SECOND SEMESTER M.Com DEGREE EXAMINATION, APRIL 2021
COMMERCE
FMCM2C10: MANAGEMENT SCIENCE

Time: 3 Hours   **Maximum Weightage: 30**

Part A: *All* **questions can be answered. Each carries** *two* **weightage (Ceiling 6 weightage).**

1.   What is management science?
2.   Explain the constituents of queuing model.
3.   What is safety stock?
4.   What is Markov analysis?
5.   A company requires 16,000 units of raw materials costing ₹ 2 per unit. The cost of placing an order is ₹ 45 and the carrying costs are 10% per year per unit of the average inventory. Determine the economic order quantity.
6.   Consider the game G with the following payoff:

$$\begin{array}{c} \\ \\ \text{Player A} \end{array} \begin{array}{cc} & \text{Player B} \\ & \begin{array}{cc} B_1 & B_2 \end{array} \\ \begin{array}{c} A_1 \\ A_2 \end{array} & \begin{bmatrix} 4 & 7 \\ -4 & \lambda \end{bmatrix} \end{array}$$

       Show that G is strictly determinable, whatever λ may be.
7.   For a particular activity of a project, time estimates received from two engineers X and Y are as follows:

	t_o	t_m	t_p
Engineer X	3	6	7
Engineer Y	4	5	9

       Show who is more certain about the time of completion of the job.

Part B: *All* **questions can be answered. Each carries** *four* **weightage (Ceiling 12 weightage).**

8.   State the limitations of the LPP technique.
9.   Enumerate various types of inventory models.
10.   What is CPM? What are the essential steps in CPM for project planning?
11.   Draw the network diagram for the project in which the pre operations and post operations are as given below.

Operations	Pre operations	Post operations
A	None	D,F
B	None	G
C	None	E,H
D	A	G
E	C	G
F	A	None
G	B,D,E	None
H	C	None

(PTO)

12. Four operators O_1, O_2, O_3, and O_4 are available to a manager who has to get four jobs J_1, J_2, J_3 and J_4 done by assigning one job to each operator. Given the time needed by different operators for different jobs in the matrix below:
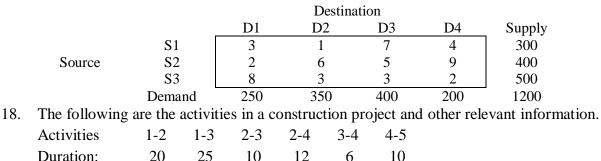
	J_1	J_2	J_3	J_4
O_1	12	10	10	8
O_2	14	12	15	11
O_3	6	10	16	4
O_4	8	10	9	7

How should manager assign the jobs so that the total time needed for all four jobs is minimum?

13. The machines in production shop breakdown at an average of 2 per hour. The non-productive time of any machine costs ₹ 30 per hour. If the cost of repairman is ₹ 50 per hour and the repair rate is 3 per hour, calculate:
    a) Number of machines not working at any point of time.
    b) Average time that a machine is waiting for the repairman.
    c) Cost of non-productive time of the machine operator.
    d) Expected cost of system per hour.

14. Given that a person's last soft drink purchase was brand A, there is a 90% chance that his next soft drink purchase will also be brand A. If a person's last soft drink purchase was brand B, there is an 80% chance that his next soft drink purchase will also be brand B. The present market share of the brand A and brand B is 55% and 45% respectively. Construct transition probability matrix. In the long run what is the market share of such soft drink?

Part C: *All* questions can be answered. Each carries *six* weightage (Ceiling 12 weightage).
15. Explain the usefulness of Management Science in decision making process.
16. A company is manufacturing two different types of products A and B. Each product has to be processed on two machines M1, and M2. Product A requires 2 hours on machine M1, and 1 hour on machine M2, product B requires 1 hour on machine M1 and 2 hours on machine M2. The available capacity of machine M1 is 104 hours and that of machine M2 is 76 hours. Profit per unit for product A is Rs.6 and that for B is Rs.11.Formulate the LP model and solve it by simplex method.
17. Solve the following transportation problem

		Destination			

		D1	D2	D3	D4	Supply
	S1	3	1	7	4	300
Source	S2	2	6	5	9	400
	S3	8	3	3	2	500
	Demand	250	350	400	200	1200

18. The following are the activities in a construction project and other relevant information.

Activities	1-2	1-3	2-3	2-4	3-4	4-5
Duration:	20	25	10	12	6	10

    a) Draw the network for the project and find critical path.
    b) Find total floats for each activity.