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MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION, SEPTEMBER - 2023

SECOND SEMESTER

MCA 201 - COMPUTER ORIENTED OPERATIONS RESEARCH

(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)

(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours **Max. Marks : 70**

PART-A

Answer any **FIVE** of the following questions. Each question carries **4** marks. **(5×4=20)**

1. a) Explain slack, surplus and artificial variables with example.

   b) Write about weak dual property and strong dual property.

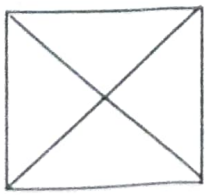
   c) Consider the transportation problem shown in table below, Find the Initial basic feasible solution using Northwest corner method.

	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	

   d) Give the mathematical formulation of assignment problem.

   e) State and formulate linear programming model for maximal flow problem.

   f) What is spanning tree? Find all the spanning trees of a following graph.



   g) Define the terms Pay off, Value of game, Saddle point.

h) Solve the game whose payoff matrix to the player A and B is given below

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	5	2	6

i) Define transient and steady state of queueing system.

j) Define following terms with respect to CPM/PERT :
i) event, ii) activity iii) Processor activity iv)dummy activity.

PART - B

Answer **FIVE** questions choosing, **ONE** question from **each** Unit. Each question carries **10** marks. **(5×10=50)**

UNIT - I

2. a) Solve the following LPP by graphical method

Max $z = 9x+13y$

Subject to constraint $2x+3y \leq 18$

$2x+y \leq 10$ *and* $x, y \geq 0$

b) Solve the following LPP by simplex method

Maximum $Z = 11x_1+4x_2$

Subjected to $7x_1+6x_2 \leq 84$

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

(OR)

3. Solve the following LPP using dual simplex method:

Minimize $z = 2x_1+x_2$

Subject to $3x_1+ x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$ $x_1, x_2 \geq 0$

UNIT - II

4. Company has factories A_1, A_2 and A_3 which supply to warehouses at W_1, W_2 and W_3. Weekly Factory capacities are 240, 200 and 130 units respectively. Weekly warehouses requirements are 190, 150 and 110 units respectively. Unit transportation in costs Rs. As follows:-

	W_1	W_2	W_3	Supply
A_1	16	20	12	240
A_2	14	8	18	200
A_3	26	24	16	130
Demand	190	150	110	450

Find initial basic solution by Vogel Approximation method and also optimum solution by MODI method.

(OR)

5. Solve the assignment problem represented by the following matrix using Hungarian method.

	A	B	C	D
1	2	3	4	5
2	4	5	6	7
3	7	8	9	8
4	3	5	8	4

UNIT - III

6. a) Write optimal equation of Floyd's algorithm and also solve for the digraph with weight matrix.

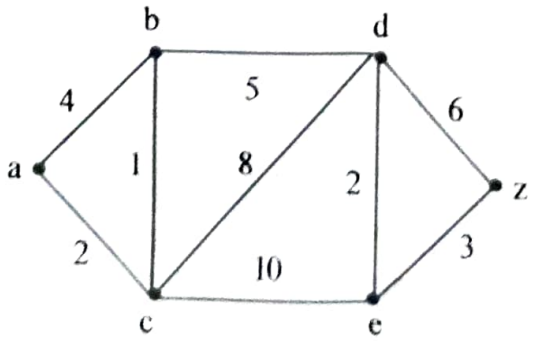
$$\begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix}$$

b) Write about the Maximal Flow Problem Algorithm

(OR)

7. a) Write about Prims algorithm for constructing minimum spanning tree.

b) Using Dijkstra algorithm to Find a Shortest Path from *a to z*.



UNIT - IV

8. Use dominance to reduce the pay-of matrix and solve the game with the following pay-off matrix.

	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

(OR)

9. Consider the following pay-off matrix and determine the optimal strategy

B

A		I	II	III
	I	6	9	4
	II	5	10	7
	III	9	8	9

UNIT - V

10. a) Describe operating characteristics of queueing system.

b) If for a period of 2 h in a day (8 - 10 am) trains arrive at the yard every 20 min, but the service time continues to remain 36 min and then Calculate average queue length on the assumption that the time capacity of the yard is limited to 4 trains only.

(OR)

11. A Project consists of the following activities the details of which are given below.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
t_m	1	4	2	1	5	5	6
t_o	1	1	2	1	2	2	3
t_p	7	7	8	1	14	8	15

Draw a network diagram for this project. Find the critical path, the expected project completion time also. Determine the float and free float of each activity.