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(Pages : 4)

Name.....

Reg. No.....

**SECOND SEMESTER M.Com. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2022**

April 2021 Session for SDE/Private Students

(CBCSS)

Master of Commerce

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

Covid Instructions are not applicable for SDE/Private Students

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A

Answer any four questions.

Each question carries 2 weightage.

1. What is two person zero sum game ?
2. Define an 'event' in network analysis.
3. What is Queue system ?
4. What is an optimal solution ?
5. What is infeasible solution ?
6. Describe "model" in Management Science. Briefly explain.
7. Flukerson's Rule to numbering of events.

(4 × 2 = 8 weightage)

Turn over

215104

Part B

Answer any **four** questions.

Each question carries 3 weightage.

8. Solve the following LPP using graphical method :

$$\begin{aligned} Z &= 3x_1 + 5x_2 \\ \text{subject to } x_1 + 2x_2 &\leq 2000 \\ x_1 + x_2 &\leq 1500 \\ x_2 &\leq 600 \\ x_1, x_2 &\geq 0. \end{aligned}$$

9. Write down the dual of the following problem :

$$\begin{aligned} Z &= 4x_1 + 2x_2 \\ \text{subject to } -x_1 - x_2 &\leq -3 \\ -x_1 + x_2 &\geq -2 \\ x_1, x_2 &\geq 0. \end{aligned}$$

10. Solve the following transportation problem by Vogel's Approximation Method :

	1	2	3	4	Supply
A	7	3	8	6	60
B	4	2	5	10	100
C	2	6	5	1	40
Demand	20	50	50	80	

11. A Company is faced with the problem of assigning five jobs to five machines, each job must be done on only one machine, the cost of processing each job on each machine is given below :

		Machines				
		M ₁	M ₂	M ₃	M ₄	M ₅
Jobs	J ₁	7	5	9	8	11
	J ₂	9	12	7	11	10
	J ₃	8	5	4	6	9
	J ₄	7	3	6	9	5
	J ₅	4	6	7	5	11

12. Find the saddle point and state the game value :

		M	N
P	6	2	
Q	-1	-4	

13. A company purchases 4500 bearing assemblies each month at a cost of Rs. 40. The holding cost is Rs. 9 per unit per year and order cost is Rs. 20. What is the Economic Order Quantity? How many orders will be placed in a year?
14. Customers arrive at a booking office window being manned by a single individual at a rate of 25 per hour. The time required to serve a customer has exponential distribution with a mean of 30 per hour. Find out i) System length; ii) Queue length; iii) Expected waiting time in the system; and iv) Expected waiting time in the queue.

(4 × 3 = 12 weightage)

Part C*Answer any two questions.**Each question carries 5 weightage.*

15. A firm makes two types of furniture : chairs and tables, the contributions for each product as calculated by accounting department are Rs. 20 per chair and Rs. 30 per table. Both products are processed on three machines M_1 , M_2 and M_3 . The time required by each product and total time available per week in each machine are as follows :

Machine	Chair	Table	Available Hours
M_1	3	3	36
M_2	5	2	50
M_3	2	6	60

How should the firm schedule its production in order to maximize contribution?

16. Consider the following table :

Activity	Predecessor activity	Optimistic (t_o)	Most likely (t_m)	Pessimistic (t_p)
A	—	2	3	10
B	—	2	3	4
C	A	1	2	3
D	A	4	6	14
E	B	4	5	12
F	C	3	4	5
G	D, E	1	1	7

Find out the critical path, Head and Tail slack, Total and independent floats.

Turn over

17. Solve the following travelling salesman problem so as to minimise the cost per cycle :

	A	B	C	D	E
A	—	3	6	2	3
B	3	—	5	2	3
C	6	5	—	6	4
D	2	2	6	—	6
E	3	3	4	6	—

18. Explain the significance of game theory in management. What are the assumptions of game theory?

(2 × 5 = 10 weightage)