PARUL UNIVERSITY
FACULTY OF MANAGEMENT STUDIES
BBA Winter 2023-24 Examination

Semester: 05   Date: 16/10/2023
Subject Code: 06191306   Time: 10:30am to 1:00pm
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.   CO   PO   BTL

A) Multiple choice type questions. (Each of 1 mark)   (05

1. The best use of linear programming technique to find an optimal use of   1   1   1
   a) Money   c) Manpower
   b) Machine   d) All of the above

2. The solution to a Transportation problem with m rows and n columns is   5   4   1
   feasible if number of
   positive allocations are
   a) $m - n$ c) $m + n - 1$
   b) $m + n$ d) $m + n + 1$

3. Which method is used to verify the optimality of the current solution of the   5   4   1
   Transportation problem
   a) Least cost method   c) Vogel's approximation
   b) MODI   d) All of the above

4. Maximization problem in the Assignment Problem is transformed into a   5   4   1
   minimization problem by
   a) Adding each entry in a column   c) Subtracting each entry
   from the maximum vale that column   in a column from the
   b) Subtracting each entry in a table d) None of these
   from the maximum value in that

5. Game theory models are classified by   6   5   1
   a) Number of players   c) sum of all payoffs
   b) Number of strategies   d) All of the above

B) Define the following. (Each of 1 mark)   (05
1. Rules of Dominance in game theory.   6   5   2
2. Basic Feasible Solution in LPP.   4   1   2
3. Assignment Problem   5   4   2
4. Degenerate basic feasible solution in Transportation Problem.   4   1   2
5. Artificial variable in LPP.   4   1   2

C) Direct questions.(Each of 1 mark)   (05
1. Slack variable in LPP.   4   1   2
2. Saddle point in game theory.   6   5   2
3. Full form of CPM.   8   3   2
4. Group replacement policy.   2   4   2
5. Write General mathematical formulation of LPP.   4   3   2

Q.2 Answer the following questions.

A) Use the graphical method to solve the following LP problem. (07) 4 3 4

$$Maximize\ Z=10x+6y$$

Subject to constraints,

$$5x + 3y \leq 30$$
$$x + 2y \leq 18$$
$$x, y \geq 0$$

B) Find initial feasible solution of following problem by Vogel's approximation method, then check optimal solution by MODI method. (08) 3 3 4

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

Q.3 Answer the following questions.

A) A department of a company has five employees with five jobs to be performed. The time in hours that each man takes to perform each job is given in the matrix form, (07) 5 4 5

Job/Time	1	2	3	4	5
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total

B) The data collected in running machines, the cost of which Rs 60000 are given below: (08) 6 5 5

Year	1	2	3	4	5
Resale Value	42000	30000	20400	14400	9650
Cost of spares	4000	4270	4880	5700	6800
Cost of Labour	14000	16000	18000	21000	25000

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

A) Solve the following games by using maxmin or minmax principle, whose payoff matrix is given below: include in your answer: strategy selection for each player and the value of game. 7 5 4,5

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

B) Solve the following LP problems by using simplex method,   3   5   6

$$Max\ Z = 3x_1 + 2x_2$$

Subject to constraint

$$x_1 + x_2 \leq 4$$
$$x_1 - x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

C) Define CPM and solve the following problem,   8   4   6

A assembly is to be made from two parts X and Y. Both parts must be turned on lathe. Y must be polished whereas X need not be polished. The sequence of activities, together with their predecessors, is given below,

Activities	Description	Predecessor Activity
A	Open work order	-
B	Get material for X	A
C	Get material for Y	A
D	Turn X on lathe	B
E	Turn Y on lathe	B,C
F	Polish Y	E
G	Assemble X and Y	D, F
H	Pack	G

Draw the network diagram.

D) Determine initial basic feasible solution to the following transportation   5   2   6
problem, by North west corner Method and Least cost method,

	1	2	3	4	Supply
A	21	16	15	3	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	6	8	23	