9

S0711 (Pages : 2) Name..

Reg. No..

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, MARCH 2020

(CUCSS)

Mathematics

MT 4E 10—ADVANCED OPERATIONS RESEARCH

ne : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *the questions.*
Each question has weightage 1.

1. Distinguish between linear programming and non-linear programming.
2. Define convex function and give an example for a convex function.
3. Define Lagrange multipliers.
4. Write the general form of a convex programming problem.
5. State the condition under which the function $F(X, Y)$ has a saddle point.
6. Write the Kuhn-Tucker conditions for the saddle points of a function.
7. Write the general form of a qudratic programming problem.
8. When do we say that a programming problem is separable ?
9. Write the general form of geometric programming problem.
0. Write the model of a serial multistage problem.
1. When do we say that an optimization problem is decomposable ?
2. Define decision variables in dynamic programming.
3. What is meant by return function ? Illustrate using an example.
4. Describe the forward recursion procedure.

(14 × 1 = 14 weightage)

Part B

Answer any **seven** *questions.*
Each question has weightage 2.

15. Mark on graph the feasible solutions of $(x_1 - 1)(x_2 - 1) \leq 1, x_1 + x_2 \geq 6, x_1 \geq 0, x_2 \geq 0$.

16. If $F(X, Y)$ has a saddle point (X_0, Y_0) for every $Y \geq 0$, then with usual notations prov
$G(X_0) \leq 0, Y_0' G(X_0) = 0$.

17. Describe how the Kuhn-Tucker theorem is derived from a convex programming problem.

18. Write the Kuhn-Tucker conditions to minimize $f = x_1^2 + x_2^2$ subject to $g = (x_1 - 1)^2 - x_2^2 \geq 0$

19. Discuss the primal-dual concept in geometric programming.

20. Maximize x^4 subject to $-\frac{1}{2} \leq x \leq 1$.

21. Justify the name geometric programming to problems involving polynomials.

22. Describe a minimum path problem in Dynamic programming.

23. Describe the computational economy in Dynamic programming.

24. What is the serial multistage model in dynamic programming ? Discuss.

(7 × 2 = 14 wei

Part C

Answer any **two** *questions.*
Each question has weightage 4.

25. Minimize $f = 2x_1 - 3x_2$ subject to $4x_1^2 + 9x_2^2 \leq 36, x_1 \geq 0, x_2 \geq 0$ using separable progra
technique.

26. By the method of quadratic programming, minimize

$$-6x_1 + 2x_1^2 - 2x_1x_2 + 2x_2^2 \text{ subject to } x_1 + x_2 \leq 2, x_1 \geq 0, x_2 \geq 0.$$

27. Use geometric programming to find the dimensions of a rectangle of maximum area inscrib
circle of radius r.

28. Maximize $\sum_{n=1}^{4} (4u_n - nu_n)^2$ subject to $\sum_{n=1}^{4} u_n = 10, u_n \geq 0$.

(2 × 4 = 8 weig