutes	2	4	6	8	10	12
Probability	0.40	0.30	0.20	0.05	0.03	0.02

Simulate the system for 10 days and find average late time. Use the following random numbers.
67,63, 39,55, 29, 78, 70, 06, 78, 76

Q.8 a) Explain Sensitivity Analysis with suitable examples. Discuss significance of Sensitivity Analysis from managerial point of view. **(10)**

b) How to solve the assignment problem for maximization? Explain with suitable example. **(10)**

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