

MBA SCM Sem.-1 Examination

FC-105

Q & MT

January-2024

Time : 2-30 Hours]

[Max. Marks : 70

Q-1 A) Attempt any two:

[10]

i) The data pertaining to kilowatt hours of electricity consumed by 100 persons in a city.

Consumption (Kilowatt hour)	0-10	10-20	20-30	30-40	40-50
No. of Users	6	25	36	20	13

Calculate the standard deviation and mode.

ii) From a sales force of 150 persons, one will be selected to attend a special sales meeting. If 52 of them are unmarried, 72 are college graduates and $\frac{3}{4}$ of the 52 that are unmarried are college graduates, find the probability that the salesperson selected at random will be neither single nor a college graduate.

iii) Suppose an item is manufactured by three machines X, Y and Z. All the three machines have equal capacity and are operated at the same rate. It is known that the percentages of defective items produced by X, Y and Z are 2, 7 and 12 per cent, respectively. All the items produced by X, Y and Z are put into one bin. From this bin, one item is drawn at random and found to be defective. What is the probability that this item was produced on Y?

B) An agricultural company wants to decide which commodity should stock to get minimum loss. It was supplied with the following information. The probability that the monsoon will be excess, normal and deficient is 0.40, 0.30 and 0.30. The estimated loss three commodities in respect of these different kinds of monsoon are:

[4]

Lose per 1 ton			
Monsoon	Excess	Normal	Deficient
Rice	10,000	4,000	15,000
Wheat	4,000	3,000	8,000
Maize	4,000	1,000	1,000

Determine the optimal decision under the decision criteria. What will be expected opportunity loss?

Q-2 A) The mean of a binomial distribution is 40 and standard deviation is 6. Calculate n, p and q. Determine the binomial probability distribution. [5]

B) Suppose, a life insurance company insures the lives of 5000 persons aged 42. If studies show the probability that any 42 years old person will die in a given year to be 0.001. Find the probability that the company will have to pay at least two claims during a given year. [5]

C) Define the word in detail: Simple random Sampling [4]

OR

- A) A workshop produces 2000 units of an item per day. The average weight of units is 130 kg with a standard deviation of 10 kg. Assuming normal distribution, how many units are expected to weigh less than 142 kg? [7]
- B) From the data given in the following table for 250 persons, find out whether there is any relationship between gender and the preference of colour. Hypothesis that there is no relationship between gender and preference of colour. ($\alpha=0.05$) [7]

Colour	Male	Female
Red	25	45
Blue	45	25
Green	50	10

- Q-3 A) The following data relate to age of 10 employees and the number of days they reported sick in a month. [7]

Age	30	32	35	40	48	50	52	55	57	61
Sick days	1	0	2	5	2	4	6	5	7	8

Calculate Karl Pearson's coefficient of correlation and interpret it.

- B) From 10 observations of price (x) and supply (y) of a commodity, the following summary figures were obtained (in appropriate units): [7]

$$\sum x = 130; \sum y = 220; \sum x^2 = 2288; \sum y^2 = 5506 \text{ and } \sum xy = 3467$$

Compute a regression line of y on x and estimate the supply when the price is 16.

OR

- A) The scores obtained by 9 salesman of a company in an intelligence test and their weekly sales (Rs. In 1000's) are as follow: [7]

Salesman	A	B	C	D	E	F	G	H	I
Test scores	50	60	50	60	80	50	80	40	70
Weekly scores	30	60	40	50	60	30	70	50	60

Obtain the regression equation of sales on intelligence test scores of the salesman.

- B) To test the significance of variation in the retail prices of a commodity in three principal cities Mumbai, Calcutta and Delhi four shops were chosen at random in each city and prices who lack confidence in their mathematical ability observed in rupees were as follows: [7]

Mumbai	15	7	11	13
Calcutta	14	10	10	6
Delhi	4	10	8	8

Do the data indicate that the price in the three cities are significantly different? ($\alpha=0.05$)

- Q-4 A) Find the dual of the following primal linear programming problem: [7]

$$\text{Minimize } Z = 6x_1 + 10x_2 - 13x_3$$

Subject to the constraints

$$x_1 + 2x_2 - 4x_3 \geq 24$$

$$x_1 + 2x_2 + 4x_3 \leq 60$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \text{ is unrestricted in sign}$$

- B) A company has 4 machines available for assignment to 4 tasks. Any machine can be assigned to any task and each task requires processing by one machine. The time required to setup each machine for the processing of each task is given in the table below. [7]

	Time (Hours)			
	Task 1	Task 2	Task 3	Task 4
Machine A	13	4	7	6
Machine B	1	11	5	4
Machine C	6	7	2	8
Machine D	1	3	5	9

The company wants to minimize the total setup time needed for the processing of all four tasks.

OR

- A) The transportation cost per unit of a product is given below. Schedule the transport to optimize the cost of transportation using Vogel Approximation method. Also, find out the minimum possible transportation costs for the given problem. [7]

	X	Y	Z	Supply
A	8	9	7	40
B	4	3	5	25
C	8	5	6	35
D	6	4	9	20
Demand	35	40	45	

- B) Use the graphical solution technique to find the optimal solution of the following linear programming model. [7]

$$\text{Maximize } Z = 3X_1 + 2X_2$$

Subject to the constraints

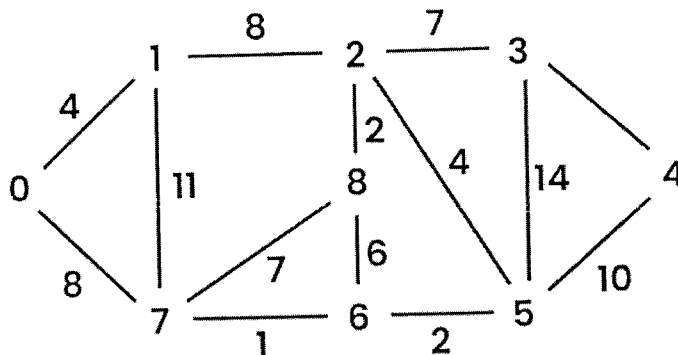
$$2X_1 + 2X_2 \leq 5$$

$$2X_1 + X_2 \leq 4$$

$$X_1 + 2X_2 \leq 4$$

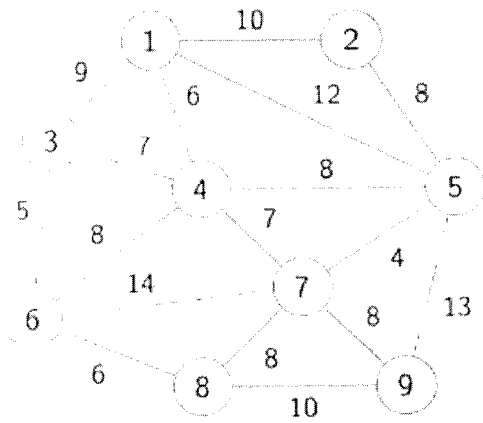
$$X_1, X_2 \geq 0$$

- Q-5 A) Find the shortest path between the node 1 to node 4 for the network model. Draw a diagram of the shortest path. [7]



- B) Find the maximum spanning tree of the following network model for all the given nodes. Determine the path and draw a network of the maximum spanning tree problem. [7]

E1188-4



- Note:** 1. Graph Papers and Logarithmic, Statistical Tables shall be provided on request.
2. Non-programmable calculator is permitted.
