



QP CODE: 26151739



26151739

Reg No :

Name :

M.Com DEGREE (CSS) PRIVATE EXAMINATION , MAY 2026

First Semester

M.Com. FINANCE AND TAXATION

Core Course - CM010104 - MANAGEMENT OPTIMISATION TECHNIQUES

2019 Admission Onwards

FFEE6C16

Time: 3 Hours

Weightage: 30

Instructions: (Applicable for 2020 admission onwards): This question Paper contains **two sections**. Answer **section I** questions in the answer book provided. **Section II internal examination questions** must be answered in the **question paper itself**. Follow the detailed instructions given under **section II**.

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define operations research.
2. List the steps involved in the research phase of operations research.
3. Convert the LPP into standard form.
 Maximize $Z = 3x_1 + 2x_2 + 5x_3$
 Subject to,

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

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

$$x_1 + 4x_3 \leq 420$$

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

6. Write a short note on prohibited assignment.
7. What do you mean by individual replacement?
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. Distinguish between Slack and Float.
10. Draw a network from the following activities:

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

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight **2** each.

11. Define Operations Research. Give the main characteristics of Operations Research.
12. A firm produces three types of biscuits A, B, C. It packs them in assortments of two size I and II. The size I contains 20 biscuits of types A, 50 of type B and 10 type of C. The size II contains 10 biscuits of types A, 80 of type B and 60 type of C. A buyer intends to buy at least 120 biscuits of type a, 740 of type B and 240 of type C. Determine the least number of packets he should buy. Formulate this as a LPP and also convert the primal into dual problem.





13. Solve graphically

$$\text{Minimize } Z = 6x_1 + 7x_2$$

Subject to,

$$3x_1 + 9x_2 \geq 36$$

$$6x_1 + 2x_2 \geq 24$$

$$2x_1 + 2x_2 \geq 16$$

$$x_1, x_2 \geq 0$$

14. Solve the following transportation problem using Vogel's approximation method

	1	2	3	4	Capacity
A	7	8	11	10	30
B	10	12	5	4	45
C	6	11	10	9	55

Required 20 28 19 33

15. A machine tool company decides to make four subassemblies through four contractors. Each contractor is to receive only one subassembly. The cost of each subassembly is determined by the bids submitted by each contractor and is shown below;

Subassemblies	Contractors			
	1	2	3	4
I	15	13	14	17
II	11	12	15	13
III	13	12	10	11
IV	15	17	14	16

Assign different subassemblies to contractors so as to minimize the total cost.

16. Calculate EMV and Optimal Act;

Act	Events			
	E1	E2	E3	E4
A1	50	300	-150	50
A2	400	0	100	0
A3	-50	200	0	100
A4	0	300	300	0





Probabilities of the events are respectively 0.15, 0.45, 0.25 and 0.15. Calculate Regret table and EOL for each Act.

17. Briefly explain the Principle of Dominance.

18. The sequence of activities together with their predecessors relating to project is given below.

Activity	A	B	C	D	E	F	G	H
Immediate Predecessors	-	A	A	B	B,C	E	D,F	G

Draw a network diagram for the project.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. A manufacturer produces two items X_1 and X_2 . X_1 needs 2 hours on machine A and 2 hours on machine B. X_2 needs 3 hours on machine A and 1 hour on machine B. If machine A can run for a maximum of 12 hours per day and B for 8 hours per day and profits from X_1 and X_2 are Rs. 4 and 5 per respectively, find by Simplex Method, how many items per day be produced have maximum profit.

20. The sales man has to visit five cities A,B,C,D and E. The intercity distances are tabulated below;

From/To	A	B	C	D	E
A	-	12	24	25	15
B	6	-	16	18	7
C	10	11	-	18	12
D	14	17	22	-	16
E	12	13	23	25	-

The distance (in Km) between two cities need not be same both ways. If the sales man starts from the city A and has to come back city A, which route would you advise him to take so that total distance travelled by him is minimized ?

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

	B_1	B_2	B_3	B_4	B_5	B_6
A_1	0	0	0	0	0	0
A_2	4	2	0	2	1	1
A_3	4	3	1	3	2	2





A ₄	4	3	7	-5	1	2
A ₅	4	3	4	-1	2	2
A ₆	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. The major elements of a project have been identified, as follows, along with their durations and immediately preceding elements.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessors	-	A	B	C	A	E	E	H,L	K	D,F,G	J	H,L	
Duration (weeks)	14	4	2	1	2	3	2	4	3	12	4	2	2

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

(2×5=10 weightage)

