

B.B.A. (2010 COURSE) SEM- V : SUMMER - 2018

SUBJECT: INTRODUCTION TO OPERATIONS RESEARCH

Day: **Saturday**
Date: **28/04/2018**

S-2018-1663

Time: **02.00 PM TO 05.00 PM**
Max. Marks: 70

N.B.:

- 1) **Q. No. 1 is COMPULSORY.**
- 2) Attempt any **FOUR** questions from **Q. No. 2 to Q. No. 7.**
- 3) Figures to the right indicate **FULL** marks.
- 4) Use of non-programmable **CALCULATOR** is allowed.

Q.1 a) Define Operations Research. Explain its significance. **(07)**

b) What is Simulation? Explain the use of Simulation. **(07)**

Q.2 Find the optimum solution for the following transportation problem. **(14)**

Sources	D ₁	D ₂	D ₃	D ₄	Availability
S ₁	8	6	10	9	56
S ₂	4	3	15	18	75
S ₃	18	5	3	7	42
Demand	28	32	45	68	173

Q.3 A marketing manager has five salesmen and five sales districts. Considering the capabilities of the 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: **(14)**

Salesmen	Districts				
	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 maximum sales.

Q.4 Use the Graphical Method to solve the following LP problem. **(14)**

Maximize $Z = 15x_1 + 10x_2$

Subject to:

$$4x_1 + 6x_2 \leq 360$$

$$3x_1 + 0x_2 \leq 180$$

$$0x_1 + 5x_2 \leq 200$$

$$x_1, x_2 \geq 0$$

Q.5 Write short notes on any **TWO** of the following: **(14)**

- a) Network Analysis
- b) Monte Carlo simulation Technique
- c) Degeneracy in Transportation Problem

P. T. O.

- 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. (14)

Activity (i-j)	Estimated Duration (Weeks)		
	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

- Draw a project network.
- Find the expected duration of each activity.
- Find the variation of each activity.
- Calculate the variance and standard deviation of the project length.

- Q.7** A bakery keeps stock of a popular brand of cake. Previous experience shows the daily demand pattern for the item with associated probabilities as given below: (14)

Daily Demand (number)	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 (14)
 Random Numbers: 25, 39, 65, 76, 12, 05, 73, 89, 19, 49.
 Also estimate the daily average demand for the cakes on the basis of simulated data.

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