



QP CODE: 25050688



25050688

Reg No :

Name :

MCom DEGREE (CSS) EXAMINATION DECEMBER 2025

First Semester

Core Courses - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES

M.COM- FINANCE AND TAXATION, MARKETING AND INTERNATIONAL
BUSINESS, MANAGEMENT AND INFORMATION TECHNOLOGY, MASTER OF COMMERCE &
MANAGEMENT

2019 Admission Onwards

9C7F9048

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight 1 each.

- Define operations research.
- Write a note on validation of operations research model.
- Convert the LPP into standard form.
Maximize $Z = 3x_1 + 2x_2 + 5x_3$
Subject to,
 $x_1 + 2x_2 + x_3 \leq 430$
 $3x_1 + 2x_3 \leq 460$
 $x_1 + 4x_3 \leq 420$
 $x_1, x_2, x_3 \geq 0$
- A firm can produce three types of cloth, say, A, B and C. Three kinds of wool are required for it, say, red wool, green wool and blue wool. One unit length of type A cloth needs 2 yards of red wool and 3 yards of blue wool; one unit length of type B cloth needs 3 yards of red wool, 2 yards of green wool and 2 yards of blue wool; and one unit length of type C cloth needs 5 yards of green wool and 4 yards of blue wool. The firm has a stock of only 8 yards of red wool, 10 yards of green wool and 15 yards of blue wool. It is assumed that the income obtained from one unit length of type A cloth is Rs. 3, of type B cloth is Rs. 5 and that of type C cloth is Rs. 4. Formulate the problem as linear programming problem.
- Find the initial basic feasible solution for the transportation problem using NWCM.

Plants	Distribution Centres				Supply
	D ₁	D ₂	D ₃	D ₄	
P ₁	2	3	11	7	6
P ₂	1	0	6	1	1
P ₃	5	8	15	9	10
Requirement	7	5	3	2	





6. Write a note on travelling salesman problems.
7. What do you mean by group replacement?
8. A truck owner from his past experience estimates that the maintenance cost per year of a truck whose purchase price is Rs 150 000 and resale value as below

Year	1	2	3	4	5	6	7	8
Maintenance	10000	50000	20000	25000	30000	40000	45000	50000
Resale Value	130000	120000	115000	105000	90000	75000	60000	50000

Determine at which time it is profitable to place the truck.

9. Which are the three time estimates in Network Analysis?
10. Draw a network for the simple project of erection of a Plant. The various elements of the project are as under:

Activity	A	B	C	D	E	F	G	H	I
Restrictions	A<B	B<E, I	C<G	D<C, F, A	E<I	F<H	G<B	H<B	-

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. List any three operations research techniques and state in what conditions they can be used.
12. Explain the limitations of linear programming.
13. A manufacturer produces two different models X and Y of the same product. Model X makes a contribution of Rs.50 per unit and model Y, Rs.30 Per unit, towards total profit. Raw materials r1 and r2 required for production. Atleast 18 kg of r1 and 12 kg of r2 must be used daily. Also at most 34 hours of labour are to be utilized. A quantity of 2 kg of r1 is needed for model X and 1kg of r1 for model Y. For each of X and Y, 1kg of r2 is required. It takes 3 hours to manufacture model X and 2 hours to manufacture model Y. For each X and Y, 1kg of r2 is required. It takes 3 hours to manufacture model X and 2 hours to manufacture model Y. How many units of each model should be produced in order to maximize the profit? Formulate an LPP and convert it to standard form.
14. Explain the steps involved in solving transportation problem using North West Corner Method.
15. Find the initial basic feasible solution for the transportation problem using VAM.

Factories	Warehouses				Availability
	I	II	III	IV	
A	90	90	100	100	200
B	50	70	130	85	100
Demand	72	100	100	30	





16. Given below is a pay off table;

Events	Acts		
	A1	A2	A3
E1	5	-1	-17
E2	18	28	30
E3	25	50	80

What will be the optimum decision if the criterion followed is (1) Maximax (2) Minimax (3) Maximin (4) Laplace (5) EMV (6) EOL. Given probabilities for various events are 0.3, 0.4 and 0.3 respectively.

17. Apply the rule of dominance and solve the following problem.

	B ₁	B ₂	B ₃
A ₁	1	7	2
A ₂	6	2	7
A ₃	6	1	6

18. Construct a network based on the following information

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time (Days)	4	1	1	1	6	5	4	8	1	2	5	7

From the above:

- Compute earliest and latest expected time for each event.
- Find the Critical path

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. A producer produces three commodities x, y and z and has two limited inputs, storage and petrol. To produce a unit either of x or y, 2 units of storage and 1 unit of petrol are required, while a unit of z requires only two units of storage and no petrol. The producer has only 8 units of storage space and 3 units of petrol. If each unit of x, y and z gives Rs. 3, Rs. 7 and Rs. 6 respectively of profits, how much of each should the producer produce to maximize his profit?
20. A company has a team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesmen and the nature of districts, the company estimates that the profit per day in rupees for each salesman in each district is as below.

Salesmen	Districts				
		1	2	3	4
	A	16	10	14	11
	B	14	11	15	15
	C	15	15	13	12
	D	13	12	14	15

Find the assignment of salesmen to various districts which will yield maximum profit.





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. Draw the network for the following project:

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Preceding activity	-	A	A	B	B	C	C	F	D	G,H	E	I
Duration (Days)	10	9	7	6	12	6	8	8	4	11	5	7

You are required to number the events by Fulkerson's rule and find the critical path. Also find the total float and time for completing the project.

(2×5=10 weightage)

