



OEMT – 402

IV Semester All UG Courses Examination, July/August 2024  
(NEP Scheme) (Freshers and Repeaters)  
MATHEMATICS – 4 (Open Elective)  
Mathematical Finance

Time : 2½ Hours

Max. Marks : 60

**Instruction :** Answer all Parts.

PART – A

I. Answer any five of the following questions : (5×3=15)

- 1) Explain bill of exchange.
- 2) Write the formulae for
  - a) Loss percent
  - b) Profit percent.
- 3) If cost price of an object is Rs. 1,350 and selling price is Rs. 1,700.  
Find profit percentage.
- 4) Define linear equations and linear inequalities.
- 5) Define linear programming problem.
- 6) Define :
  - a) Multiple optimal solution.
  - b) Unbounded solution for a LPP.

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|---|
| 7) Give the mathematical formulation of a transportation problem.                               |
| 8) Give the two conditions for unbalanced transportation problem.                               |
| 9) Write the types to determine an initial basic feasible solution of a transportation problem. |



P.T.O.





## PART – B

II. Answer **any three** of the following questions : (3×5=15)

- 1) The Banker's gain on a certain sum due  $\frac{5}{2}$  years. Hence is  $\frac{9}{25}$  of the Banker's discount. What is the rate percent ?
- 2) Mohit bought a CD for Rs. 750 and sold it for Rs. 875. Find his gain percent.
- 3) By selling a T-shirt for Rs. 530 a shopkeeper loses 4%. For how much should he sell it to gain 6% ?
- 4) Calculate the present worth of Rs. 20,000 due 2 years and at the rate of interest of 10% per annum.
- 5) The Banker's gain on a bill is  $\frac{1}{5}$  of the banker's discount and the rate of interest is 20% p.a. Find the unexpired period of the bill.

## PART – C

III. Answer **any three** of the following questions : (3×5=15)

- 1) A company manufactures two types of products  $A_1$  and  $A_2$ . Each product uses milling and drilling machine. The process time per unit of  $A_1$  on the milling is 10 hrs. and on the drilling machine is 8 hrs. The processing time per unit of  $A_2$  on the milling is 15 hrs. and drilling is 10 hrs. The maximum number of hours available per week on the milling and drilling machine are 80 hrs. and 60 hrs. respectively. Also the profit per unit of selling  $A_1$  and  $A_2$  are Rs. 25 and Rs. 35 respectively.

Formulate a LP model to determine the production volume of each of the products such that the total profit is maximised.

Machine	Details of product machine hours/unit		Limit on machine hrs.
	Product $A_1$	Product $A_2$	
Milling machine	10	15	80
Drilling machine	8	10	60
Profit/Unit (Rs.)	25	35	





2) Solve the following LPP by graphical method

Minimise  $z = 4x_1 + 6x_2$

Subject to  $x_1 + x_2 \geq 8,$

$6x_1 + x_2 \geq 12$

where  $x_1, x_2 \geq 0.$

3) Solve the following LPP by graphical method

Maximise  $z = 7x_1 + 6x_2,$

Subject to  $x_1 + x_2 \leq 14,$

$2x_1 + x_2 \leq 6,$

where  $x_1, x_2 \geq 0.$

4) Solve the following LPP by graphical method

Maximise  $z = 25x_1 + 20x_2$

Subject to  $16x_1 + 12x_2 \leq 100$

$8x_1 + 16x_2 \leq 80$

where  $x_1, x_2 \geq 0.$

5) Solve the following LPP by graphical method

Minimise  $z = 20x_1 + 10x_2$

Subject to  $x_1 + 2x_2 \leq 40,$

$4x_1 + 3x_2 \geq 60,$

where  $x_1, x_2 \geq 0.$



PART – D

IV. Answer any three of the following questions :

(3x5=15)

1) Solve by using North-West Corner rule.

	Destination				Supply
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
O <sub>1</sub>	4	6	8	8	40
O <sub>2</sub>	6	8	6	7	60
O <sub>3</sub>	5	7	6	8	50
Demand	20	30	50	50	



- 2) Find the optimal solution for the cost and supply/demand matrix given below by using modi method.

	Destination				Supply
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
O <sub>1</sub>	3	1	7	4	250
O <sub>2</sub>	2	6	5	9	350
O <sub>3</sub>	8	3	3	2	400
Demand	200	300	350	150	

- 3) Obtain the initial basic feasible solution of a transportation problem whose cost and origin requirement table is given below by using Vogel's approximation method.

Origin/Destination	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Supply
O <sub>1</sub>	2	7	4	5
O <sub>2</sub>	3	3	1	8
O <sub>3</sub>	5	4	7	7
O <sub>4</sub>	1	6	2	14
Demand	7	9	18	34

- 4) Explain the matrix minimum method to determine basic feasible solution.  
 5) Find the solution of travelling salesman problem.

		To City			
		A	B	C	D
From City	A	∞	4	9	5
	B	6	∞	4	8
	C	9	4	∞	9
	D	5	8	9	∞

