K16U 1807

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 – 2014 Admn.-Regular) Examination, November 2016

Open Course

5D04 MAT : LINEAR PROGRAMMING

Time : 2 Hours Max. Marks : 20

SECTION – A

Answer **all** the questions. **Each** question carries **one** mark.

1. What do you mean by slack variables in L.P.P. ?
2. Give a necessary and sufficient condition for the existence of a feasible solution to the general transportation problem.
3. Define the term loop associated with a transportation table.
4. When do you say that a transportation problem is balanced ? **(1×4=4)**

SECTION – B

Answer **any 6** questions. **Each** question carries **two** marks.

5. What is the canonical form of L.P.P. ? What are its characteristics ?
6. Reduce the following L.P.P. to its standard form :
   Determine $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$ so as to maximize $z = 2x_1 + x_2 + 4x_3$ subject to the constraints : $-2x_1 + 4x_2 \leq 4, x_1 + 2x_2 + x_3 \geq 5, 2x_1 + 3x_3 \leq 2$.
7. Give the mathematical formulation of the following Diet problem :
   Given the nutrient contents of a number of different foodstuffs and the daily minimum requirement of each nutrient for a diet, determine the balanced diet which satisfied the minimum daily requirements and at the same time has the minimum cost.
8. Obtain the dual of the following L.P.P. :
   Maximize $f(x) = 2x_1 + 5x_2 + 6x_3$ subject to the constraints :
   $5x_1 + 6x_2 - x_3 \leq 3, -2x_1 + x_2 + 4x_3 \leq 4, x_1 - 5x_2 + 3x_3 \leq 1, -3x_1 - 3x_2 + 7x_3 \leq 6,$
   $x_1, x_2, x_3 \geq 0$.

P.T.O.

9. State the result connecting linear dependence and loops in a transportation problem.

10. What is meant by degeneracy in transportation problem ? How do you resolve degeneracy at the initial solution ?

11. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

12. Obtain an initial basic feasible solution to the following transportation problem using the matrix minima method

	D_1	D_2	D_3	D_4	Capacity
O_1	1	2	3	4	6
O_2	4	3	2	0	8
O_3	0	2	2	1	10
Demand	4	6	8	6	

13. Explain the assignment problem and its mathematical formulation. **(6×2=12)**

SECTION – C

Answer **any** 1 question. **Each** question carries **four** marks.

14. Use simplex method to solve the L.P.P. :
Maximize $z = 3x_1 + 2x_2$ subject to the constraints :
$x_1 + x_2 \leq 6$, $2x_1 + x_2 \leq 6$, $x_1 \geq 0$, $x_2 \geq 0$.

15. Solve the following transportation problem :

From	To			
	A	B	C	Available
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Requirement	4	2	2	

(1×4=4)