

D 122450

(Pages : 4)

Name.....

Reg. No.....

**SECOND SEMESTER M.Com. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2025**

(CBCSS)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

*Answer should be written in english only.***Part A***Answer any **four** questions.**Each question carries 2 weightage.*

1. Describe 'Monte Carlo' technique of simulation.
2. Define Linear Programming Problem ?
3. What is slack variable in LPP ?
4. What is an unbalanced transpiration problem ?
5. What do you mean by 'Balking' ?
6. What is total float in network analysis ?
7. Briefly explain Degeneracy in Transportation Problem.

(4 × 2 = 8 weightage)

Part B*Answer any **four** questions.**Each question carries 3 weightage.*

8. A company produces two types of garments A and B. Both garments pass through two workmen, first a cutter and second a tailor. Garment A requires 2 hours of the cutter's time and 1 hour of the tailor's time ; garment B requires 1 hour of cutter's and 2 hours of tailor's time. The cutter has 104 hours and tailor has 76 hours of available time each month. Profit on garment A is Rs. 60.00 and on garment B is Rs. 110.00. Formulate a mathematical model.

Turn over

9. Solve the following LPP :

$$\begin{aligned} \text{Maximize } Z &= 6x_1 + 8x_2 \\ \text{subject to } 30x_1 + 20x_2 &\leq 300 \\ 5x_1 + 10x_2 &\leq 110 \\ x_1, x_2 &\geq 0. \end{aligned}$$

10. Customers arrive at the first class ticket counter of a theatre at a rate of 12 per hour. There is one clerk service the customer at the rate of 30 per hour.

What is the probability that there is no customer in counter (idle system) ?

What is the probability that there are more than 2 customers in the counter ?

11. From the following information, find out the economic ordering quantity and the number of orders to be placed in a year

Annual Consumption : 120 units

Buying cost per order Rs. 20

Price per unit : Rs. 100.

Storage and carrying cost as percentage of average inventory : 12 %

12. Solve the following pay-off matrix, determine the optimal strategies and the value of the game :

		B	
		5	1
A		3	4

13. Given below is the time (days) required when a particular programme is assigned to a particular programmer :

		Programmer			
		A	B	C	D
Programmes	1	12	10	8	9
	2	8	9	11	7
	3	11	14	12	10
	4	9	9	8	9

Assign the programmers to the programmes in such a way that the total computing time is the least.

14. A project is expected to take 15 months along the critical path having a standard deviation of 3 months. What is the probability of completing the project on the due date, if the due date fixed is (a) 18 months ; and (b) 12 months ?

(4 × 3 = 12 weightage)

Part C

Answer any **two** questions.

Each question carries 5 weightage.

15. For a project given below find :

- (i) Expected time for each activity ;
- (ii) T_E and T_L values for all events ;
- (iii) Earliest Start Time, Earliest Finish Time, Latest Start Time, and Latest Finish Time values for all activities ; and
- (iv) The critical path

Task	:	A	B	C	D	E	F	G	H	I	J	K
Least time	:	4	5	8	2	4	7	8	4	3	5	6
				1		1	1	1			1	
Greatest Time	:	6	9	2	6	0	5	6	8	7	1	12
				1				1				
Most likely time	:	5	7	0	4	7	8	2	6	5	8	9

16. Solve the following transportation problem :

	D_1	D_2	D_3	D_4	D_5	D_6	a_j
S_1	9	12	9	6	9	10	5
S_2	7	3	7	7	5	5	6
S_3	6	5	9	11	3	11	2
S_4	6	8	11	2	2	10	9
b_j	4	4	6	2	4	2	

Turn over

17. A firm makes two types of garments : A and B, the contributions for each product as calculated by accounting department are Rs. 20 per A and Rs. 30 per B. 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	A	B	Available hours
M1	3	3	36
M2	5	2	50
M3	2	6	60

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

18. Briefly explain the methodology of Management Science.

(2 × 5 = 10 weightage)

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(Pages : 2).

Name.....

Reg. No.....

