Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MBA

SEM: II - CARRY OVER THEORY EXAMINATION - SEPTEMBER 2022

Subject: Quantitative Techniques for Managers

Time: 3 Hours   Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.

2. Section A - Question No- 1 is 1 marker & Question No- 2 carries 2 marks each.

3. Section B - Question No-3 is based on external choice carrying 6 marks each.

4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.

5. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A   20

1. Attempt all parts:-

1-a.   The graphical method of LP problem uses   (CO1)   1

               (a) Objective function equation

               (b) Constraint equation

               (c) Linear equations

               (d) All of the above

1-b.   What is the name of method to optimize the objective function in LPP? (CO1)   1

               (a) Simplex Method

               (b) Least Cost Method

               (c) Hungarian Method

               (d) None of the above

1-c.   The occurrence of degeneracy while solving a transportation problem means that (CO2)   1

               (a) Total supply equals total demand

               (b) The solution so obtained is not feasible

               (c) The few allocations become negative

               (d) None of the above

1-d.   The solution to a transportation problem with 'm' rows(supplies) and 'n' 1
        columns(destination) is feasible if number of positive allocations are (CO2)

        (a) m+n

        (b) mn

        (c) m+n-1

        (d) m+n+1

1-e.   What happen when maxi-min & mini-max values of the game are same (CO3) 1

        (a) No solution exists.

        (b) Solution is mixed.

        (c) Saddle point exists.

        (d) None of these

1-f.   The method used for solving an assignment problem is called (CO3) 1

        (a) Reduce matrix method

        (b) MODI method

        (c) Hungarian method

        (d) None of these

1-g.   Customer behavior in which he moves from one queue to another in a multiple channel 1
        situation is (CO4)

        (a) Balking

        (b) Reneging

        (c) Jockeying

        (d) alternating

1-h.   The total time required to complete all the jobs in a job sequencing problem is known as 1
        (CO4)

        (a) elapsed time

        (b) idle time

        (c) processing time

        (d) processing order

1-i.   The following goes on increasing with the increase in degree of maintenance efforts (CO5) 1

        (a) Cost of down time

        (b) Cost of spares and maintenance

        (c) Labour and Overhead Cost

(d) All three

1-j. The objective of network analysis is to (CO5) 1

  (a) Minimize total project duration

  (b) Minimize total project cost

  (c) Minimize production delays, interruption and conflicts

  (d) All three

2. Attempt all parts:-

2.a. Write any four advantages of O.R. (CO1) 2

2.b. Write the name of all methods for finding the initial basic solution of a transportation problem. (CO2) 2

2.c. How do we balance an unbalanced assignment problem? (CO3) 2

2.d. What is traffic intensity? (CO4) 2

2.e. Explain the term Group replacement policy in replacement model. (CO5) 2

<center>SECTION B 30</center>

3. Answer any <u>five</u> of the following:-

3-a. Use the Graphical Method, to Solve LPP 6

Maximize $Z = 6x_1 + 8x_2$

subject to

$5x_1 + 10x_2 \leqslant 60$

$4x_1 + 4x_2 \leqslant 40$

$x_1, x_2 \geq 0$

(CO1)

3-b. Write a short note on Scope of Operation Research. (CO1) 6

3-c. Obtain an initial basic feasible solution to the following transportation problem by using Least- cost method. 6

	A	B	D	a_i
I	9	8	5	25
II	6	8	4	35
III	7	6	9	40
b_j	30	25	40	

(CO2)

3-d. List the Various methods of finding the initial basic feasible solution of a transportation 6

problem. Which is the best method of solving transportation problem and why? (CO2)

3.e.   Write a short note on 'Assignment Problem'. Give two areas of its applications. (CO3)   6

3.f.   Find the sequences that minimizes the total time in hours required to complete the following   6
tasks:

Task	A	B	C	D	E	F	G
Machine I	3	8	7	4	9	8	7
Machine II	4	3	2	5	1	4	3
Machine III	6	7	5	11	5	6	12

What is the minimum elapsed time? (CO4)

3.g.   Following table gives the running costs(maintenance Costs) per year and resale prices of a   6
certain equipment whose purchase price is Rs. 5,000:

Year	1	2	3	4	5	6	7	8
Running costs(Rs.)	1500	1600	1800	2100	2500	2900	3400	4000
Resale value (Rs.)	3500	2500	1700	1200	800	500	500	500

At what year is the replacement due? (CO5)

<div align="center">SECTION C   50</div>

4. Answer any <u>one</u> of the following:-

4-a.   Explain the concept, scope and tools of O.R. as applicable to business and industry. (CO1)   10

4-b.   Solve the LPP   10

$$\text{Max} z = 18x_1 + 24x_2$$

$$\text{Subject to } 4x_1 + 2x_2 \leq 8,$$

$$2x_1 + 5x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

(CO1)

5. Answer any <u>one</u> of the following:-

5-a.   Determine an initial basic feasible solution to the following transportation problem using: (a)   10
matrix minima method, and (b) Vogel's method.

	A	B	C	D	Supply
I	1	2	1	4	30
II	1	3	2	1	50
III	4	2	5	9	20
Demand	20	40	30	10	100

(CO2)

5-b.   Solve the following unbalanced transportation problem by using MODI Method (symbols   10
        have their usual meaning):

	D_1	D_2	D_3	a_i
O_1	4	3	2	10
O_2	2	5	0	13
O_3	3	8	6	12
b_j	8	5	4	

(CO2)

6. Answer any <u>one</u> of the following:-

6-a.   Solve the following assignment to find the maximum total expected sale: 10

		Area			
		I	II	III	IV
	A	42	35	28	21
Salesman	B	30	25	20	15
	C	30	25	20	15
	D	24	20	16	12

(CO3)

6-b.   Explain the following terms: 10

i) Players, Strategy

ii) Two person zero sum game

iii) Payoff matrix

iv) Saddle point

v) types of strategy. (CO3)

7. Answer any <u>one</u> of the following:-

7-a.   Solve the following sequencing problem   10

Items	Machines				
	A	B	C	D	E
I	9	7	5	4	11
II	8	8	6	7	12

| III | 7 | 6 | 7 | 8 | 10 |
| IV | 10 | 5 | 5 | 4 | 8 |

(CO4)

7-b. With respect to the queue system explain the following   10

   i. Input process

  ii. Queue discipline

 iii. Capacity of the system

 iv. Holding time

  v. Balking

 vi. Jockeying. (CO4)

8. Answer any <u>one</u> of the following:-

8-a. Why does the problem of replacement arise? What is group replacement? When it is   10
economical? Explain with example. (CO5)

8-b. A project has the following time schedule.   10

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration (months)	2	2	1	4	8	5	3	1	5	4	3

Construct the network and compute, Critical path and its duration. (CO5)