



QP CODE: 25050688 S



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Reg No :

Name :

M.Com.(CSS) DEGREE SPECIAL EXAMINATION , DECEMBER 2025

First Semester

M.Com. FINANCE AND TAXATION

Core Course - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES

2019 Admission Onwards

120AC060

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. Define operations research.
2. Elaborate the wholistic approach characteristic of operations research.
3. What do you mean by basic feasible solution in LPP?
4. Convert the following LPP into standard form;
 Minimize $Z = 5x_1 + 3x_2$
 Subject to,
 $2x_1 + 4x_2 \leq 12$
 $2x_1 + 2x_2 = 10$
 $5x_1 + 2x_2 \geq 10$
 $x_1, x_2 \geq 0$
5. Write a short note on NWCM.
6. Obtain the initial basic feasible solution to the transportation problem using NWCM.

Warehouse	Stores				Availability
	I	II	III	IV	
A	7	3	5	5	34
B	5	5	7	6	15
C	8	6	6	5	12
D	6	1	6	4	19
Demand	21	25	17	17	





7. You are given the following pay -off matrix;

States of nature	A1	A2	A3
S1	25	-10	-125
S2	400	440	400
S3	650	740	750

The probabilities of the states of nature are respectively 0.1, 0.7 and 0.2. Calculate and tabulate the EMV and conclude which of the acts can be chosen as the best.

8. Write a short note on Game Theory.
9. Describe the term crashing in Network analysis.
10. Draw the following logic network: A, C, D can start simultaneously; $E > B, C$; $F, G > D$; $H, I > E, F$; $J > I, G$; $K > H$; $B > A$

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. Quantifying the elements of a decision problem is the easy part; the hard part is solving the model'. Do you agree? Why or why not?
12. Briefly explain the concept of degeneracy in linear programming.
13. Solve graphically
 Maximize $Z = 7x_1 + 5x_2$
 Subject to,
 $x_1 + 2x_2 \leq 16$
 $4x_1 + 3x_2 \leq 12$
 $x_1, x_2 \geq 0$
14. Explain the steps involved in solving transportation problem using Vogels approximation Method.
15. Find the initial basic feasible solution for the transportation problem using LCM.

From	To				Capacity
	W ₁	W ₂	W ₃	W ₄	
P ₁	21	16	25	13	11
P ₂	17	18	14	23	13
P ₃	32	27	18	41	19
Requirement	6	10	12	15	





16. The original cost of a machine is Rs 5000. Operating cost varies as follows

Year	1	2	3	4	5	6	7
Operating cost (in Rs)	400	500	700	1000	1300	1700	2100

If the discount rate of money is 9%. What should be the optimal replacement period?

17. Solve the following 2 x 2 game by probability method.

	B ₁	B ₂
A ₁	3	5
A ₂	4	1

18. Explain the following terms: (i) Optimistic Time (ii) Pessimistic Time (iii) Expected Time (iv) Variance in relation to activities.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. A small scale industrialist produces four types of machine components M₁, M₂, M₃ and M₄ made of steel and brass. The amounts of steel and brass required for each component and the number of man-weeks of labour required to manufacture and assemble one unit of each component are as follows:

	M ₁	M ₂	M ₃	M ₄	Availability
Steel	6	5	3	2	100 kg
Brass	3	4	9	2	75 kg
Man-Weeks	1	2	1	2	20

The labour is restricted to 20 man-weeks, steel is restricted to 100 kg per week and brass to 75 kg per week. The industrialist's profit on each unit of M₁, M₂, M₃ and M₄ is Rs. 6, Rs. 4, Rs. 7 and Rs. 5 respectively. How many of each type of machine components should he produce to maximize his profit and how much is his profit?

20. Solve the following assignment problem:

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13





21. a) The following mortality rate has been observed for a certain type of electric bulb:

Week	1	2	3	4	5	6	7	8
Prob. of failure by the weekend	0.00	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed bulb is Rs. 14.60. It has been decided that all bulbs are replaced simultaneously at fixed intervals and also to replace individual bulbs as they fail in service. If the cost of group replacement is Rs. 4.60 per bulb, what is the optimal interval between two group replacements.

- b) Solve the following using sub game technique;

	B ₁	B ₂
A ₁	2	5
A ₂	2	3
A ₃	3	2
A ₄	-2	8

22. The following table gives the activities and other relevant data of a project:

Activity		1-2	1-4	1-3	2-4	3-4	2-5	4-5
Time(days)	Normal	4	6	2	5	2	7	4
	Crash	3	4	1	3	2	5	2
Cost (Rs.)	Normal	120	300	60	300	200	230	200
	Crash	180	500	120	500	200	350	480

Indirect cost per day for a project is Rs.100.

1. Draw the network diagram.
2. Find the normal duration and cost of the project.
3. Crash the number of days to the maximum possible.
4. Find the optimum duration and cost.

(2×5=10 weightage)

