K20U 0131

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.) Examination, April 2020
(2014 Admission Onwards)
CORE COURSE IN MATHEMATICS
6B14MAT (Elective A) : Operations Research

Time : 3 Hours Max. Marks : 48

SECTION – A

All the first **4** questions are **compulsory**. They carry **1** mark **each**.

1. Define global minimum of a function f(x).
2. What do you mean by degeneracy in a linear programming problem ?
3. What is assignment problem ?
4. Define saddle point of a game.

SECTION – B

Answer **any 8** questions from among the questions **5** to **14**. These questions carry **2** marks **each**.

5. Show that the function $f((x_1, x_2)) = x_1^2 + x_2^2$ is a convex function over all of R^2.
6. Determine whether the quadratic form $2x_1^2 + 6x_2^2 - 6x_1x_2$ is positive definite or negative definite.
7. Define the term basic solution. How many basic solutions are there to a given system of two simultaneous linear equation in four unknowns ?
8. State the general LPP in the canonical form.
9. Explain least cost method to solve transportation problem for an initial solution.

P.T.O.

10. What is degeneracy in transportation problems ?

11. Give two applications of assignment problem.

12. Define the sequencing problem with n jobs and two machines.

13. What assumptions are made in the theory of games ?

14. Explain the dominance property in game theory.

SECTION – C

Answer **any 4** questions from among the questions **15** to **20**. These questions carry **4** marks **each**.

15. Let f(x) be a convex function on a convex set S. Prove that f(x) has a local minimum on S, then this local minimum is also a global minimum on S.

16. Solve graphically Max $Z = 80x_1 + 55x_2$

Subject to $4x_1 + 2x_2 \leq 40$

$2x_1 + 4x_2 \leq 32 \quad x_1 \geq 0, x_2 \geq 0.$

17. Obtain an initial basic feasible solution to the following transportation problem :

	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	

18. Show that the optimal solution of a assignment problem is unchanged if we add or subtract the same constant to the entries of any row or column of the cost matrix.

19. Explain the sequencing problem with n jobs and k machines.

20. Explain the graphical method of solving a game.

SECTION – D

Answer **any 2** questions from among the questions **21** to **24.** These questions carry **6** marks **each.**

21. Define the dual of a linear programming problem. Prove that the dual of the dual is the primal.

22. Solve the following transportation problem.

	X	Y	Z	Availability
A	50	30	220	1
B	90	45	170	3
C	250	200	50	4
requirement	4	2	2	

23. Explain the Hungarian method to solve an assignment problem.

24. Describe the procedure to solve any 2×2 two person zero sum game without any saddle point.