

QP CODE: 24045575



Reg No :

Name :

M.Com DEGREE (CSS) EXAMINATION, DECEMBER 2024

First Semester

CORE - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES

M.COM FINANCE AND TAXATION (SF), M.COM FINANCE AND TAXATION, M.COM MARKETING
AND INTERNATIONAL BUSINESS (SF), M.COM MANAGEMENT AND INFORMATION
TECHNOLOGY (SF), MASTER OF COMMERCE AND MANAGEMENT

2019 ADMISSION ONWARDS

02AF40D1

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. Write a note on judgement phase in operations research.
2. Give a brief account on analytical and iterative methods for solving operations research models.
3. Write a short note on simplex method for solving LPP.
4. Write the standard form of the following problem.

$$\text{Maximize } Z = 3x_1 + 2x_2 + 5x_3$$

Subject to,

$$x_1 + 2x_2 + x_3 \leq 430$$

$$3x_1 + 2x_3 \leq 460$$

$$x_1 + 4x_3 \leq 420$$

$$x_1, x_2, x_3 \geq 0$$

5. Find the initial basic feasible solution for the transportation problem using NWCM.

Origins	Destinations				Availability
	D ₁	D ₂	D ₃	D ₄	
P ₁	1	2	1	4	30
P ₂	3	3	2	1	50
P ₃	4	2	5	9	20
Requirement	20	40	30	10	

6. Explain how to resolve the degeneracy in transportation problem.
7. Write note on Replacement Theory.

8. Solve the following game;

Firm X	Firm Y		
	Y_1	Y_2	Y_3
X_1	4	20	6
X_2	18	12	10

9. Write a short note on CPM?
10. Draw the network for the project whose activities with their relationships are given below:
A, E, D can start simultaneously; B, C > A; F, G > D, C; H > E, F

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. Explain the methodology of operations research and the main phases of operations research.
12. ABC company combines factors x and y to form a product which must weight 50kg. Atleast 20 kg of x and not more than 40 kg of y can be used. x costs Rs. 25 per kg and y costs Rs. 10 per kg. Formulate this as a LPP and also obtain the dual of this problem.
13. The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients B_1 and B_2 . B_1 costs Rs. 5/kg and B_2 costs Rs. 8/kg. Strength considerations dictate that the brick contains not more than 4 kg of B_1 and a minimum of 2 kg of B_2 . Since the demand for the product is likely to be related to the price of the brick, find out graphically the minimum cost of the brick satisfying the above conditions.
14. Explain degeneracy in transportation problems.
15. Find the optimum solution to the following problem showing the cost(Rs.) for assigning workers to jobs.

Workers	Job		
	X	Y	Z
A	18	17	16
B	15	13	14
C	19	20	21

16. Explain how decision is made under uncertainty.
17. Solve the following 2 x 2 game by probability method.

	B_1	B_2
A_1	3	-2
A_2	-2	3

18. Write a note on network analysis? Explain how network analysis useful for large complex projects?

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any two questions.

Weight 5 each.

19. A fertiliser is marketed in polythene bags weighing at least 80 kg. Each bag of fertiliser consists of a mixture of two ingredients-nitrate and phosphate. The cost of nitrate is Rs. 40/- per kg and the cost of phosphate is Rs. 25/- per kg. Every bag must contain at least 1,500 gm of ammonia. The ammonia content in 1 kg of nitrate is 20gm and in 1 kg of phosphate is 12 gm. Determine the optimum mix of phosphate and nitrate in a bag of fertiliser that will minimise the total cost.
20. The information on the available supply to each warehouse, requirement of each market and the unit transportation cost from each warehouse to each market is given below:

Warehouse	Market				Supply
	M1	M2	M3	M4	
A	5	2	4	3	22
B	4	8	1	6	15
C	4	6	7	5	8
Demand	7	12	17	9	

The shipping clerk has worked out the following schedule from his experience

Units	12	1	9	15	7	1
From-Warehouse	A	A	A	B	C	C
To-Market	M2	M3	M4	M3	M1	M3

You are required to-

1. Check and see if the clerk has the optimal schedule.
 2. Find the optimal schedule and minimum total shipping cost.
21. A) A news paper boy has the following probability of selling a magazine

No of copies sold	Probability
10	0.1
11	0.3
12	0.4
13	0.2

Cost of a copy is Rs 3 and sale price is Rs 5 . He cannot return magazine but each for one rupee only. Prepare pay off table. How many copies should he order? Also find expected number of sales.

B) A manufacturer is offered two machines A and B. A is priced at Rs 5000 and running costs are estimated at Rs. 800 for each of the first five years, increasing by Rs 200 per year in the sixth and subsequent years. Machine B has same capacity as A, costs Rs. 2500 but will have running cost of Rs 1200 per year for six years increasing by Rs 200 per year thereafter. If money is worth 10% per year,



which machine should be purchased? (Assume that machines will be eventually sold for scrap at negligible price)

22. The following table gives the activities in a construction project:

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration (Days)	20	25	10	12	6	10

Draw the network diagram.

1. Find the three types of floats (total, free, independent) for each activity.
2. Find the critical path and the duration of the project.

(2×5=10 weightage)