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Printed Page:-4 **Subject Code:- BBBA0205**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
BBA
SEM: II - THEORY EXAMINATION (2025 - 2026)
Subject: Quantitative Techniques for Decision Making

Time: 2.5 Hours **Max. Marks: 60**

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:-

(1.1) Operations research approach is: (CO1,K1) 1

(a) Intuitive
(b) Scientific
(c) Multi-disciplinary
(d) None of the above

(1.2) The allocated cells in the transportation table is: (CO2, K2) 1

(a) Unoccupied
(b) Occupied
(c) Degenerate
(d) None of the above

(1.3) In the assignment problem, all assignments must be made: (CO3, K2) 1

(a) Only for profitable jobs
(b) Only for the least cost jobs
(c) Randomly
(d) Exactly one job per worker and one worker per job

(1.4) If idle time on a machine is reduced, then: (CO4, K2) 1

(a) Efficiency increases
(b) Efficiency decreases
(c) No effect on efficiency
(d) Cannot say

(1.5) In decision-making under certainty, the decision-maker: (CO5, K1) 1

(a) Knows all possible outcomes and their probabilities.
(b) Does not know the outcomes or their probabilities
(c) Knows exactly which state of nature will occur.
(d) Bases the decision on past experiences only.

2. Attempt all parts:-

(2.1) Define slack variable. (CO1, K1) 2

(2.2) Define degeneracy in Transportation Problem. (CO2, K1) 2

(2.3) Define Zero-Sum Game. (CO3, K1) 2

(2.4) Write the condition for Johnson's Rule used for n jobs through three machines in sequencing problems. (CO4,K1) 2

(2.5) Write down the names of four methods that are useful for decision making under uncertainty. (CO5, K1) 2

SECTION-B 15

3. Answer any three of the following:-

(3.1) Define Linear Programming Problem (LPP). Explain its assumptions. (CO1, K2) 5

(3.2) Obtain an initial basic feasible solution to the following transportation problem by using least- cost method. (CO2, K3) 5

	D1	D2	D3	Supply
O1	9	8	5	25
O2	6	8	4	35
O3	7	6	9	40
Demand	30	25	45	

(3.3) Solve the following game and determine the value of game: (CO3, K3) 5

Player B

Player A $\begin{bmatrix} 2 & 5 \\ 4 & 1 \end{bmatrix}$

(3.4) Determine a sequence for the jobs, that will minimize the total elapsed time and also calculate total elapsed time.(CO4,K3) 5

Job No.	**1**	**2**	**3**	**4**	**5**	**6**
Machine I	3	1	4	2	9	10
Machine II	3	10	7	8	4	8

(3.5) Explain the decision tree approach with diagram and its procedure.(CO5,K2) 5

SECTION-C 30

4. Answer any one of the following:-

(4.1) Consider a chocolate manufacturing company that produces only two types of chocolate A and B. Both the chocolates require Milk and Choco only. To manufacture each unit of A and B, the following quantities are required: 6

i. Each unit of A requires 1 unit of Milk and 3 units of Choco

ii. Each unit of B requires 1 unit of Milk and 2 units of Choco

iii. The company kitchen has a total of 5 units of Milk and 12 units of Choco. On each sale, the company makes a profit of Rs 6 per unit A sold and Rs 5 per unit B sold. Now, the company wishes to maximize its profit. Formulate this problem as a LPP and determine the optimal solution. (CO1, K3)

(4.2) Solve the following linear programming problem by simplex method: (CO1, K3) 6

$$\text{Max } Z = 2x + 3y$$

subject to

$$x + 2y \leq 6,$$

$$2x + y \leq 8,$$

$$x \geq 0, y \geq 0$$

5. Answer any one of the following:-

(5.1) Define Transportation problem and describe the steps involved in the North-West Corner Method. (CO2, K2) 6

(5.2) Solve the following Transportation problem by using VAM method: (CO2, K3) 6

	C1	C2	C3	C4	C5	SUPPLY
F1	12	4	9	5	9	55
F2	8	1	6	6	7	45
F3	1	12	4	7	7	30
F4	10	15	6	9	1	50
DEMAND	40	20	50	30	40	180

6. Answer any one of the following:-

(6.1) Solve the following game: (CO3, K3) 6

Player B

$$\text{Player A} \begin{bmatrix} 1 & 3 & -3 & 7 \\ 2 & 5 & 4 & -6 \end{bmatrix}$$

(6.2) Solve the following assignment problem. (CO3, K3) 6

	I	II	III	IV	V
A	5	11	10	12	4
B	2	4	6	3	5
C	3	12	5	14	6
D	6	14	4	11	7
E	7	9	8	12	5

7. Answer any one of the following:-

(7.1) Explain the method of sequencing of n jobs on two machines using Johnson's Rule. (CO4, K2) 6

(7.2) A machine operator has to perform three operations — turning, threading and knurling — on a number of different jobs. The time required to perform these operations (in minutes) for each job is given below. Determine the order in which the jobs should be processed in order to minimize the total time required to perform all the jobs. Also calculate the minimum elapsed time. (CO4, K3) 6

Job	**1**	**2**	**3**	**4**	**5**	**6**
Turning	3	12	5	2	9	11
Threading	8	6	4	6	3	1

Knurling	13	14	9	12	8	13

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

(8.1) A company has two strategies S1 and S2. The payoffs (₹000) under states of nature N_1, N_2, N_3 with probabilities 0.2, 0.5, and 0.3 are: 6

Nature\Strategies	S_1	S_2
N_1	40	35
N_2	30	25
N_3	20	30

Calculate EMV (Expected Monetary Value) and select the best strategy. (CO5, K3)

(8.2) The payoff table is given below: 6

Events	***Actions***			
	S_1	S_2	S_3	S_4
A	*27*	*12*	*14*	*26*
B	*45*	*17*	*35*	*20*
C	*52*	*36*	*29*	*15*

Determine the optimal course of action according to
i) Maximax criterion
ii) Minimax regret criterion
iii) Laplace criterion (CO5, K3)