19101385

QP CODE: 19101385

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, MAY 2019

Fourth Semester

B.Sc Mathematics Model II Computer Science

Complemetary Course - MM4CMT02 - MATHEMATICS - OPERATIONS RESEARCH - NON LINEAR PROGRAMMING

2017 Admission onwards

DB794A57

Maximum Marks: 80 **Time: 3 Hours**

Part A

Answer any **ten** questions.

Each question carries **2** marks.

1. Define Integer Programming Problem.
2. Give the relation between S_F, T_F and $[T_F]$ in Integer Programming Problem.
3. Which are the two strategies adopted in branch and bound method
4. When a problem is said to be pruned?
5. Define Convex programming problem
6. Define Lagrangian Function
7. State Kuhn-Tucker Theorem
8. Write the Lagrangian function for Minimize $-2x_1 - 3x_2$ subject to $2x_1 + 2x_2 \leq 7, 0 \leq x_1 \leq 2, 0 \leq x_2 \leq 2, x_1, x_2 \geq 0$
9. Write down Kuhn-Tucker conditions
10. What assumptions can be made in the minimum of Quadratic Programming Problem if $P\ne 0$ and $X^\prime C X$ is Positive Semidefinite
11. Give an example of a Quadratic Programming Problem in which $P\ne0$ and $X^\prime CX$ is positive semidefinite.
12. What do you mean by a separable function. Give an example

(10×2=20)

Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Explain whether an integer programming problem can be solved by rounding off the corresponding simplex solution.
14. Solve by Cutting Plane Method
    Maximize $x_1 + x_2$ subject to $7x_1 - 6x_2 \leq 5, 6x_1 + 3x_2 \geq 7, -3x_1 + 8x_2 \leq 6, x_1, x_2$ non negative integers.

15. Solve by Branch and Bound Method
Minimize $4x_1 + 5x_2$ subject to $3x_1 + x_2 \geq 2, x_1 + 4x_2 \geq 5, 3x_1 + 2x_2 \geq 7, x_1, x_2$ non negative integers.

16. Find the initial branches of the problem
Minimize $3x_1 - x_2$ subject to
$-10x_1 + 6x_2 \leq 15, 14x_1 + 18x_2 \geq 63, x_1, x_2$ non negative integers.

17. Solve the following problem graphically subject to the constraints
Maximise $(x_1 - 4)^2 + (x_2 - 4)^2$
$x_2 + x_2 \leq 6,\ x_1 - x_2 \leq 1,\ 2x_1 + x_2 \geq 6,\ \frac{1}{2}x_1 - x_2 \geq -4,\ x_1 \geq 0,\ x_2 \geq 0$

18. Write K-T conditions for the problem minimise $\frac{3x_1 + x_2 + 3}{x_1 + 2x_2 + 6}$ subject to
$x_1 + 2x_2 \leq 12, 2x_1 - x_2 \leq 4,\ x_1, x_2 \geq 0$

19. Minimise $f = (x_1 + x_2)^2 + (x_2 - 2)$ over the region $0 \leq x_1 \leq 2,\ 0 \leq x_2 \leq 1$, by writing the K-T conditions and obtain the saddle point.

20. Solve by the method of Quadratic programming minimise
$-6x_1 + 2x_1^2 - 2x_1x_2 + 2x_2^2$ subject to $x_1 + x_2 \leq 2, x_1, x_2 \geq 0$

21. Solve
Maximise $f(x_1, x_2) = 2x_1 + 3x_2^4 + 4$
subject to $g_1(x_1, x_2) = 3x_1^2 + 4x_2^2 \leq 36, x_1, x_2 \geq 0$

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. Solve by Branch and Bound Method
Minimize $-2x_1 - 3x_2$ subject to $2x_1 + 2x_2 \leq 7, 0 \leq x_1 \leq 2, 0 \leq x_2 \leq 2, x_1, x_2$ integers

23. Solve by K-T conditions maximise $2x_1 - x_1^2 + x_2$ subject to $2x_1 + 3x_2 \leq 6, 2x_1 + x_2 \leq 4, x_1, x_2 \geq 0$

24. Solve by K-T conditions minimise
$16(x_1 - 2)^2 + (4x_2 - 9)^2$
subject to $x_1 - x_2^2 \geq 0, x_1 + x_2 \leq 6, x_1, x_2 \geq 0$

25. Solve by the method of Separable programming
Minimise $9x_1 - 4x_3 - 3x_1^2 - x_2^2 + 2x_3^3$ subject to $2x_1^2 + 4x_2^2 + 2x_3 \leq 5, x_1, x_2, x_3 \geq 0$

(2×15=30)