SECOND SEMESTER M.Com. DEGREE EXAMINATION, JUNE 2016

(CUCSS)

MC 2C 09—MANAGEMENT SCIENCE

(2015 Admissions)

Time : Three Hours

Maximum 36 : Weightage

Part A

Answer all questions.

Each question carries 1 weightage.

1. Define Operation Research.
2. Write the expansion of PERT and CPM ?
3. Define the term "ACTIVIT" in a network ?
4. What is an Assignment Problem ?
5. What is Network ?
6. What is meant by Critical Path ?

(6 × 1 = 6 weightage)

Part B

Answer any six question.

Each question carries 3 weightage.

7. What are the Phases of Operations Research ?
8. State the steps of Formulation of Linear Programming
9. Explain Forward Pass and Backward Pass Method in Network Analysis.
10. What is Assignment Problem in Operation Research ?
11. Briefly explain the Game Theory.

Turn over

12. There is 40% chance that a patient admitted to the hospital, is suffering from cancer. A doctor has to decide whether a serious operation should be performed or not. If the patient is suffering from cancer and the serious operation is performed, the chance that he will recover is 70%, otherwise it is 35%. On the other hand, if the patient is not suffering from cancer and the serious operation is performed the chance that he will recover is 20%, otherwise it is 100%. Assume that recovery and death are the only possible results. Construct an appropriate decision tree. What decision should the doctor take ?
13. Distinguish between CPM and PERT.
14. A company is involved in the production of two items (X and Y). The resources need to produce X and Y are twofold, namely machine time for automatic processing and craftsman time for hand finishing. The table below gives the number of minutes required for each item:

	Machine time	Craftsman time
Item X	13	20
Y	19	29

The company has 40 hours of machine time available in the next working week but only 35 hours of craftsman time. Machine time is costed at £10 per hour worked and craftsman time is costed at £2 per hour worked. Both machine and craftsman idle times incur no costs. The revenue received for each item produced (all production is sold) is £20 for X and £30 for Y. The company has a specific contract to produce 10 items of X per week for a particular customer.

- (a) Formulate the problem of deciding how much to produce per week as a linear program.
- (b) Solve this linear program graphically.

(6 × 3 = 18 weightage)

Part C

Answer any two question.

Each question carries 6 weightage.

15. Write a short note on Programme Evaluation and Review Technique.
16. State the Elements of Queuing Systems.
17. Explain Hungarian Assignment Method.

(2 × 6 = 12 weightage)

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(Pages : 2)

Name.....

Reg. No.....

SECOND SEMESTER M.Com. DEGREE EXAMINATION, JUNE 2017

(CUCSS-PG)

Commerce

MC 2C 9—MANAGEMENT SCIENCE

(2015 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A

Answer all questions.

Each question carries 1 weightage.

1. What is an Unbalanced Transportation Problem ?
2. What is an Assignment Problem ?
3. What is Network ?
4. Define Event Float in CPM.
5. What is meant by Critical Path ?
6. What is meant LPP ?

(6 × 1 = 6 weightage)

Part B

Answer any six question.

Each question carries 3 weightage.

7. Explain the scope of Operations Research.
8. What are the objectives of Linear Programming ?
9. Discuss the types of Activities in Network Analysis.
10. Briefly explain the Game theory.
11. Write a short note on Stepping Stone Method.
12. Distinguish between CPM and PERT.

Turn over

13. A manufacturing company is engaged in producing three types of product A, B and C. The production department produces each day, components sufficient to make 100 units of A, 50 units of B and 60 units of C. The management is confronted with the problem of optimizing the daily production of products in the assembly department, where any 200 man hours are available daily for assembling the products. The following additional information is available :

Type of product	Profit contribution Per unit of product (Rs)	Assembly time per product (hrs)
A	24	1.6
B	40	3.4
C	90	5

The company has a daily order 40 units of product A and total of 30 units of product B and C. Formulate this problem as Linear Programming problem so as to maximize total profit.

14. A small maintenance project consists of the following Jobs whose precedence relationships are gives below :

Job	1-2	1 - 3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration in days	15	15	3	5	8	12	1	14	3	14

- Draw an Arrow Diagram.
- Find the Total Float for each activity.
- Find the Critical Path and the Project Duration.

