Reg. No. : ....

Name : ....

Fourth Semester M.Com. Degree Examination, July 2023

Elective — Finance/Marketing

PAPER IV : CO 244S — MANAGEMENT OPTIMIZATION TECHNIQUES

(Common for Finance and Marketing)

(2018 Admission onwards)

Time : 3 Hours   ⟲_sanju.s.a   Max. Marks : 75

PART – A

Answer all questions. Each carries 2 marks.

1. Which are the types of operations research models?
2. How Inventory Models are useful?
3. What is a Linear Programming model?
4. Where Game Theory is used?
5. What is Simulation?
6. What is duality of LPP?
7. What is an Unbalanced Assignment Problem?
8. What are the Limitations of Simulation?
9. Which are the different time estimates under PERT?
10. Which are the different types of Floats, in Network Analysis?

(10 × 2 = 20 Marks)

P.T.O.

PART – B

Answer **any five** questions. Each question carries **5 marks**.

11. Which are the steps in Intelligent decision making?
12. Which are the types of techniques in network scheduling?
13. A city hospital has the following minimal daily requirement for nurses.

Period	Clock time (24 hours day)	Minimal number of nurses required
1	6 a.m. - 10 a.m.	2 L
2	10 a.m. - 2 p.m.	7
3	2 p.m. - 6 p.m.	15
4	6 p.m. - 10 p.m.	8 L
5	10 p.m. - 2 a.m.	20 L
6	2 a.m. - 6 a.m.	6 L

Nurses report to the hospital at the beginning of each period and work for 8 consecutive hours. The hospital wants to determine the minimal number of nurses to be employed so that there will be sufficient number of nurses available for each period. Formulate this as a Linear Programming question by setting up appropriate constraints and objective function.

14. Explain Hungarian Method. ⓞ _sanju.s.a
15. Solve the game with the following pay-off matrix.

Player Y
Strategies

		I	II	III	IV	V
Player X Strategies	1	9	12	7	14	26
	2	25	35	20	28	30
	3	7	6	-8	3	2
	4	8	11	13	-2	1

16. An airline is planning to open a satellite ticket desk in a new shopping plaza, staffed by one ticket agent. It is estimated that requests for tickets and information will average 15 per hour, and requests will have a Poisson distribution. Service time is assumed to be exponentially distributed. Previous experience with similar satellite operations suggests that mean service time should average about three minutes per request. Determine each of the following:

(a) System utilization
(b) Percentage of time the server (agent) will be idle.
(c) The expected number of customers waiting to be served.
(d) The average time customers will spend in the system. The probability of zero customers in the system and the probability of four customers in the system.

2

R – 6656

17. A Public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of Rs.2,800. for a cost of Rs.1,500 per month. preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy carried is suitable for the firm?

18. Draw the network diagram for the following data

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

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(5 × 5 = 25 Marks)

PART – C

Answer **any two** of the following questions. Each question carries **15** marks.

19. The Bombay transport company has trucks available at four different sites in the following numbers:

Site A   5 Trucks
Site B   10 Trucks
Site C   7 Trucks
Site D   3 Trucks

Customers-W, X and Y require trucks as shown below

Customer W   5 Trucks
Customer X   8 Trucks
Customer Y   10 Trucks

Variable costs of getting trucks to the customers are given below :

	Rs.	Rs.	Rs.
From A to W	7 to X	3 to Y	6
From B to W	4 to X	6 to Y	8
From C to W	5 to X	8 to Y	4
From D to W	8 to X	4 to Y	3

Solve the above transporation problem

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R – 6656

20. A Bank is in the process of formulating its loan policy involving a maximum of Rs.600 Million. Table below gives the relevant types of loans. Bad debts are not recoverable and produce no interest receive. To meet competition from other Banks the following policy guidelines have been set. At east 40% of the finds must be allocated to the agricultural and commercial loans. Funds allocated to housing must be at least 50% of all loans given to personal, car, Housing. The overall bad debit on all loans may not exceed 0.06. Formulate a linear program Model to determine optimal loan allocations.

Type of loan	Interest rate %	Bad debts (Probability)
Personal	17	0.10
Car	14	0.07
Housing	11	0.05
Agricultural	10	0.08
Commercial	13	0.06

21. Explain different stages network analysis.

22. Solve the following game by graphical method.

Player B

Player A $\begin{pmatrix} -18 & 2 \\ 6 & -4 \end{pmatrix}$

$(2 \times 15 = 30 \text{ Marks})$

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Reg. No. : ....

Name : ....

Fourth Semester M.Com. Degree Examination, June 2022

Elective-Finance/Marketing

Paper IV : CO 244S MANAGEMENT OPTIMIZATION TECHNIQUES

(2018 Admission Onwards)

Time : 3 Hours   ⓞ _sanju.s.a   Max. Marks : 75

SECTION – A

Answer all questions. Each carries 2 marks.

