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Reg. No................................

Name...................................

M.Sc. DEGREE (C.S.S.) EXAMINATION, NOVEMBER 2019

Third Semester

Faculty of Science

Branch I (A)—Mathematics

MT 03 C15—OPTIMIZATION TECHNIQUES

(2012—2018 Admissions)

Time : Three Hours | Maximum Weight : 30

Part A

Answer any **five** *questions.*
Each question carries weight 1.

1. Differentiate between LPP, ILP and MILP.
2. Compare and comment on Branch and Bound method and cutting plane method.
3. Prove or disprove : centre of a graph is unique.
4. Explain what do you understand by sensitivity analysis.
5. Explain : (a) Saddle point ; (b) Value of the game.
6. Explain the notion of dominance.
7. Give example for concave and convex functions. Explain.
8. Define : Complementary problem.

$(5 \times 1 = 5)$

Part B

Answer any **five** *questions.*
Each question carries weight 2.

9. Summarise "branch and bound method" steps.
10. State and prove Taylor's theorem.
11. Write a note on goal programming.
12. State the algorithm to find the spanning tree of minimum length.

Turn over

13. Explain maximum flow problem and duality to maximum flow problem.

14. Solve the following game graphically :

		P_2			
		1	2	3	4
P_1	1	19	15	17	16
	2	0	20	15	5

15. State Hocke and Jeeves Search algorithm.

16. Develope Kuhn-Tucker condition for the problem :

Maximize $f(x)$

subject to $g_1(x) \le 0,\ g_2(x) = 0,\ g_3(x) \ge 0.$

(5 × 2 = 10)

Part C

Answer any **three** *questions.*

Each question carries weight 5.

17. Use cutting plane method to :

Maximize $z = 7x_1 + 10x_2$

subject to $-x_1 + 3x_2 \le 6$

$7x_1 + x_2 \le 35$

$x_1, x_2 \ge 0$ integers.

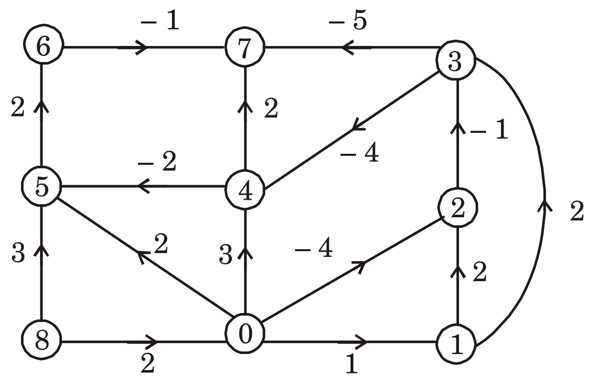
18. (a) State and prove max-flow min-cut theorem.

(b) Explain :

(i) Problem of potential difference.

(ii) An algorithm for solving the problem of minimum path.

19. Find the minimum path from v_0 to v_7 in the graph given below :



20. (a) Solve graphically $\begin{pmatrix} 2 & 7 \\ 3 & 5 \\ 11 & 2 \end{pmatrix}$.

(b) Explain the concept of dominance and rules with examples.

21. Use golden section search to :

$$\text{Maximize } f(x) = \begin{cases} 3x & 0 \le x \le 2 \\ \frac{1}{3}(-x + 20) & 2 \le x \le 3. \end{cases}$$

22. Solve by Lagrange multiplier method :

$$\text{Minimize } Z = x_1^2 + x_2^2 + x_3^2$$

$$\text{subject to } 4x_1 + x_2^2 + 2x_3 - 14 = 0.$$

(3 × 5 = 15)