(6 × 3 = 18 weightage)

Part C

Answer any two question.

Each question carries 6 weightage.

- What are the techniques in Operation Research ?
- State the Elements of Queuing Systems.
- Write a short note on Programme Evaluation and Review Technique.

(2 × 6 = 12 weightage)

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(Pages : 2)

Name.....

Reg. No.....

SECOND SEMESTER M.Com. DEGREE EXAMINATION, JUNE 2018

(CUCSS-PG)

Commerce

MC 2C 9—MANAGEMENT SCIENCE

(2015 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A

Answer all questions.

Each question carries 1 weightage.

1. Define the term Operations Research.
2. What is modeling ?
3. What is meant by linear programming ?
4. Define the term Assignment.
5. What is CPM ?
6. Expand of PERT.

(6 × 1 = 6 weightage)

Part B

Answer any six questions.

Each question carries 3 weightage.

7. State the limitation of a graphical method.
8. Describe the merits of Management science.
9. State the characteristics of linear programming problem.
10. Write a note on Vogel's approximations methods.
11. Discuss the similarities and differences of CPM and PERT.
12. Give some applications of queueing theory.
13. What do you understand from a transportation model of OR ?
14. Write a note on various assumptions made in single-channel queueing theory.

(6 × 3 = 18 weightage)

Turn over

Part C

*Answer any two questions.
Each question carries 6 weightage.*

15. Explain the different types of models used in Operations Research.
16. Describe the role of network models of operations research for managerial decision-making.
17. Explain the linear programming problem is generalized matrix form.

(2 × 6 = 12 weightage)

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(Pages : 3)

Name.....

Reg. No.....

**SECOND SEMESTER M.Com. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

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. *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 do you mean by degeneracy in transportation ?
2. What are the stock out cost ?
3. Define deterministic model.
4. Explain Jockeying.
5. Explain network diagram.
6. What do you mean by value of game in pure strategy ?

(4 × 2 = 8 weightage)

Part B

*Answer any four questions.
Each question carries 3 weightage.*

7. An animal feed company must produce at least 2000 kg of a mixture consisting of ingredients X and Y daily. X cost Rs 30 per kg and Y cost Rs 80 per kg. No more than 800 kg of X can be used and at least 600 kg of Y must be used. Formulate a mathematical model to the problem.

Turn over

8. A smart phone repairman finds that the times spend on his job has an exponential distribution with mean 30 minutes. If he repairs sent in the order in which they came in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hours day, what is repairman's expected idle time each day. How many jobs are ahead of the average set just brought in .
9. XYZ company uses 12,000 units of component A in a year Component A is currently made in 30 batches of 400 units on a machine that makes 8 units per hour. The company operates for 2000 hours per year and it costs Rs. 60 to set up the machine, irrespective of batch size. For work in progress purposes, component A is valued at Rs. 10. Investigate whether the existing production plan is optimal and if not, to suggest a new plan showing what savings are possible.
10. From the following pay off matrix for firm A, determine the optimal strategies for both the firms and the value of the game using maximin-minimax principle.

		Firm B				
8	12	-3	50	30		
40	12	10	20	50		
-40	-30	-10	-30	60		
50	10	-50	-20	-60		

11. Explain Characteristics of Management Science.
12. What do you mean by assignment problem ? Explain the assignment algorithm.
13. Explain the decision making process under Markov analysis.
14. A Small project consisting of eight activities has the following characteristics :

Activity	Preceding activity	Most optimistic time	Most likely time	Most pessimistic time
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

Draw the PERT network for the project, determine critical path.

(4 × 3 = 12 weightage)

Part C

Answer any two questions.
Each question carries 5 weightage.

