Registration No.:

Answer Q1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)
a) What is the full form of VAM and explain its uses?
b) Why are slack and surplus variables important in the Simplex method?
c) What is meant by dominance?
d) What is the effect of tied ranks on rank correlation?
e) Mention one managerial application of LPP.
f) What is a steady-state probability?
g) What happens to regression lines when correlation is zero?
h) How does uncertainty affect strategic decision-making in organizations?
i) Why is the study of queue behavior important for managers?
j) Why is a Markov chain called a memoryless process?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 x 8)
a) One card is drawn from a pack of 52 cards. What is the probability that card drawn is an ace?
b) The mean and standard deviation of a distribution are 60 and 8 respectively. Find the coefficient of variation.
c) Calculate arithmetic means:

Class Interval	0-10	10-20	20-30	30-40
Frequency	6	10	15	12

d) Find the rank correlation coefficient and interpret it:

Students	M	N	O	P	Q
Marks in Maths	75	69	85	74	65
Marks in Statistics	73	66	83	77	60

e) What do you mean by assignment problem? Give its mathematical formulation.
f) The correlation coefficient between marks in two subjects is 0.3 based on a sample of 100 students. Calculate the standard error and interpret the result.

g) What is probability that two people are born on the same day (ignoring date).

h) Maximize profit by assigning 3 machines to 3 jobs:

	Job 1	Job 2	Job 3
Machine-1	12	4	8
Machine-2	8	6	7
Machine-3	5	9	5

Convert it to a maximization problem and solve using Hungarian method.

i) Discuss the different types of queue behavior with examples.

j) Calculate regression coefficients for the following frequency distribution:

X	12	12	15	18
Y	18	22	32	36
F	3	6	5	2

Compute b_{yx} and b_{xy} using step-by-step methods.

k) Calculate the standard deviation:

Class Interval	0–10	10–20	20–30	30–40	40–50
Frequency	6	9	14	4	8

l) Calculate the coefficient of variation when: Mean = 50, Standard Deviation = 5

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 The Dilkhus Manufacturing Company has a current transportation schedule which is being questioned by the top management as to whether it is optimal. Find an optimal schedule. **(16)**

Warehouses	Factory-A	Factory-B	Factory-A	Warehouse requirements
1	50	40	80	400
2	80	70	40	400
3	60	70	60	500
4	60	60	60	400
5	30	50	40	800
Factory availability	800	600	1100	2500

Q4 Two leading manufacturers, firm A and B, of a detergent powder are planning to make fund allocations for advertising their product. The matrix given below shows the percentage of market share of firm A for its various advertising policies. **(16)**

	No advertising	Medium advertising	Large advertising
No advertising	60	50	40
Medium advertising	70	55	45
Large advertising	80	60	50

Determine the optimal strategies for firm A.

Q5 Solve the following linear programming problem by means of the simplex procedure: **(16)**

Maximize

subject to

$Z = x_2 - 3x_3 + 2x_5$

$x_1 + 3x_2 - x_3 + 2x_5 = 7$

$-2x_2 + 4x_3 + x_4 = 12$

$-4x_2 + 3x_3 + 8x_5 + x_6 = 10$

$X_j \geq 0, j = 1, 2\ldots.6.$

Q6 Find the assignment of men to jobs that will minimize the total time taken in minutes and is given **(16)** in the following matrix.

Workers	Jobs			
	A	**B**	**C**	**D**
1	45	40	51	67
2	55	40	61	53
3	49	52	48	64
4	41	45	60	55