K18U 1615

Reg. No. : .....

Name : .....

V Semester B.A./B.Sc./B.Com./B.B.A./B.B.A.T.T.M./B.B.A.R.T.M./B.B.M./ B.T.T.M./B.C.A./B.S.W./B.A. Afsal Ul Ulama Degree (CBCSS – Reg./Sup./Imp.) Examination, November 2018
(2014 Admn. Onwards)
Open Course
5D04MAT : LINEAR PROGRAMMING

Time : 2 Hours Max. Marks : 20

SECTION – A

All the first 4 questions are **compulsory**. They carry 1 mark **each**. (1×4=4)

1. Define slack variable and surplus variable.
2. How many basic feasible solutions are there to a system of 3 simultaneous linear equations in 4 unknowns ?
3. What is an unbalanced transportation problem ?
4. What do you mean by degeneracy in transportation problem ?

SECTION – B

Answer **any 6** questions from among the questions **5** to **13**. These questions carry **2** marks **each**. (2×6=12)

5. Explain the standard form of an L.P.P.
6. Find any three basic solutions of the equations
   $2x_1 + 6x_2 + 2x_3 + x_4 = 3 : 6x_1 + 4x_2 + 4x_3 + 6x_4 = 2$.
7. Solve the following L.P.P. graphically
   Minimize $z = 4x_1 + 2x_2$ subject to the constraints
   $x_1 + 2x_2 \geq 2, 3x_1 + x_2 \geq 3, 4x_1 + 3x_2 \geq 6, x_1 \geq 0, x_2 \geq 0$.
8. Formulate dual of the following L.P.P.
   Maximize $z = 2x_1 + x_2$ subject to the constraints
   $x_1 + 2x_2 \leq 10, x_1 + x_2 \leq 6, x_1 - x_2 \leq 2, x_1 - 2x_2 \leq 1, x_1 \geq 0, x_2 \geq 0$.

P.T.O.

9. Give a mathematical formulation of the transportation problem.

10. Explain loops in transportation tables.

11. Find an initial basic feasible solution to the following transportation problem using Vogel's approximation method.

Market		M1	M2	M3	M4	Supply
	O1	1	2	1	4	30
Origin	O2	3	3	2	1	50
	O3	4	2	5	9	20
Demand		20	40	30	10	

12. Explain difference between transportation problem and an assignment problem.

13. Solve the following minimal assignment problem.

	M1	M2	M3	M4	M5
P1	8	5	2	6	1
P2	0	9	5	5	4
P3	3	8	9	2	6
P4	4	3	1	0	3
P5	9	5	8	9	5

SECTION – C

Answer **any 1** question from among the following questions. These questions carry 4 marks **each**. **(4×1=4)**

14. Solve using simplex method.

Maximize $z = x_1 + x_2$ subject to the constraints

$2x_1 + x_2 \leq 4$, $x_1 + 2x_2 \leq 3$, $x_1 \geq 0$, $x_2 \geq 0$.

15. A basic feasible solution the following transportation problem is given as $x_{11} = 1$, $x_{12} = 10$, $x_{13} = 3$, $x_{23} = 12$ and $x_{31} = 5$. Is it an optimal solution, if not find an optimal solution ?

Destination →		D1	D2	D3	Supply
	O1	6	8	4	14
Origin	O2	4	9	3	12
	O3	1	2	6	5
Demand		6	10	15	