15. Solve the following assignment problem :

Employees Task	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

16. Solve the following problem :

$$\text{Maximize } Z = 6x_1 + 4x_2$$

$$\text{Subject to } -2x_1 + x_2 \leq 2$$

$$x_1 - x_2 \leq 2$$

$$3x_1 + 2x_2 \leq 9$$

$$x_1, x_2 \geq 0.$$

17. A Project Schedule has the following characteristics :

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

- Construct Network Diagram.
 - Compute T_E and T_L for each event.
 - Find critical path.
 - Find EST, LST, EFT, LFT values of all activities.
18. What are the application areas of Linear Programming ?

(2 × 5 = 10 weightage)

SECOND SEMESTER M.Com. DEGREE EXAMINATION, JUNE 2019

(CUCSS)

MC 2C 9—MANAGEMENT SCIENCE

(2015 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A*Answer all questions.**Each question carries 1 weightage.*

- | | |
|----------------------------|--|
| 1. What is a model ? | 2. What are tactical decisions ? |
| 3. What is payoff matrix ? | 4. What is slack variable ? |
| 5. What is total float ? | 6. What is unbalanced assignment model ? |

(6 × 1 = 6 weightage)

Part B*Answer any six questions.**Each question carries 3 weightage.*

7. Explain the main characteristics of OR.
8. What is 'Big M' method ?
9. What is degeneracy in transportation problem ?
10. How does the problem of replacement arise ?
11. Explain the meaning of 'critical path'.
12. Draw a network for a simple project rection of steel works for a shed. The various elements of the project are as shown below :

Activity node	Pre-requisites
A	—
B	—
C	A
D	B
E	A
F	B
G	C, D
H	G, F
I	E
J	H, I
K	J

Turn over

13. Reduce the following game by dominance property and solve it :

		Player B				
		1	2	3	4	5
Player A	I	1	3	2	7	4
	II	3	4	1	5	6
	III	6	5	7	6	5
	IV	2	0	6	3	1

14. Customers arrive at a one window drive-in washing centre according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window, including that for the serviced car can accommodate a maximum of three cars. Other cars can wait outside the space. How long is an arriving customer expected to wait before starting service ?

(6 × 3 = 18 weightage)

Part C

Answer any two questions.

Each question carries 6 weightage.

15. Explain the scope of Operations Research.
16. Write a brief note on PERT.
17. What is LPP ? Explain the requirements for a Linear Programming Problem.

(2 × 6 = 12 weightage)

C 83011

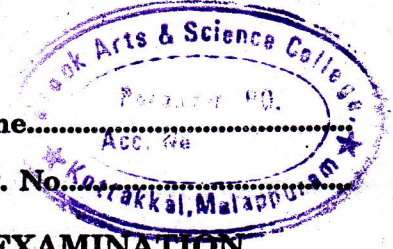
(Pages : 4)

Name.....

Passport No.

Acc. No.

Reg. No.....



SECOND SEMESTER M.A./M.Sc./M.Com. DEGREE EXAMINATION

JUNE 2020

(CBCSS)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

Part A

Answer any four questions.

Each question carries 2 weightage.

1. What do you mean by unbalanced transportation problem ?
2. What do you mean by slack variable ?
3. Define analog model.
4. Explain balking.
5. What do you mean by a critical activity in project management ?
6. What is mixed strategy ?

(4 × 2 = 8 weightage)

Part B

Answer any four questions.

Each question carries 3 weightage.

7. A home resourceful decorator manufactures two types of lamps A and B. Both lamps go through two technicians first a cutter and a finisher. Lamp A requires 2 hours of the cutter's time and 1 hour of the finisher's time : Lamp B requires 1 hour of cutter's time and 2 hours of finisher's time. The cutter has 200 hours and finisher has 90 hours of available time each month. Profit on the Lamp A is Rs. 60 and on one B lamp is 110. Formulate LPP model.
8. In a car workshop, the cars arrive at a rate of 30 car per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate average length of queue and the probability the queue size exceeds

9. A factory requires 1500 units of an item per month, each costing Rs 27. The cost per order is Rs. 150 and the inventory carrying charges worked out to 20% of the average inventory. Find out the EOQ and number of orders per year. Would you accept a 2 % discount on a minimum supply quantity of 1200 units ?
10. From the following pay off matrix for firm A, determine the optimal strategies for both the firms and the value of the game using maximin-minimax principle :

