

**B.B.A. (2010 COURSE) SEM- V : WINTER - 2017**  
**SUBJECT: INTRODUCTION TO OPERATIONS RESEARCH**

Day: **Saturday**  
 Date: **11/11/2017**

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

**W-2017-1571**

**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)** What is Operations Research? Explain its history in brief. **(07)**
- b)** What is degeneracy in Transportation problem? How it will overcome? **(07)**  
 Explain with suitable example.

- Q.2** A captain of cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows: **(14)**

	<b>Positions</b>				
<b>Batsmen</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum.

- Q.3** Find the optimum solution for the following transportation problem. **(14)**

<b>Plant</b>	<b>Site</b>				<b>Capacity</b>
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	
<b>X</b>	9	12	9	6	<b>70</b>
<b>Y</b>	7	3	7	7	<b>60</b>
<b>Z</b>	6	5	9	11	<b>90</b>
<b>Requirement</b>	<b>70</b>	<b>50</b>	<b>70</b>	<b>30</b>	

Using Vogel's method find the I. B.F.S and test it for optimality.

- Q.4** Use the Graphical Method to solve the following LPP. **(14)**  
 Maximize  $Z = 10x + 15y$

Subject to:

$$11x + 5y \leq 2700$$

$$5x + 10y \leq 2000$$

$$x + 2y \leq 450$$

$$x \geq 0, y \geq 0$$

**P. T. O.**

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

- a) Monte Carlo Simulation Techniques
- b) Network Analysis
- c) Limitations of Operations Research in Business Management

**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

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

**Q.7** A confectioner sells confectionary items. Past data of demand per week (in hundred kilograms) with frequency is given below: **(14)**

<b>Demand /Week</b>	0	5	10	15	20	25
<b>Frequency</b>	2	11	8	21	5	3

Using the following set of random numbers, generate the demand for the next 15 weeks. Also find the average demand per week. **(14)**

35, 52, 90, 13, 23, 73, 34, 57, 35, 83, 94, 56, 67, 66, 60.

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