

**B.B.A. SEM – V (2015 CBCS COURSE) : WINTER - 2017**  
**SUBJECT: INTRODUCTION TO OPERATION RESEARCH**

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

Time **02.00 PM TO 05.00 PM**  
Max. Marks: 100

**W-2017-1535**

**N.B.**

- 1) Attempt any **FOUR** Questions from Section - I and any **TWO** Questions from Section- II
- 2) Use of Non programmable Calculator is **ALLOWED**.
- 3) Graph papers can be made available, if necessary
- 4) Answers to both the Sections should be written in the **SEPERATE** answer books.

**SECTION – I**

**Q.1** A company produces two types of Leather belts, A and B. Belt A is of superior quality and B is of an inferior quality. The profit from the two are Rs. 40 and Rs. 30 per belt, respectively. Each belt of type A requires twice as much time as required by a belt of type B. If all the belts are of type B, a company could produce 1,000 belts per day. But the supply of leather is sufficient only for 800 belts per day. Belt A requires a fancy buckle and only 400 of them are available per day. For belt B only 700 buckles are available per day. Solve this problem to determine how many units of the two types of belts the company should manufacture in order to have maximum overall profit? **(15)**

**Q.2** Consider four basis of operations B and three targets T. The tons of bombs per aircraft form any base that can be delivered to any target are given in the following table: **(15)**

Target (T)

		<b>T<sub>1</sub></b>	<b>T<sub>2</sub></b>	<b>T<sub>3</sub></b>
Base (B)	<b>B<sub>1</sub></b>	8	6	5
	<b>B<sub>2</sub></b>	6	6	6
	<b>B<sub>3</sub></b>	10	8	4
	<b>B<sub>4</sub></b>	8	6	4

The daily supply of each of the four bases is 150 per day. The daily requirement of three targets is 200 per day. Find the allocations of targets from each base to each target which maximizes the total tonnage over all three targets.

**Q.3** Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and is given in the following table: **(15)**

Jobs

		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
Men	<b>A</b>	2	9	2	7	1
	<b>B</b>	6	8	7	6	1
	<b>C</b>	4	6	5	3	1
	<b>D</b>	4	2	7	3	1
	<b>E</b>	5	3	9	5	1

Find out how men should be assigned the jobs in way that will minimize the total time taken.

P.T.O.

- Q.4 a)** Determine an initial basic feasible solution to the following transportation problem by using Least Cost Method. **(08)**

		Destination				
		D1	D2	D3	D4	Supply
Source	S1	1	2	1	4	30
	S2	3	3	2	1	30
	S3	4	2	5	9	40
	Demand	20	40	30	10	

- b)** Explain the Graphical Method of Linear Programming Problem (LPP) to find optimal solution. **(07)**

- Q.5** Write short notes on any three of the followings **(15)**

- Limitations of Operations Research
- Slack in network analysis
- Use of Operations Research
- Monte Carlo Simulation

### SECTION – II

- Q.6** A small project consists of seven activities, the details of which are given below: **(20)**

Activity	Immediate Predecessor	Expected Duration (days)		
		Optimistic	Most Likely	Pessimistic
A	-	3	1	7
B	A	6	2	14
C	A	3	3	3
D	B,C	10	4	22
E	B	7	3	15
F	D,E	5	2	14
G	D	4	4	4

- Draw the network diagram
- Find the critical path

- Q.7** Bright Bakery keeps stock of a popular brand of cake. Previous experience indicates the daily demand as given here: **(20)**

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Consider the following sequence of the random numbers:

48,78,19,51,56,77,15,14,68,09

Using this sequence, simulate the demand for next ten days.

- Q.8 a)** Solve the following LPP graphically and state what your solution indicates. **(10)**

$$\text{Max } Z = 5X_1 + 3X_2$$

Subject to

$$3X_1 + 5X_2 \leq 15$$

$$5X_1 + 2X_2 \leq 10$$

$$\text{and } X_1, X_2 \geq 0$$

- b)** Explain the Multiple solutions in the assignment problems. **(10)**