	Firm B				
	3	- 1	4	6	7
	- 1	8	2	4	12
Firm A	16	8	6	14	12
	1	11	- 4	2	1

11. List out the limitations of Management Science.
12. Explain the decision making process under Markov analysis
13. Solve the following assignment problem :

	Employees	I	II	III	IV	V
Task						
	A	1	3	2	3	6
	B	2	4	3	1	5
	C	5	6	3	4	6
	D	3	1	4	2	2
	E	1	5	6	5	4

14. XYZ company uses 12,000 units of component A in a year Component A is currently made in 30 batches of 400 units on a machine that makes 8 units per hour. The company operates for 2000 hours per year and it costs Rs. 60 to set up the machine, irrespective of batch size. For work in progress purposes, component A is valued at Rs. 10. Investigate whether the existing production plan is optimal and if not, to suggest a new plan showing what savings are possible.

(4 × 3 = 12 weightage)

Part C

Answer any two questions.

Each question carries 5 weightage.

15. What do you mean by assignment problem ? Explain the assignment algorithm.
16. A Small project consisting of eight activities has the following characteristics :

Activity	Preceding activity	Most optimistic time	Most likely time	Most pessimistic time
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

Draw the PERT network for the project, determine critical path and show the EST, EFT, LST and LFT.

17. Following data are available for a firm which manufactures three items A, B and C :

Product	Time required (in hours)		Profit
	Assembly	Finishing	
A	10	2	800
B	4	5	600
C	5	4	300
Firm's capacity	2,000	1,009	

- (i) Express the above data in the form of linear programming problem to maximize the profit from the production.
- (ii) Solve it by simplex method.

Turn over

18. Solve the following transportation problem :

Warehouse \ Factory	W1	W2	W3	W4	W5	Available
F1	3	4	6	8	9	20
F2	2	10	1	5	8	30
F3	7	11	20	40	3	15
F4	2	1	9	14	16	13
Required	40	6	8	18	6	

(2 × 5 = 10 weightage)

C 23295

(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

Part B

Answer any **four** questions.
Each question carries 3 weightage.

8. Solve the following LPP using graphical method :

$$Z = 3x_1 + 5x_2$$

subject to

$$x_1 + 2x_2 \leq 2000$$

$$x_1 + x_2 \leq 1500$$

$$x_2 \leq 600$$

$$x_1, x_2 \geq 0.$$

9. Write down the dual of the following problem :

$$Z = 4x_1 + 2x_2$$

subject to

$$-x_1 - x_2 \leq -3$$

$$-x_1 + x_2 \geq -2$$

$$x_1, x_2 \geq 0.$$

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
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)

C 24568

(Pages : 3 + 4 = 7)

Name.....

Reg. No.....

SECOND SEMESTER M.Com. DEGREE EXAMINATION, APRIL 2022

(CBCSS—SDE/PRIVATE)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A

*Answer any **four** questions.
Each question carries 2 weightage.*

1. Discuss the transient solutions in queuing theory.
2. Explain value of the game.
3. What are Markov chains ?
4. What is dummy activity ?
5. Explain ABC analysis ?
6. What is critical activity ?
7. What do you mean by Mixed strategy ?

(4 × 2 = 8 weightage)

Part B

*Answer any **four** questions.
Each question carries 3 weightage.*

8. Explain the methods of finding the initial feasible solution in transportation problem.
9. Discuss the basic assumptions of Linear Programming Problem.
10. A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which these come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is the repairman's expected idle time each day ? How many jobs are ahead of the average set just brought in ?

Turn over

11. A stockiest has to supply 400 units of a product every Monday to his customers. He gets the product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5 % per year of the cost of the product. Find :

(i) Economic lot size ; and (ii) The total optimal cost (including the capital cost).

