Printed Page:- 06

Subject Code:- AMBA0205

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MBA

SEM: II - CARRY OVER THEORY EXAMINATION - JUNE 2023

Subject: Quantitative Techniques for Managers

Time: 3 Hours | Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *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. Operations research approach is (CO 1) 1

(a) Scientific

(b) Multidisciplinary

(c) Intuitive

(d) All of the above

1-b. Linear Programming Problem that can be solved by graphical method has ______________. (CO1) 1

(a) Linear constraints

(b) Quadratic constraints

(c) Non linear constraints

(d) Bi-quadratic constraints

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

(a) m+n

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(b) mn

(c) m+n-1

(d) m+n+1

1-d. __________ or __________ are used to "balance" a transportation problem. 1

(a) Destinations; sources

(b) units supplied; units demanded

(c) Dummy rows; dummy columns

(d) Large cost coefficients; small cost coefficients

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 situation is (CO4) 1

(a) Balking

(b) Reneging

(c) Jockeying

(d) alternating

1-h. The procedure for determining an optimal sequence of n jobs on two machines was developed by: 1

(a) Newton

(b) Johnson

(c) Legender

(d) J.V. Neumann

1-i. 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

1-j. The replacement policy that is imposed on an item irrespective of its failure is (CO5) 1

(a) Group replacement

(b) Individual replacement

(c) Repair spare replacement

(d) Successive replacement

2. Attempt all parts:-

2.a. What do you understand by LPP? (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. Write the two major differences between PERT and CPM. 2

SECTION B **30**

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 static vs. dynamic models in O.R. (CO1) 6

3-c. Find initial basic feasible solution by using Vogel's approximation method of the following transportation problem: 6

	D_1	D_2	D_3	Supply
O_1	6	8	14	14
O_2	4	3	8	12
O_3	1	2	6	5

Demand	6	10	15	

3-d. What are the conditions for the application of the optimality test in case of transportation problem? Briefly explain as to why these conditions should be satisfied? 6

3.e. Explain the assumptions underlying game theory. 6

3.f. What do you understand by the terms (i) Arrival Pattern (ii) Service Pattern (iii) Service Channel in queuing model? 6

3.g. Explain with example the failure mechanism of items in replacement model. 6

SECTION C 50

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

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

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

	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)

5-b. Solve the following cost minimization transportation problem and find the optimal solution by using MODI Method ; 10

Origins	Destinations				Available
	P	Q	R	S	
A	21	16	25	13	11
B	17	18	14	23	13

C	32	17	18	41	19
Required	6	10	12	15	

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

6-a. Solve the following assignment problem in order to minimize the total cost. (CO3) 10

	Machines				
Jobs		A	B	C	D
	I	18	24	28	32
	II	8	13	17	18
	III	10	15	19	22

6-b. Solve the following game graphically: (CO3) 10

	Player B				
Player A	4	2	5	-6	6
	7	-9	7	4	8

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

7-a. Determine a sequence for the jobs, that will minimize the total elapsed time and also calculate idle time. 10

Job No.	1	2	3	4	5
Machine A	5	7	6	9	5
Machine B	2	1	4	5	3
Machine C	3	7	5	6	7

7-b. A car park contains 5 cars. The arrival of cars is Poisson, at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with mean of 0.5 hours. How many cars are in the car park on an average? 10

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

8-a. A machine owner finds from his past records that the maintenance cost per year of a machine, whose purchase price is Rs. 6000 are given below: 10

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Maintenance cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale price	3000	1500	750	375	200	200	200	200

Determine at what age a machine replacement is due.

8-b. A small maintenance project consists of the following 12 jobs. 10

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Jobs	1-2	2-3	2-4	3-4	3-5	4-6	5-8	6-7	6-10	7-9	8-9	9-10
Duration (days)	2	7	3	3	5	3	5	8	4	4	1	7

Draw the arrow network of the project. Summaries CPM calculations in a tabular form, hence determine the critical path.