KAMARAJ COLLEGE (Autonomous)

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(6 Pages) **Reg. No:……**

Question Code:26E00418 **Course Code: 24UECO42**

UG Degree - End Semester Examinations, April 2026

Fourth Semester

B.COM

Operations Research

(For those who joined in July 2024 onwards)

Time: 3Hours **Maximum: 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

CO:1 K:1 1. Who is often referred to as the father of Linear Programming?

(a) George Dantzig (b) A.K. Erlang

(c) Richard Bellman (d) John von Neumann

CO:1 K:2 2. What is the 'Feasible Region' in LPP?

(a) The area containing the worst possible solutions

(b) The area outside the non-negativity restrictions

(c) The region where the objective function is zero

(d) The set of all points that satisfy all constraints simultaneously

CO:2 K:1 3. Which method finds an Initial Basic Feasible Solution (IBFS)?

(a) MODI Method (b) Stepping Stone Method

(c) North West Corner Method (d) Hungarian Method

CO:2 K:2 4. When does a Transportation Problem become 'unbalanced'?

(a) When total supply does not equal total demand

(b) When the number of rows exceeds the number of columns

(c) When there are more than two destinations

(d) When all costs are equal

CO:3 5. What is a 'Zero-Sum' game?

K:1

(a) Both players win
(b) No player gains anything
(c) The gain of one player equals the loss of the other
(d) The total payoff is a variable constant

CO:3 6. What does the 'Maximin' criterion do?

K:2

(a) To maximize the maximum possible gain
(b) To minimize the maximum possible loss for the player
(c) To ensure a fair game for the opponent
(d) To calculate the probability of winning

CO4 7. What does EOQ stand for?

K1

(a) Efficient Order Quality
(b) Essential Output Quota
(c) Estimated Order Quota
(d) Economic Order Quantity

CO:4 8. What is the goal of JIT (Just-in-Time)?

K:2

(a) To maximize safety stock
(b) To eliminate waste and minimize inventory holding levels
(c) To order in bulk to get discounts
(d) To predict demand using historical data

CO:5 9. In Network Analysis, what is 'Slack' or 'Float'?

K:1

(a) The amount of time an activity can be delayed without delaying the project
(b) The total time required to complete the project
(c) The cost of crashing an activity
(d) The critical path duration

CO:5 10. PERT is _____, while CPM is _____.

K:2

(a) PERT is deterministic, while CPM is probabilistic
(b) PERT is used for construction, CPM for research
(c) CPM is activity-oriented, while PERT is event-oriented
(d) There is no difference between the two

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

CO:1 K:3 11. (a) Apply the Graphical Method to solve the following LPP:

Maximize $Z=3x_1+5x_2$

subject to

$x_1+2x_2 \leq 20$

$x_1+x_2 \leq 15$ and $x_1, x_2 \geq 0$.

(OR)

(b) Analyze the characteristics of operation research.

CO:2 K:3 12. (a) Find the initial basic feasible solution for the following transportation problem using the North-West Corner Method:

From/To	D1	D2	D3	Supply
O1	2	3	1	6
O2	4	1	5	8
O3	5	6	7	10
Demand	7	5	12	24

(OR)

(b) Construct the procedure for graphic solution.

CO:3 K:3 13. (a) What are the advantages and limitations of simulation?

(OR)

(b) Explain the assumptions of Two-Person Zero Sum game.

CO:4 K:4 14. (a) Calculate the economic order quantity from the following particulars:

Annual requirement =2,000 units

Cost of materials per unit =Rs. 20

Cost of placing and receiving one order= Rs. 40

Annual carrying cost of inventory, 20% of inventory value.

(OR)

(b) Distinguish between Material Requirement Planning (MRP)

and Just-in-Time (JIT) systems.

CO:5 15. (a) Write a short note on PERT and CPM.

K:3

(OR)

(b) Draw the network diagram for a project with the following activities and their dependencies:

A. Start

B. Start

C. Follows A

D. Follows A

E. Follows B and C

F. Follows E

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 500 words.

CO:1 16. (a) Solve the following LPP using the graphical method and identify the optimal solution:

K:4

Minimize $Z = 4x + 6y$

Subject to:

$2x + y \geq 3$

$x + 2y \geq 5$

$x, y \geq 0$

(OR)

(b) Critique the limitations of Linear Programming.

CO:2 17. (a) Find the optimal solution for the following transportation problem using the Stepping-Stone Method, given the initial basic feasible solution:

K:4

To/From	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

(OR)

(b) A company has three factories located in three cities viz. X, Y, Z. These factories supplies consignments to four dealers viz. A, B, C and D. The dealers are spread all over the country. The production capacity of these factories is 1000, 700 and 900 units per month respectively. The net return per unit product is given in the following table.

	Dealers				
Factory	A	B	C	D	Capacity
X	6	6	6	4	1000
Y	4	2	4	5	700
Z	5	6	7	8	900
Requirement	900	800	500	400	2600

Determine a suitable allocation to maximize the total return.

CO:3 K:4 18. (a) Solve the following game whose pay off matrix is

9 3 1 8 0

6 5 4 6 7

2 4 3 3 8

5 6 2 2 1

(OR)

(b) A company purchasing scrap material has two types of scarp materials available. The first type has 30% of material X, 20% of material Y and 50% of material Z by weight. The second type has 40% of material X, 10% of material Y and 30% of material Z. The costs of the two scraps are Rs.120 and Rs.160 per kg respectively. The company requires at least 240 kg of material X, 100 kg of material Y and 290 kg of material Z. Find the optimum quantities of the two scraps to be purchased so that the company requirements of the three materials are satisfied at a minimum cost.

CO:4 K:4 19. (a) Analyze the Single Period Probabilistic Inventory Model.

(OR)

(b) A trader stocks a particular seasonal product at the beginning of the season and cannot re-order. The item costs

him Rs. 25 each and he sells at Rs. 50 each. For any item that cannot be met on demand, the trader has estimated a goodwill cost of Rs.15. Any item unsold will have a salvage value of Rs. 10. Holding cost during the period is estimated to be 10 per cent of the price. The probability distribution of demand is as follows:

Units Stocked	2	3	4	5	6
Probability of Demand, p(D=Q)	0.35	0.25	0.20	0.15	0.05

Determine the optimal number of items to be stocked.

CO:5 K:4 20. (a) The utility data for a network are given below. Determine the total, free, independent and interfering floats and identify the critical path

Activity	1-2	1-3	2-4	3-4	2-5	4-5
Duration (weeks)	13	12	2	8	15	2

(OR)

(b) Draw a network diagram and find the critical path for the following project:

Activity	Predecessor	Duration (Days)
A	-	5
B	-	7
C	A	4
D	A, B	6
E	C, D	3
F	E	8