12. From the following payoff matrix find the value of game :

		Player B				
		I	II	III	IV	V
Player A	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	-6

13. Draw a network diagram from the following activities :

Job	Predecessor	Job	Predecessor	Job	Predecessor
A	-	F	A	L	G, H
B	-	G	F	M	J, K, L
C	A	H	D, E	N	J, K, L
D	A	J	G, H	O	K, J
E	B, C	K	G, H		

14. Solve the following assignment problem. Cell values represent cost of assigning job A, B, C and D to the machines I, II, III and IV :

		Machines			
		I	II	III	IV
Jobs	A	10	12	19	11
	B	5	10	7	8
	C	12	14	13	11
	D	8	15	11	9

(4 × 3 = 12 weightage)

Part C

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

15. Discuss the different types of models in decision making and their uses.
16. Solve the following problem graphically :

$$\begin{aligned} \text{Minimize} \quad & Z = 3x + 9y \\ \text{subject to the constraints : } & x + 3y \leq 60 \\ & x + y \geq 10 \\ & x \leq y \\ & x \geq 0, y \geq 0. \end{aligned}$$

17. Following are the times estimates of the project (in weeks) :

Activity	Preceding activity	Most Optimistic Time (a)	Most Likely Time (m)	Most Pessimistic Time (b)
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

- (i) Draw the PERT network for the project.
- (ii) Prepare the activity schedule for the project.
- (iii) Determine the critical path.
- (iv) If a 30-week deadline is imposed, what is the probability that the project will be finished within the time limit ?
18. Elaborate the different inventory models used in inventory management.

(2 × 5 = 10 weightage)

C 24568

(Pages : 4)

Name.....

Reg. No.....

SECOND SEMESTER M.Com. DEGREE EXAMINATION, APRIL 2022

(CBCSS—SDE/PRIVATE)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

[Improvement Candidates need not appear for MCQ Part]

(Multiple Choice Questions for SDE Candidates)

Time : 20 Minutes**Total No. of Questions : 20****Maximum : 5 Weightage****INSTRUCTIONS TO THE CANDIDATE**

1. This Question Paper carries Multiple Choice Questions from 1 to 20.
2. The candidate should check that the question paper supplied to him/her contains all the 20 questions in serial order.
3. Each question is provided with choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and enter it in the main answer-book.
4. The MCQ question paper will be supplied after the completion of the descriptive examination.

MCM 2C 10—MANAGEMENT SCIENCE

(Multiple Choice Questions for SDE Candidates)

1. In India, first Operations Research unit was set up at _____.
 - (A) Regional Research Laboratory, Hyderabad.
 - (B) Indian Statistical Institute, Kolkotha.
 - (C) Indian Institute of Science and Technology, Bengaluru.
 - (D) Indian Institute of Science and Technology, Mohali.
2. Who defined Operations Research as “the art of giving bad answers to problems which otherwise have worse answers” ?
 - (A) H M Wagner.
 - (B) H A Taha.
 - (C) T L Saaty.
 - (D) Arthur Clark.
3. Operations Research has the characteristic that it is done by a team of _____.
 - (A) Scientists.
 - (B) Mathematicians.
 - (C) Academicians.
 - (D) Politicians.
4. _____ models are obtained by enlarging or reducing the size of the items.
 - (A) Iconic models.
 - (B) Analogue models.
 - (C) Symbolic models.
 - (D) None of these.
5. _____ models assume that the values of the variables do not change with time during a particular period.
 - (A) Dynamic
 - (B) Static.
 - (C) Both (A) and (B).
 - (D) None of these.
6. Dual of the dual is a _____.
 - (A) Dual.
 - (B) Primal.
 - (C) Alternative.
 - (D) None of these.
7. For salesman who has to visit ‘ n ’ cities, which of the following are the ways of his tour plans :
 - (A) $n !$.
 - (B) $(n + 1) !$.
 - (C) $(n - 1) !$.
 - (D) n .

