QP CODE: 24803214

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Reg No : .....

Name : .....

M.C.A DEGREE EXAMINATION, JUNE 2024

Second Semester

MASTER OF COMPUTER APPLICATION

CORE - MCACT201 - OPTIMIZATION TECHNIQUES FOR COMPUTER APPLICATIONS

2020 Admission Onwards

CD6E1E0B

Time: 3 Hours Maximum: 75 Marks

Part A

*Answer any **ten** questions*

*Each question carries **3** marks*

1. Write the general form of a LPP.
2. Discuss Standard form of LPP.
3. What is the role of Slack and Surplus variable in Simplex method?
4. What are the advantages of Big M method?
5. Explain transportation problem and show that it can be considered as an LPP.
6. Define Assignment Problem.
7. What are the steps in solving an assignment problem ?
8. What is mean by value of the game?
9. What is mean by zero sum games?
10. Briefly explain the areas of applications of network techniques.
11. What are the rules of network construction ?
12. Write some applications of simulation.

(10×3=30 marks)

Part B

*Answer **all** questions*

*Each question carries **9** marks*

13. a) A paint manufacturer produces two types of paint, one type of standard quality (S) and the other of top quality (T). To make these paints, he needs two ingredients, the pigment and the resin. Standard quality paint requires 2 units of pigment and 3 units of resin for each unit made, and is sold at a profit of Rs.1 per unit. Top quality paint requires 4 units of pigment and 2 units of resin for each unit made, and is sold at a profit of Rs.1.50 per unit. He has stocks of 12 units of pigment, and 10 units of resin. Formulate the above problem as a linear programming problem to maximize his profit.

OR

b) Solve the following LPP using graphical method:-
Min Z $=4x_1+2x_2$
Subject to $x_1+2x_2 \geq 2$, $3x_1+x_2 \geq 3$, $4x_1+3x_2 \geq 6$, and $x_1 , x_2 \geq 0$

14. a) Solve by simplex method.
Maximise $Z=2x_1+x_2$
subject to $x_1+2x_2 \leq 10$, $x_1 +x_2 \leq 6$, $x_1 - x_2 \leq 2$, $x_1 - 2x_2 \leq 1$, $x_1 \geq 0$, $x_2 \geq 0$

OR

b) Use Dual Simplex method to solve the following LPP
Min $Z=3x_1+x_2$
Subject to the constraints
$x_1+x_2 \geq 1$, $2x_1+3x_2 \geq 2$, $x_1,x_2 \geq 0$

15. a) A company manufacturing air coolers has two plants located at Mumbai and Kolkata with a weekly capacity of 200 units and 100 units ,respectively.The company supplies air coolers to its 4 showrooms situated at Ranchi,Delhi,Lucknow and Kanpur which have a demand of 75,100, 100 and 30 units respectively.The cost of transportation per unit (in Rs) is shown in the table.Find Transportation Cost.

	Ranchi	Delhi	Lucknow	Kanpur
Mumbai	90	90	100	100
Kolkata	50	70	130	85

OR

b) Solve the travelling salesman problem for the following table.

From item	To item				
	A	B	C	D	E
A	_	4	7	3	4
B	4	_	6	3	4
C	7	6	_	7	5
D	3	3	7	_	7
E	4	4	5	7	_

16. a) Solve the game whose payoff matrix is given by

Player A	Player B		
	1	7	2
	6	2	7
	5	1	6

OR

b) A repair shop attended by a single mechanic has an average of four customers an hour who bring small appliances. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him six minutes, on the average. You are required to (a) Find the probability that the shop is empty (b) Find the probability of finding at least one customer in the shop (c) What is the average number of customers in the system? (d) Find the average time spent, including service.

17. a) Consider the following project. The time estimates are listed in the table as follows:

	Activity	A	B	C	D	E	F	G
Time estimates(weeks)	Predecessor	_	_	A	B	B	C,D	E
	Optimistic(t_0)	3	2	2	2	1	4	1
	Most Likely(t_m)	6	5	4	3	3	6	5
	Pessimistic(t_p)	9	8	6	10	11	8	15

1)Draw the network diagram

2)Find the critical path expected project duration

3)Find the probability of completing the project by 18 weeks.

OR

b) There are nine jobs, each of which must go through two machines P and Q in the order PQ, the processing times (in hours) are given below:

Machine / Jobs	A	B	C	D	E	F	G	H	I
P	2	5	4	9	6	8	7	5	4
Q	6	8	7	4	3	9	3	8	11

Find the sequence that minimizes the total elapsed time T.Also calculate the total idle time for the machines in this period.

(5×9=45 marks)