QUESTION BANK (STATISTICAL TECHNIQUES)

Q.1. Compute first four moments of the data 3, 5, 7, 9 about the mean. Also, compute the first four moments about the point 4.

Q.2. In a certain distribution the first four moments about the point x=4 are -1.5, 17, -30 and 308, Calculate β_1 and β_2 and comment upon the skewness and kurtosis of the distribution.

Q.3. Find the moment generating function of the discrete distribution given by $f(x)= e^{-\lambda}\lambda^x/x!$. Also find the first and second moments about the mean.

Q.4. Find the least squares approximations of second degree for the discrete data

X	-2	-1	0	1	2
Y	15	1	1	3	19

Q.5. For two random variables, x and y with the same mean, the two regression equations are y = ax+ b and x = αx + β . Show that $\frac{b}{\beta} = \frac{1-a}{1-\alpha}$. Find also the common mean.

Q.6. Find the coefficient of correlation between x and y from the table of their values

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

Q.7. The following regression equations and variances are obtained from a correlation table: $20x - 9y - 107 = 0, 4x - 5y + 33 = 0$, variance of x=9. Find (i) the mean values x and y (ii) the standard deviation of y.

Q.8. Given the following data:

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

Compute the coefficient of linear multiple correlation of X_3 on X_1 and X_2.

Q.9. Fit an exponential curve obeying the gas equation PV^{γ}= k for the following data:

V	50	100	150	200
P	135	48	26	17

Q.10. Find the moment generating function of the normal distribution.

Q.11. Obtain the moment generating function of the random variable x having probability distribution:

$$F(x) = \begin{cases} x & for\ 0 < x < 1 \\ 2 - x & for\ 1 \le x \le 2 \\ 0 & for\ x \ge 2 \end{cases}$$

Q.12. Calculate the first four central moments about mean of the following data:

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	10	20	40	20	10

Q.13. Find the moment generating function of the exponential distribution $f(x) = \frac{1}{c}e^{-x/c}$, 0< x<∞, c>0.Also find its mean and standard deviation.

Q.14. By the method of least squares, fit the curve $y = ax+bx^2$ that best fits the following data:

X	1	2	3	4	5
Y	1.8	5.1	8.9	14.1	19.8

Q.15. Fit a parabolic curve of regression of y on x to the following data:

X	1	1.5	2	2.5	3	3.5	4
Y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

Q.16. Fit a relation y= ax $+\frac{b}{x}$ which satisfies the following data, using method of least squares:

X	1	2	3	4	5	6	7	8
Y	5.4	6.2	8.2	10.3	12.6	14.8	17.2	19.5

Q.17. The two regression equations of the variables x and y are x=19.13-0.87y and y= 11.64-0.50x. Find **(i)** mean of x & y **(ii)** correlation coefficient between x & y.

Q. 18. Define skewness and kurtosis. Explain their types and also their relation with Karl Pearson's $\beta$and γ coefficients.

Q. 19. Calculate first four moments about mean for the following frequency distributions and comment upon skewness and kurtosis:

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	5	10	40	20	25

Q. 20. In a frequency distribution the mean is 1.5, variance 0.64, is β_2 2.5 and γ_1 is 0.3. Find μ_1 and μ_2 and also the first four moments about origin.

Q. 21. The first four moments of a distribution about '0' are -0.20, 1.76, -2.36 and 10.88. Find the first four moments about mean.

Q. 22. Fit the curve y= $\frac{c_0}{x} + c_1\sqrt{x}$ to the following data:

X	0.1	0.2	0.4	0.5	1.0	2.0
Y	21	11	7	6	5	6

Q. 23. The marks secured by recruits in the selection test (X) and in the proficiency test (Y) are given below:

Serial no.:	1	2	3	4	5	6	7	8	9
X:	10	15	12	17	13	16	24	14	22
Y:	30	42	45	46	33	34	40	35	39

Calculate the rank correlation co-efficient.

Q. 24. Find an expression for the angle between two regression lines for two variables x and y. explain its significance when r = 0 and r = +-1.

Q25. The following results were obtained from records of age (x) and systolic blood pressure (y) of a group of 10 men:

	X	Y
Mean	53	142
Variance	130	165

And $\sum(x-\bar{x})(y-\bar{y})= 1220$

Find the appropriate regression equation and use it to estimate the blood pressure of a man whose age is 45.

Q.25. Fit a second-degree parabola to the following data by Least Square method:

X	1	2	3	4	5
Y	1090	1220	1390	1625	1915

Q.26. For 10 observations on price (x) and supply(y), the following data were obtained (in appropriate units):

$\sum x=130$, $\sum y= 220$, $\sum x^2= 2288$, $\sum y^2= 5506$ and $\sum xy=3467$

Obtain the two lines of regression and estimate the supply when the price is 16 units.

Q.27. Find the expressions for the regression coefficients in linear regression. Also find the relation between regression coefficients and coefficient of co-relation.

Q.28. Define Karl Pearson's coefficient of correlation. How would you interpret the sign and magnitude of correlation coefficient?