18P206 (Pages: 2) Name:……………………..

Reg. No:…………………..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2019

(Regular/Supplementary/Improvement)

(CUCSS - PG)

(Mathematics)

CC17P MT2 C11 / CC18P MT2 C11 - OPERATIONS RESEARCH

(2017 Admissions onwards)

Time: Three Hours Maximum: 36 Weightage

Part A

Answer ***all*** questions. Each question carries 1 weightage.

1. Define maximum flow problem.
2. Define path, chain, cycle, components with example.
3. Define sensitivity analysis.
4. Define Basic feasible solutions.
5. Define convex functions.
6. What is degeneracy in linear programming problem?
7. Prove that dual of the dual is primal.
8. Assignment problem is a particular case of Transportation problem. Justify.
9. Define loop in transportation array.
10. Define generalized transportation problem.
11. Define ILP and MILP.
12. Define Mathematical expectation of the game.
13. Find the optimal strategy and value of the game $\begin{bmatrix} 2 & -1 & -2 \\ 1 & 0 & 1 \\ -2 & -1 & 2 \end{bmatrix}$
14. Define the concept of Notion of Dominance.

(14 x 1 = 14 Weightage)

Part B

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

15. Show that the linear function $f(X) = CX$ is both convex and concave.
16. Show that if $\{x_i\}$and $\{y_i\}$ are two flows in a graph, then $\{ax_i + by_i\}$ is also a flow. Where a, b are real constants.
17. Show that an optimal solution of $Min\, f(X) = CX, Subject\ to\ X \in T_F$ is an optimal solution of $Min\, f(X) = CX,$ subject to $X \in [T_F]$. Conversely, a basic optimal solution of $Min\, f(X) = CX,$ subject to $X \in [T_F]$ is an optimal solution of $Min\, f(X) = CX,$ subject to $X \in T_F$

18. Prove that a vertex of S_F is a basic feasible solution.
19. Prove that transportation problem has a triangular basis.
20. Describe the effect of deletion of the variables in the optimal solution of an LP problem.
21. Explain Transportation matrix with example.
22. Explain the Caterer problem.
23. State and prove max flow min cut theorem.
24. Solve the game with the given payoff matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 3 & 1 \end{bmatrix}$

(7 x 2 = 14 Weightage)

Part C

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

25. State and prove fundamental theorem on Rectangular Games.
26. Solve the transportation problem

Origin	Destination			Availability
	D_1	D_2	D_3	
O_1	4	5	2	30
O_2	4	1	3	40
O_3	3	6	2	20
O_4	2	3	7	60
Requirement	40	50	60	

27. Solve the game using the notion of dominance with pay off matrix $\begin{bmatrix} 0 & 5 & -4 \\ 3 & 9 & -6 \\ 3 & -1 & 2 \end{bmatrix}$
28. Explain branch and bound method using a suitable example.

(2 x 4 = 8 Weightage)

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