1. What is Operations Research?

2. What are the Characteristics of Optimisation techniques?

3. Where Queuing Theory is used

4. What is Decision Theory?

5. What is meant by Feasible Region?

6. In LPP, when a basic solution to the system of equations is called degenerate?

7. How an Unbalanced Transportation Problem is treated?

8. What is an Assignment Problem?

9. What are the Advantage of simulation?

10. What is the significance of Slack, in Network Analysis

(10 × 2 = 20 Marks)

P.T.O.

SECTION – B

Answer any five questions. **Each question carries 5 marks.**

11. Which are the popular optimization techniques `

12. A company owns two flour mills viz. A and B, which have different production capacities for high, medium and low quality flour. The company has entered a contract to supply flour to a firm every month with at least 8, 12 and 24 quintals of high, medium and low quality respectively. It costs the company Rs.2000 and Rs.1500 per day town mill A and B respectively. On a day, Mill A produces 6, 2 and 4 quintals of high, medium and low quality flour, Mill B produces 2, 4 and 12 quintals of high, medium and low quality flour respectively. How many days per month should each mill be operated in order to meet the contract order most economically

13. Solve the following unbalanced assignment problem of minimizing the total time for performing all the jobs

		Jobs				
		1	2	3	4	5
	A	5	2	4	2	5
	B	2	4	7	6	6
Workers	C	6	7	5	8	7
	D	5	2	3	3	4
	E	8	3	7	8	6
	F	3	6	3	5	7

14. Solve the game with the following pay-off matrix.

		Player B				
		Strategies				
		I	II	III	IV	V
	1	-2	.5	-3	6	7
Player A Strategies	2	4	6	8	-1	6
	3	8	2	3	5	4
	4	15	14	18	12	20

15. A supplier is required to deliver 20000 tons of raw materials in one year to a large manufacturing organization. The supplier maintains his go-down to store the material received from various resources. He finds that cost of inventory holding is 30 paisa per ton per month. His cost for ordering the material is Rs. 400. One of the conditions of the supplier contact from the manufacturing organization is That the contract will be terminated in the event of supply not being maintained as a schedule. Determine (1) in what lot size is the supplier should produce the material for minimum total associated cost of inventory? (2) At what time interval should he procure the material? It may be assume that replacement of inventory is instantaneous

16. Customers arrive at a bakery at an average rate of 16 per hour on weekday mornings. The arrival can be described by a Poisson distribution with a mean of 16. Each clerk can serve a customer in an average of three minutes; This time can be described by an exponential distribution with a mean of 3.0 minutes.

    (a) What are the arrival and service rates?

    (b) Compute the average number of customers being served at anytime.

    (c) Suppose it has been determined that the average number of customers waiting in line is 3.2. compute the average number of customers in the system (i.e., waiting in line or being served), the average time customers wait in line, and the average time in the system.

17. What are the Differences between PERT and CPM?

18. Which are the different types of activities and events in a Network analysis?

(5 × 5 = 25 Marks)

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SECTION – C

Answer any **two** of the following questions. Each question carries **15 marks**.

19. Solve using simplex method

    Maximize : $-12.5x_1 - 14.5x_2$

    Subject to :
    $$x_1 + x_2 - S3 = 2000$$
    $$40x_1 + 75x_2 - S4 = 100000$$
    $$75x_1 + 100x_2 + S5 = 200000$$
    $$x_1, x_2, S3, S4, S5 \geq 0$$

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20. Explain the different methods used for solving a Transportation problem.

21. Solve the following transportation problem using Vogel Approximation Method.

Origin	Destination				a_i
	1	2	3	4	
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
bj	60	40	30	110	240

22. The following details are available regarding a project

Activity	Predecessor Activity	Duration (Weeks)
A	–	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Determine the critical path, the critical activities and the project completion time

(2 × 15 = 30 Marks)

Reg. No. : ....

Name : ....

Fourth Semester M.Com. Degree Examination, March 2021

Elective – Finance/Marketing

Paper IV : CO 244 S – MANAGEMENT OPTIMIZATION TECHNIQUES

(Common for Finance and Marketing)

(2018 Admission Onwards)

Time : 3 Hours   [O] _sanju.s.a   Max. Marks : 75

SECTION – A

Answer all questions. Each question carries 2 marks.

1. Define linear Programming.

2. What are slack variables?

3. What is a dummy activity?

4. What is unbalanced assignment problem?

5. What is network diagram?

6. What is called the value of a game?

7. What is optimal solution?

8. What is critical path?

9. What is saddle point?

10. What is free float?

SECTION – B

Answer any five questions. Each question carries 5 marks.

