



QP CODE: 23003271



23003271

Reg No : .....

Name : .....

**M COM DEGREE (CSS) EXAMINATION, APRIL 2023**

**First Semester**

**CORE - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES**

M.COM FINANCE AND TAXATION, M.COM FINANCE AND TAXATION (SF), M.COM MARKETING AND INTERNATIONAL BUSINESS (SF), M.COM MANAGEMENT AND INFORMATION TECHNOLOGY (SF), Master of Commerce and Management

2019 ADMISSION ONWARDS

A4518E04

Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

Answer any **eight** questions.

Weight 1 each.

1. Write briefly about Iconic models, Analogue models and Mathematical models.
2. Give a brief account on analytical and iterative methods for solving operations research models.
3. Write a short note on LPP.
4. A company sells two different products L and M. The company makes a profit of Rs. 400 and Rs. 300 per unit on products L and M respectively. The two products are produced in a common production process and are sold in two different markets. The production process has a capacity of 30,000 man-hours. It takes 300 man- hours to produce a unit of L and 100 man-hours to produce a unit of product M. The company estimates that the maximum number of units of L that can be sold is 80 and that of M is 120 units. Subject to these limitations, the product can be sold in any combination. Formulate this as a LPP.
5. Give a brief note on Vogels Approximation Method.
6. Illustrate with the help of an example how will you solve an unbalanced transportation problem.
7. Give a brief note on 'Minimax Criterion'.
8. Find the saddle point and value of the game.

	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	-3	-2	6
A <sub>2</sub>	2	0	2
A <sub>3</sub>	5	-2	-4

9. Mention the objectives of using network analysis.





10. Draw the network for the project consisting of eleven activities with constraints determined as under:

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Predecessors	-	A	A	A	B	C	C	D	E	F	G,H	I,J,K

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

Answer any **six** questions.

Weight 2 each.

- Mention different phases in an operation research study. Point out the limitations,if any.
- Explain the procedure for solving maximisation problem of LP using simplex method.
- A company sells two different products A and B. The two products are produced in a common production process and are sold in two different markets. The production process has a total capacity of 45,000 man hours. It takes 5 hours to produce a unit of A 3 hours to produce a unit of B. The market have been surveyed and the company officials feel that the maximum number of units of A that can be sold is 7000 and B is 10,000.if the profit is Rs.600 per unit for the product A and Rs. 400 per unit for the product B,how many units of each product should be sold to maximise profit? Formulate the problem as a linear programming model and convert the LPP into standard form.
- Explain the methods for obtaining initial feasible solution of a transportation problem.
- The following table shows all the necessary information on the availability of supply to each warehouse ,the requirement of each market and unit transportation cost from each warehouse to each market .Find intial basis solution using VAM.

Warehouse	Market	Supply
	P Q R S	
A	6 3 5 4	22
B	5 9 2 7	15
C	5 7 8 6	8
Demand	7 12 17 9	

16. Given the following pay off matrix;

State of nature	Probability	Donot expand	Expand 200 units	Expand 400 units
High Demand	0.4	2500	3500	5000
Medium Demand	0.4	2500	3500	2500
Low Demand	0.2	2500	1500	1000

What should be the decision if we use (i) EMV criterion (ii) Minimax criterion (iii) Maximax criterion.

- XYZ Machine tools seek your expert opinion for the optimal replacement period of a machine used by them. The data relevant for decision making is given below:
  - Capital cost of the machine is Rs 10000
  - Operating cost is Rs 500 in the first four years and then it increases by 300 each year.
  - Interest rate for the firm is 10% p.a
- A project has fourteen activities A through M. The relationships which obtain among these activities are given below. Construct the network diagram and number them.





- A is the first operation.
- B and C can be performed in parallel and are immediate successor to A.
- D, E and F follow B.
- G follows E.
- H follows D, but it cannot start till E is complete.
- I and J succeed G.
- F and J precede K.
- H and I precede L.
- M succeeds L and K.
- The last operation N succeeds M and C.

(6×2=12 weightage)

**Part C (Essay Type Questions)**

Answer any *two* questions.

Weight 5 each.

19. A finished product must weigh exactly 150 grams. The two raw materials used in manufacturing the product are A, with a cost of Rs. 2- per unit and B with a cost of Rs. 8/- per unit. At least 14 units of B and not more than 20 units of A must be used. Each unit of A and B weighs 5 gms and 10 gms respectively. How much of each type of raw material should be used for each unit of final product in order to minimize the cost? Use Simplex Method.
20. A company has one surplus truck in each cities A, B, C, D and E and one deficit in each of the cities 1, 2, 3, 4, 5 and 6. The distance between the cities in kilometers is shown in the matrix below,

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>A</b>	12	10	15	22	18	8
<b>B</b>	10	18	25	15	16	12
<b>C</b>	11	10	3	8	5	9
<b>D</b>	6	14	10	13	13	12
<b>E</b>	8	12	11	7	13	10

Find the assignment of trucks from the cities in surplus to cities in deficit so that the total distance covered by the vehicles is minimum.

21. I) Apply the rule of dominance and solve the following problem.

	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>	B <sub>6</sub>
A <sub>1</sub>	0	0	0	0	0	0
A <sub>2</sub>	4	2	0	2	1	1
A <sub>3</sub>	4	3	1	3	2	2
A <sub>4</sub>	4	3	7	-5	1	2
A <sub>5</sub>	4	3	4	-1	2	2
A <sub>6</sub>	4	3	3	-2	2	2





II) A machine X costs Rs 5000. The maintenance cost is Rs 1000 in the first four years and then it increases by Rs 200 in each successive years. Another machine Y costs Rs 8000 whose maintenance cost is Rs 200 in the first year which increases by Rs 400 in every succeeding year. Assuming

- (i) Both the machines have no salvage value
- (ii) That the time value of money is 10% p.a.
- (iii) Maintenance and operating costs are incurred in the beginning of each year.

Find out what is optimal replacement time for machine X and machine Y and which should be preferred?

22. An established company has decided to add a new product to its line. It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors that have been selected on a geographical basis. The steps shown in the following table are to be planned.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessors	-	A	B	A	D	E	-	G	J,H	-	A	C,K	I,L
Duration (days)	6	4	7	2	4	10	2	10	6	13	9	3	5

1. Draw an arrow diagram for this project.
2. Indicate the critical path.
3. For each non-critical activity, find the total and free float.

(2×5=10 weightage)