8. The variables whose co-efficient vectors are unit vectors, are called _____.
- (A) Unit variables. (B) Basic variables.
(C) Non-basic variables. (D) None of these.
9. In maximisation cases, _____ are assigned to the artificial variables as their co-efficients in the objective function.
- (A) $+m$. (B) $-m$.
(C) 0 (D) None of these.
10. In a maximisation assignment problem, the objective is to maximise _____.
- (A) Profit. (B) Cost.
(C) Optimisation. (D) None of these.
11. _____ is concerned with determination of the most economic replacement policy.
- (A) Probabilistic programming. (B) Linear programming.
(C) Linear programming. (D) Replacement theory.
12. Which of the followings is an assumption of Linear Programming Technique ?
- (A) Divisibility. (B) Additivity.
(C) Proportionality. (D) All of the above.
13. While solving an LPP, infeasibility may be removed by :
- (A) Removing a variable. (B) Removing a constraint.
(C) Adding a variable. (D) Adding a constraint.
14. An organisation chart is an example of _____.
- (A) Iconic model. (B) Mathematical model.
(C) Analogue model. (D) None of these.
15. An activity which must be completed before commencement of one or more other activities is called _____.
- (A) Successor activity. (B) Predecessor activity.
(C) Dummy activity. (D) None of these.

Turn over

16. An event which represents the beginning of more than one activity is a :
- (A) Merge event. (B) Net event.
(C) Burst event. (D) None of these.
17. In a network diagram, activity is denoted by _____.
- (A) Node. (B) Arrow.
(C) Triangle. (D) None of these.
18. Which of the following method is used to solve mixed strategy problems ?
- (A) Probability method. (B) Graphic method.
(C) Linear Programming method. (D) All of the above.
19. In queuing theory, FCFS stand for _____.
- (A) First Cum First Served. (B) First Customer First Served.
(C) Fast Channel First Served.
20. Game theory became popular when the book "Theory of Games and Economic Behaviour" was published in 1944 by _____.
- (A) Von Neumann. (B) Mc Closky.
(C) Von-Neumann and Mc Closky. (D) Von-neumann and Morgenstern.

C 42725

(Pages : 4)

Name.....

Reg. No.....

**SECOND SEMESTER M.Com. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2023**

(CBCSS)

M.Com.

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A

*Answer any four questions.
Each question carries 2 weightage.*

1. What do you mean by degeneracy in transportation problem ?
2. Explain the Minimax and Maximin principle used in the theory of games.
3. What do you mean by transition probability in Markov analysis ?
4. Name the elements of decision theory.
5. Explain VED analysis.
6. What is head event slack ?
7. What is simplex method in LPP ?

(4 × 2 = 8 weightage)

Part B

*Answer any four questions.
Each question carries 3 weightage.*

8. Differentiate between PERT and CPM.
9. What is inventory management ? Discuss the techniques of inventory management.

Turn over

10. In a departmental store one cashier is there to serve the customers. And the customers pick up their needs by themselves. The arrival rate is 9 customers for every 5 minutes and the cashier can serve 10 customers in 5 minutes. Assuming Poisson arrival rate and exponential distribution for service rate, find :
- Average number of customers in the system ;
 - Average number of customers in the queue or average queue length ; and
 - Average time a customer spends in the system.
11. Five salesmen are to be assigned to five districts. Estimates of sales revenue (in thousands) for each salesman are given as follows :

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment pattern that maximises the sales revenue.

12. Solve the game whose payoff matrix is given below :

		Player B				
		I	II	III	IV	V
Player A	I	- 2	0	0	5	3
	II	4	2	1	3	2
	III	- 4	- 3	0	- 2	6
	IV	5	3	- 4	2	- 6

13. ABC company estimates that it will sell 12000 units of its product for the forthcoming year, the ordering cost is Rs. 100 per order and the carrying cost per year is 20 % of the purchase price per unit. The purchase price per unit is Rs. 50. Find :
- Economic Order Quantity ;
 - No. of orders/year ; and
 - Time between successive order.
14. Find out the minimum cost solution for the following transportation problem, using North West Corner Rule method :

To \ From	P	Q	R	Availability
A	16	19	12	14
B	22	13	19	16
C	14	28	8	12
Requirement	10	15	17	

(4 × 3 = 12 weightage)

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

15. What is decision-making under uncertainty ? Explain the various quantitative methods that are useful for decision-making under uncertainty
16. Solve graphically the given linear programming problem.

