Third Semester MBA Degree Examination, April/May 2022
BUSINESS ADMINISTRATION
Operations Research

Time : 3 Hours   Max. Marks : 70

SECTION – A

Answer **any two** of the following. **Each** question carries **10** marks. Answer to **each** questions should **not** exceed **5** pages.   **(2x10=20)**

1. Elucidate the areas of operations research applications in business.

2. Describe the requirements for a linear programming problem.

3. Explain the characteristics of queuing model.

SECTION – B

Answer **any three** of the following. **Each** question carries **12** marks. Answer to **each** questions should **not** exceed **6** pages.   **(3x12=36)**

4. A company manufactures two products, X and Y by using three machines A, B, and C. Machine A has 4 hours of capacity available during the coming week. Similarly, the available capacity of machines B and C during the coming week is 24 hours and 35 hours respectively. One unit of product X requires one hour of Machine A, 3 hours of machine B and 10 hours of machine C. Similarly one unit of product Y requires 1 hour, 8 hours and 7 hours of machine A, B and C respectively. When one unit of X is sold in the market, it yields a profit of Rs. 5/- per product and that of Y is Rs. 7/- per unit. Solve the problem by using graphical method to find the optimal product mix.

5. A manager has 4 jobs on hand to be assigned to 3 of his clerical staff. Clerical staff differs in efficiency. The efficiency is a measure of time taken by them to do various jobs. The manager wants to assign the duty to his staff, so that the total time taken by the staff should be minimum. The matrix given below shows the time taken by each person to do a particular job. Help the manager in assigning the jobs to the personnel.

Jobs	Men (Time taken to do jobs in hours)		
	X	Y	Z
A	10	27	16
B	14	28	7
C	36	32	16
D	19	31	21

6. The pay off matrix shown in the following table describes the increase in market share for firm A and decrease in market share for firm B with different strategies.

	B_1	B_2	B_3	B_4
A_1	35	65	25	5
A_2	30	20	15	0
A_3	40	50	0	10
A_4	55	60	10	15

Find the optimum strategies for both the firm and value of the game.

7. A firm is considering replacement of a machine, whose cost price is Rs. 60,000. The running costs are estimated to at Rs. 5000 for the first year increasing by 3000 year in the second and subsequent years. Assume that the machine have resale value for the first five year only, there after the machine have no resale value.

Year	1	2	3	4	5
Resale Value	30000	25000	25000	20000	20000

When should the machine be replaced ?

8. Discuss the application of simulation in business operations.

SECTION – C
(Compulsory)

Answer to **each** questions should **not** exceed **6** pages.   **(1x14=14)**

9. The following table gives the estimates of optimistic time (t_0), most likely time (t_m) and pessimistic time (t_p) of different activities of a project.

Activity	t_0	t_m	t_p
1-2	4	8	12
2-3	1	4	7
3-4	8	12	16
3-5	3	5	7
4-6	3	6	9
5-7	3	6	9
5-8	4	8	6
6-10	4	6	8
7-9	4	8	12
8-9	2	5	8
9-10	4	10	16

Construct the network diagram and calculate the probability of finishing the project.

a) Less than 45 days

b) Less than 38 days.

c) Probability that project will complete in 38 to 45 weeks.