11. Distinguish between PERT and CPM.

12. State the assumptions of linear programming.

13. Explain the various methods of finding initial feasible solution in transportation problem.

14. Write down the dual of the following problem :

Minimize $Z = 2x_1 + 3x_2$

Subject to :

$x_1 + x_2 \geq 10$
$2x_1 + 3x_1 \geq 24$
$x_1, x_2 \geq 0$

15. Find the initial feasible solution to the transportation by north west corner method

Origin	D1	D2	D3	Supply
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Demand	7	9	18	

16. Find the optimal solution to the following assignment problem showing the cost for assigning workers to job :

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

17. For the following game, find the optimal strategies of A and B and value of the game using principle of dominance.

Player A	Player B			
	B1	B2	B3	B4
A1	7	6	8	9
A2	−4	−3	9	10
A3	3	0	4	2
A4	10	5	−2	0

18. A company uses annually 3200 units of raw material costing Rs. 6 per unit. Placing each order cost Rs. 150 and inventory carrying costs are 25% per year of average inventory values. Compute EOQ.

(5 x 5 = 25 Marks)

SECTION – C

Answer any two questions. Each question carries 15 marks.

19. Explain the various optimization techniques used for decision making.

20. Draw a network diagram and find the critical path and project duration, assuming that the expected time are normally distributed.

Activity	Days		
	Optimistic	Most likely	Pessimistic
1 – 2	2	5	14
1 – 3	9	12	15
2 – 4	5	14	17
3 – 4	2	5	8
3 – 5	8	17	20
4 – 5	6	9	12

L – 5527

21. Solve the L.P.P using simplex method :

Minimize $Z = 3x_1 + 8x_2$

Subject to :

$x_1 + x_2 = 200 ; x_1 \leq 80 , x_2 \geq 60$

$x_1, x_2 \geq 0.$

22. Solve the following transportation problem whose cost matrix availability at each and requirement at each warehouse are given as follows by using MODI method.

Plant	W1	W2	W3	W4	Availability
P1	190	300	500	100	70
P2	700	300	400	600	90
P3	400	100	600	200	180
Requirement	50	80	70	140	

(2 × 15 = 30 Marks)

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Reg. No. :

Name : ...

Fourth Semester M.Com. Degree Examination, May 2020

Elective – Finance/Marketing

Paper IV : CO 244S — MANAGEMENT OPTIMIZATION TECHNIQUES

(Common for Finance and Marketing)

(2018 Admission)

Time : 3 Hours Max. Marks : 75

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SECTION – A

Answer all questions. Each question carries 2 marks.

1. What is saddle point?

2. What do you mean by degeneracy in transportation problem?

3. What is dummy activity?

4. What is Initial Basic Feasible Solution?

5. What is Monte carlo simulation?

6. What are slack variables?

7. Write a note on Vogel's Approximation Method.

8. What are assignment problems?

9 What do you mean by EOQ?

10 What is Waiting Line theory?

(10 x 2 = 20 Marks)

SECTION – B

Answer any **five** questions. Each question carries **5** marks.

11. What are the basic assumptions in Linear Programming?

12. Explain the characteristics of management optimisation techniques.

13. Distinguish between Transportation problem and Assignment problem.

14. Develop a network diagram for the project specified below

Activity	Immediate Predecessor Activity
A	–
B	A
C	B
D	B
E	C
F	D
G	E,F

15. Solve the game:

Player Y

⊙_sanju.s.a   Player X

2	5
4	1

16. The cost of a machine is Rs. 6100 and its scrap value is only Rs. 100. The maintenance costs are found to be:

Year:	1	2	3	4	5	6	7	8
Running cost:	100	250	400	600	900	1250	1600	2000

When should the Machine be replaced?

2

17. Find the initial basic feasible solution of the transportation problem by using VAM.

	Destination			Available
	3	2	1	15
Origin	1	2	3	20
	2	3	1	14
Required	10	6	12	

18. At one-man book binding centre, customers arrive according to Poisson distribution with mean arrival rate of 4 per hour and the book binding time is exponentially distributed with an average of 12 minutes. Find out the following:

   (a) The average number of customers in the book binding centre and the average number of customers waiting for book binding.

   (b) The percentage of time arrival can walk in straight without having to wait.

   (c) The percentage of customers who have to wait before getting into the book binder's table.

                                                    (5 × 5 = 25 Marks)

SECTION – C

Answer any **two** questions. Each question carries **15 marks**.

19. A project schedule has the following characteristics:

Activity	Predecessor Activity	Duration (weeks)
A	–	15
B	A	17
C	A	21
D	B	19
E	B	22
F	C,D	18

   (a) Construct network diagram.

J – 5296

(b) Compute T_E and T_L for each event.

(c) Find EST, LST, EFT and LFT.

(d) Find critical path and project duration.

20. What do you mean by Operations Research models? Explain the different models in Operations Research?

21. Solve using simplex method

Max $z = 3x_1 + 2x_2 + x_3$

Subject to :

$4x_1 + x_2 + x_3 = 30$
$2x_1 + 3x_2 + x_3 \leq 60$
$x_1 + 2x_2 + 3x_3 \leq 40$

22. Three jobs A , B, C are to be assigned to three machines X,Y ,Z. The processing costs are as given in the matrix shown below. Find the allocation which will minimize the overall processing cost.

		Jobs		
		X	Y	Z
	A	19	28	31
Machines	B	11	17	16
	C	12	15	13

(2 x 15 = 30 Marks)

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