Subject: Business Statistics - I | Course Code: MGMT 321
Full Marks: 100 | Time: 3:00 Hours

You are required to answer in your own words as far as applicable. Figures in the margins indicate full marks.

SECTION A: VERY SHORT ANSWER QUESTIONS (10 X2 = 20 MARKS)

Answer ALL questions.

Q1. What do you mean by statistics?

Q2. Find the median value by empirical relationship if mean ($\overline{X}$) = 42.2 and mode = 41.3.

Q3. The average wage of the male workers working in a factory is Rs. 80 and the number of workers is 100. The average wage of the female workers is Rs. 70 and their number is 50. Find the average wage of all the workers taken together.

Q4. If the sum of upper quartile and lower quartile is 20 and their difference is 10. Find the value coefficient of quartile deviation.

Q5. An analysis of the monthly wages paid to workers in the firms A and B belonging to the same industry gives the following results.

	Average wages (Rs)	S.D. of wages (Rs)
Firm A	480	20
Firm B	475	25

Which market shows greater variation in individual wages?

Q6. For 50 pairs of observations on two variables sales (X) and pricing (Y), the following results were obtained. $\sum X = 75$, $\sum Y = 80$, $\sum X^2 = 130$, $\sum Y^2 = 140$, $\sum XY = 120$. Find out if there exists any relationship between sales and pricing.

Q7. For a given set of data $\sum XY = 190$, $\sum X^2 = 165$, $\sum Y^2 = 220$, $\sum X = 25$, $\sum Y = 30$, n = 5. Find the equation of regression line Y on X. Estimate the value of Y when X = 8.

Q8. If $A = \begin{pmatrix} 1 & 0 \\ 2 & -3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}$, Find AB

Q9. Evaluate the determinant:
$$\begin{vmatrix} a+b & a-b \\ a-b & a+b \end{vmatrix}$$

Q10. What is the probability of giving a child birth by a pregnant woman on Sunday of a week?

SECTION B: SHORT ANSWER QUESTIONS (6 X 8 = 48 MARKS)

Answer any SIX questions.

Q11. Distinguish between primary and secondary data. What are the different methods of collecting secondary data? (8)

Q12. For a certain frequency distribution of 51 households, calculate the missing frequencies if arithmetic mean is 5. (8)

Size	2	3	4	5	6	7
No. of households	2	3	?	21	?	5

Q13. For a group of 200 candidates, the mean and standard deviation were found to be 40 and 15 respectively. Later on it was discovered that the score 43 was misread as 53. Find the correct mean and standard deviation corresponding to the corrected figures. (8)

Q14. What do you mean by correlation coefficient between two variables? While calculating the coefficient of correlation between two variables X and Y, the following results were obtained: (2+6)

N =30	$\sum X = 120$	$\sum Y = 90$
$\sum X^2 = 600$	$\sum Y^2 = 250$	$\sum XY = 356$

Later it was found that two pairs of observations were wrongly entered as (8, 10) and (12,7) instead of (8,12) and (10,8) respectively. Calculate the correct value of correlation coefficient.

Q15. The following information regarding the expenditure on advertising and sales.

	Mean (Rs. lakh)	Standard deviation (Rs. lakh)
Advertising Expenditure (Lakhs Rs.)	Rs. 10	Rs. 3
Sales (Lakhs Rs.)	Rs. 90	Rs. 12
Correlation coefficient	0.8	

(a) Calculate the two regression lines. (6)

(b) What should be advertisement expenditure if the company wants to attain sales target of Rs. 120 lakhs? (2)

Q16. Find the matrices A and B such that: (8)

$$A + 2B = \begin{pmatrix} 3 & 2 & 0 \\ 3 & 3 & 5 \\ 4 & 4 & 6 \end{pmatrix}, \quad 2A + B = \begin{pmatrix} 3 & 1 & 3 \\ 0 & 3 & 7 \\ 5 & 2 & 3 \end{pmatrix}$$

Q17. Solve the equation by using Cramer's rule: (8)

x + y + z = 10, 2x + z = 8, y + 2z = 12

Q18. Find graphically the maximum value of : Z = 3x + 3y (8)

Subject to Constraints: x + y ≤ 5, x + 2y ≤ 8,   x, y ≥ 0

SECTION C: LONG ANSWER QUESTIONS (2 X 16 = 32 MARKS)

*Answer any **TWO** questions.*

Q19. The following are the weekly production in units (output) of 60 workers of a factory.

72	23	48	51	64	82	12	33	50	39	57	35
88	77	25	39	52	48	64	49	52	41	72	62
49	32	54	67	46	55	57	82	44	75	56	51
63	59	69	53	42	75	85	68	55	52	45	40
57	20	75	46	51	50	16	62	56	54	40	55

The management has decided to give bonus of Rs. 5000, Rs. 6000, Rs. 7000, Rs.8000 and Rs. 9000 to each worker in the respective output group 40 to 50, 50 to 60 and so on.

Find:

i. Mean output of all the workers (4)

ii. Average bonus received by the workers (4)

iii. Standard deviation of bonus. (8)

Q20. Goals scored by two teams A and B in a football season were as follows:

Number of goals scored	Numbers of matches	
	Team A	Team B
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

Find which team may be considered to be more consistent. (16)

Q21. A consumer product company wants to measure the effectiveness of different types of advertising media in the promotion of its product. Specifically, the company is interested in the effectiveness newspaper advertising. A sample 69 cities with approximately equal populations is selected for study during a test period of one month. The data of sales of the product and newspaper advertising media expenditure are given below.

Advertising expenditure	Sales of the product				
	0-500	500-1000	1000-1500	1500-2000	2000-2500
0-200	12	6	-	-	-
200-400	2	18	4	2	1
400-600	-	4	7	3	-
600-800	-	1	-	2	1
800-1000	-	-	1	2	3

Now you are required to find:

i. Correlation coefficient. (12)

ii. Estimate the total sales of product when the advertising expenditure is Rs. 1200. (4)

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