Printed Page:-04 **Subject Code:- BCSBS0401**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2024- 2025)

Subject: Operations Research

Time: 2 Hours **Max. Marks: 50**

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 15

1. Attempt all parts:-

1-a. A physical model is an example of (CO1,K1) 1

(a) A verbal model
(b) An analogue model
(c) An iconic model
(d) A mathematical model

1-b. One equality constraint in primal indicates (CO2,K2) 1

(a) One equality constraint in dual
(b) One unrestricted variable in dual
(c) One constraint in dual
(d) None of these

1-c. The transportation problem is basically a (CO3,K1) 1

(a) Maximization model
(b) Minimization model
(c) Transshipment problem
(d) Iconic model

1-d. Critical activities in Network analysis have (CO4,K2) 1

(a) Zero Float
(b) Minimum float
(c) Maximum float

(d) None of these

1-e. One can increase the chance that result of simulation are not erroneous by(CO5,K1) 1

(a) Validating the simulation

(b) Changing the input parameters

(c) Using discrete probability in place of continuous ones.

(d) None of these

2. Attempt all parts:-

2.a. Name some characteristics of a good model.. (CO1,K1) 2

2.b. A manufacturer makes two products A and B using two machines P and Q. Product A requires 2 hours on machine P and 6 hours on machine Q. Product B requires 5 hours on machine P and no time on machine Q. There are 16 hours of time per day available on machine P and 30 hours on Q. Profit margin from A and B is Rs. 2 and Rs. 10 per unit respectively. Formulate the above as an LPP to maximize the profit. (CO2,K2) 2

2.c. Discuss the steps to convert a maximization assignment problem into a minimization problem? (CO3,K2) 2

2.d. Give the the common errors in the construction of network. (CO4,K1) 2

2.e. Define Pseudo-random numbers. (CO5,K1) 2

SECTION-B 15

3. Answer any three of the following:-

3-a. Distinguish the following models with suitable examples: (CO1,K1) 5

a) Stochastic and deterministic models

b) Static and dynamic models

3-b. Solve the following LPP by using two phase method: (CO2,K3) 5

Max $Z = 5x_1 + 3x_2$

Subject to $2x_1 + x_2 \leq 1$

$x_1 + 4x_2 \geq 6$

$x_1, x_2 \geq 0$

3.c. The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs, which are as follows: (CO3,K3) 5

	A	B	C	D	E
1	62	78	50	111	82
2	71	84	61	73	59
3	87	92	111	71	81
4	48	64	87	77	80

Determine the assignments of mechanics to the job that will result in maximum profit. Also write down the job which should be declined.

3.d. The annual demand of an item is Rs. 3200 units. The unit cost is Rs. 6 and 5

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inventory carrying charges are 25 percent per annum. if the cost of one procurement is Rs. 150, Calculate Economic Order Quantity (EOQ) and no. of orders per year. (CO4,K3)

3.e. A bakery keeps stock of a popular brand of cake. Previous experience shows the demand pattern for the item with associated probabilities, as given below: 5

Daily demand (number):	0	10	2 0	30	40	50
Probability :	0.01	0.2	0.15	0.50	0.12	0.02

Simulate the demand for next 10 days. Also estimate the daily average demand for the cakes on the basis of simulated data. (CO5,K3)
Random Numbers: 25,39,65,76,12, 5,73,89,19,49.

SECTION-C 20

4. Answer any one of the following:-

4-a. Define OR and Discuss the various phases in solving an OR problem. (CO1,K1) 4

4-b. Explain the role of decision making in Operations Research. (CO1,K1) 4

5. Answer any one of the following:-

5-a. Solve the following LPP by using graphical method: (CO2,K3) 4

Max. $Z = 3x_1 + 2x_2$
subject to $5x_1 + x_2 \geq 10$
$x_1 + x_2 \geq 6$
$x_1 + 4x_2 \geq 12$
$x_1, x_2 \geq 0$

5-b. Use Big-M method to solve the following LPP (CO2, K3) 4

Maximize $Z = 3x_1 + 2x_2$
Subject to $2x_1 + x_2 \leq 2$
$3x_1 + 4x_2 \geq 12$
and $x_1, x_2 \geq 0$

6. Answer any one of the following:-

6-a. Obtain an initial basic feasible solution to the following transportation problem by using matrix minima method. (CO3,K3) 4

	D_1	D_2	D_3	D_4	Supply
O_1	5	4	2	6	20
O_2	8	3	5	7	30
O_3	5	9	4	6	50
Demand	10	40	20	30	

6-b. Solve the following transportation problem using the Vogel's Approximation method. (CO3,K3) 4

	A	B	C	Supply
1	2	2	3	10
2	4	1	2	15
3	1	3	1	40
Demand	20	15	30	

7. Answer any one of the following:-

7-a.	Define Inventory and also discuss different types of inventories. (CO4,K1)	4
7-b.	Define Network scheduling and also give the various phases involved in a project. (CO4,K1)	4

8. Answer any one of the following:-

8-a.	Define simulation and explain the necessity of simulation in present world. (CO5,K2)	4
8-b.	Explain the steps involved in Monte-Carlo Simulation. (CO5,K1)	4

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