Seat No:_____ Enrollment No:_____

PARUL UNIVERSITY

FACULTY OF MANAGEMENT

BBA Winter 2022 - 23 Examination

Semester: 5 **Date:06/10/2022**
Subject Code: 06191306 **Time: 10:30 am to 01:00 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/Fill in the blanks. (Each of 01 mark) **(05)**

1 A feasible solution to an LP problem.

a) Must satisfy all of the problem's constraints simultaneously

b) Need not satisfy all of the constraints, only some of them

c) Must be a corner point of the feasible region

d) Must optimize the value of the objective function

2 With the transportation technique, the initial solution can be generated in any fashion one chooses. The only restriction is that

a) The solution is not degenerate.

b) One must use the northwest-corner method.

c) The solution must be optimal.

d) The edge constraints for supply and demand are satisfied.

3 The northwest corner rule requires that we start allocating units to shipping routes in the:

a) Middle cell.

b) Lower right corner of the table

c) Upper right corner of the table.

d) Highest costly cell of the table.

4 What is the fundamental purpose of game theory?

a) To predict firm behaviour

b) To analyse decision-making

c) To predict decision outcomes

d) None of the above

5 What is concerned with the prediction of replacement costs and determination of the most economic replacement policy?

a) Search Theory

b) Probabilistic Programming

c) Theory of replacement

d) None of the above

B) Define the following. (Each of 01 mark) **(05)**

1. Feasible Solution.
2. Degenerate Solution
3. Unbalanced assignment problems
4. Saddle Point
5. Pure Strategy

C) Direct questions. (Each of 01 mark) **(05)**

1. What is difference between Slack variable and Surplus variable?
2. Write necessary & sufficient condition for solution of Transportation Problem.
3. What is an assignment problem?
4. What is a fair game?

5. Draw PERT Chart :

Activity	Sequence	Description	No. of Days
a	1-2	Sale estimate	15
b	2-3	Determining the selling price	5
c	2-4	Determining production budget	10
d	3-4	Determining cost of production	18
e	4-5	Preparation of Budget	19

Q.2 Answer the following questions.

A) Obtain initial basic feasible solution using Vogel's approximation method. **(07)**

	A	B	C	D	E	F	Supply
I	6	12	9	6	9	10	5
II	7	3	7	7	5	5	6
III	6	5	9	11	3	11	2
IV	6	8	11	2	2	10	9
Demand	4	4	6	2	4	2	22

B) A machine X costs Rs 5,000. Its maintenance cost is Rs 1,000 in each of first four years and it increase by Rs 200 every year. Assuming that machine has no salvage value. Determine the optimal replacement time for the machine assuming that time value of money is 10%. **(08)**

Q.3 Answer the following questions.

A) A company has four machines that are to be used for three jobs. Each job can be assigned to one and only one machine. The cost of each job an each machine is given in the following table. **(07)**

	Machines			
Jobs	W	X	Y	Z
A	18	24	28	32
B	8	13	17	18
C	10	15	19	22

What are job assignment pairs that shall minimize the cost?

B) For the game with payoff matrix **(08)**

	Player B				
Player A	B_1	B_2	B_3	B_4	B_5
A_1	- 2	0	0	5	3
A_2	3	2	1	2	2
A_3	-4	-3	0	-2	6
A_4	5	3	-4	2	6

Determine the optimal strategy for players A and B. Also determine value of game.

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

1. Solve LPP by Simplex method

$Max\ z = 3x_1 + 4x_2$

subject to constraint

$2x_1 + 3x_2 \le 16,$

$2x_1 + x_2 \le 8$

$x_1,\ x_2 \ge 0$

2. 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.

(a) Formulate this problem LP model as maximize profit

(b) Solve the problem by Graphical

3. Represent following information as network diagram.

Activity	A	B	C	D	E	F
Sequence	1-2	1-3	2-3	2-4	3-4	3-5
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

4. Write down difference between PERT and CPM.