Seat No:_____ Enrollment No:_____

PARUL UNIVERSITY

FACULTY OF MANAGEMENT

BBA Winter 2018 - 19 Examination

Semester: 5 **Date: 27/10/2018**
Subject Code: 06191306 **Time: 2:00 pm to 4:30 pm**
Subject Name: Operations Research **Total Marks: 60**

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Do as Directed.

A).Multiple choice type questions. **(05)**

1. A feasible solution to an L.P problem
- **a)** Must satisfy all problems constraints
- **b)** Need not satisfy all constraints
- **c)** Must be a corner point
- **d)** Must optimize the value of objective function

2. How many basic variables of the basic feasible solution of a transportation problem have?
- **a)** m + n - 1
- **b)** m + n + 1
- **c)** m - n + 1
- **d)** m - n - 1

3. The method used for solving an assignment problem is called
- **a)**Reduced matrix method
- **b)**Hungarian method
- **c)** MODI method
- **d)** None of the above

4. Network models have advantage in terms of project
- **a)** planning
- **b)** controlling
- **c)** scheduling
- **d)** all of the above

5. Games which involve more than two players are called
- **a)**conflicting games
- **b)** N-Person games
- **c)** negotiable games
- **d)** all of the above

B).Define the following. **(05)**

1. Feasible Solution
2. Degenerate solution in Transportation problem
3. Zero sum game
4. Replacement model
5. Mixed strategy.

C).Direct questions. **(05)**

1. What is unbalanced transportation problem
2. What are the methods of solving transportation problem?
3. What is assignment problem ?
5. Write full form of CPM and PERT.
5. Which principle is used to reduce the size of the payoff matrix of a game.

Q.2 Answer the following questions.

A). A company has three factories A, B and c with production capacity 70,90 and 115 units respectively. The units produced are supplies to four dealers D, E, F and G and their demands are 50, 60, 70 and 95 respectively. **(07)**

	D	E	F	G
A	17	20	13	12
B	15	21	26	25
C	15	14	15	17

Find the total transportation cost.

B). A manufacturer produces two types of machines. For producing machine of type A, 2 tons of iron and 200 working hours are required and for producing machines of type B, 4 tons of iron and 150 working hours are required. The maximum manufacturer has 900 tons of iron and 60,000 working hours is maximum. If the profit on type A machine of rupees 500 and that on type B machine is rupees 800. **(08)**

(a) Formulate this problem LP model as maximize profit

(b) Solve the problem by Graphical

Q.3 Answer the following questions.

A). 1. Three jobs X, Y and Z are to be done on three machines P,Q and R. The following matrix shows the costs of doing different jobs on different machines. Assign the three jobs to the three machines so as to minimize the total cost. **(04)**

	Machines (cost in Rs.)		
Jobs	P	Q	R
X	21	24	31
Y	11	19	17
Z	15	17	13

2. Write a short note on Hungarian method. **(03)**

B). 1. A firm is considering replacement of a machine, whose cost price is Rs 12,200 and scrap value is only Rs. 200. The maintenance cost are found as follow: **(04)**

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

2. Find value of game and best strategy for each player. **(04)**

	Player B			
Player A	B_1	B_2	B_3	B_4
A_1	1	7	3	4
A_2	5	6	4	5
A_3	7	2	0	3

Q.4 Attempt any two questions. (Each of 7.5 mark) **(15)**

. 1. Solve LPP by Simplex method

$$Max\, z = 2x_1 + 4x_2 + x_3$$

subject to constraint

$$x_1 + 2x_2 \le 4,$$
$$2x_1 + x_2 \le 3,$$
$$x_2 + 4x_3 \le 3,$$
$$x_1, x_2, x_3 \ge 0$$

2. Find the Optimal solution of transportation problem.

	W_1	W_2	W_3	W_4	Supply
S_1	8	9	6	3	19
S_2	6	11	5	10	12
S_3	3	8	7	9	14
Demand	15	6	11	13	

3. A large establishment has an installation with 1,000 bulbs of a certain type. Form the past data it has observed that failure rates of bulbs as detailed here:

End of week	1	2	3	4	5
Probability of failure to date	0.10	0.25	0.50	0.70	1.00

It is given that the cost of replacing an individual bulb is Rs 3 while if the entire group of bulbs is replaced, the cost would be Rs 1 per bulb. Determine optimal time period for replacement.

4. Represent following information as network diagram.

Activity	A	B	C	D	E	F
Sequence	1-2	1-3	2-3	2-4	3-4	4-5
Time	20	25	10	12	5	10

(a) Find Earliest and latest expected completion times for each activity.
(b) Find critical path.
(c) Calculate total float and free float for non-critical activity.