$$\begin{aligned} \text{Minimize } Z &= 3x_1 + 5x_2 \\ \text{subject to } & -3x_1 + 4x_2 \leq 12 \\ & 2x_1 - x_2 \geq -2 \\ & 2x_1 + 3x_2 \geq 12, \\ & x_1 \leq 4, x_2 \geq 2 \\ & x_1, x_2 \geq 0. \end{aligned}$$

Turn over

17. The time estimates of a project are given (in days) below :

Activity	Time estimates in days			Immediate Predecessor
	P	M	O	
A	20	10	5	–
B	12	7	5	–
C	12	10	8	A
D	40	20	6	C
E	90	60	30	D
F	14	10	7	D
G	50	30	20	C
H	12	10	8	E, F, G
I	6	4	3	B
J	1	1	1	H, I

- Draw network diagram, find project duration and variance
- What is the probability that product manager will be able to complete the task within 80 days-time?

18. Define Theory of Game. Discuss the assumptions and strategies of theory of game.

(2 × 5 = 10 weightage)

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(Pages : 4)

Name.....

Reg. No.....

**SECOND SEMESTER M.Com. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2024**

(CBCSS)

Master of Commerce

MCM 2C 10—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

*Answer should be written in English Only.***Part. A***Answer any **four** questions.**Each question carries 2 weightage.*

1. Discuss the types of queueing models.
2. What is saddle point ?
3. How will you classify Markov chains ?
4. What is dummy activity ?
5. Explain FSN analysis.
6. What is critical activity ?
7. What do you mean by pure strategy ?

(4 × 2 = 8 weightage)

Part B*Answer any **four** questions.**Each question carries 3 weightage.*

8. Explain the steps of optimality test using Modi method.
9. What are costs that are involved in carrying inventory ?

Turn over

10. Customers arrive at a window in a bank, according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window including that for the serviced customers can accommodate a maximum of three customers. Other customers can wait outside this space.
- What is the probability that an arriving customer can go directly to the space in front of the window ?
 - What is the probability that an arriving customer will have to wait outside the indicated space ?
 - How long is an arriving customer expected to wait before being served ?
11. From the following pay-off matrix find the value of game :

	<i>Player B</i>			
	B_1	B_2	B_3	
<i>Player A</i>	A_1	0	3	1
	A_2	0	-4	-3
	A_3	1	5	-1

12. Construct a network for a project whose activities and their predecessor relationship given in the table.
- | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|------|------|
| Activity | A | B | C | D | E | F | G | H | I | J | K |
| Predecessor | - | - | - | A | B | B | C | D | E | H, I | F, G |
13. The demand rate of a particular item is 12000 units per year. The set-up cost per run is Rs. 350 and the holding cost is Rs. 20 per unit per month. If no shortages are allowed and the replacement is instantaneous, determine :
- The optimum run size ;
 - The optimum scheduling period ; and
 - Minimum total expected annual cost.

14. Find the basic feasible solution of the following problem using Vogel's Approximation method :

<i>Origin</i>	<i>Destination</i>				<i>Supply</i>
	1	2	3	4	
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
<i>Demand</i>	60	40	30	110	240

(4 × 3 = 12 weightage)

Part C

Answer any **two** questions.

Each question carries 5 weightage.

15. What are types of decision? Elaborate the steps of decision making.
16. Solve the following problem using simplex method:

$$\text{Maximize } Z = 6x + 3y$$

Subject to the constraints :

$$2x + 5y \leq 120$$

$$2x + y \leq 40$$

$$x \geq 0, y \geq 0.$$

17. A computer centre has four expert programmers and needs to develop four application programmes. The head of the computer Centre, estimates the computer time (in minutes) required by the respective experts to develop the application programmes as follows :

Turn over

PROGRAMMES PROGRAMMERS	A	B	C	D
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

Find the assignment pattern that minimize the time required to develop the application programmes.

18. What is PERT Network? Compare and contrast between CPM and PERT, in the context of project management.

(2 × 5 = 10 weightage)