UNIT III: Statistics SPPU Questions

1) The first four moments of a distribution about 2 are 1, 2.5, 5.5 and 16. Calculate the first four moments about the mean, A. M., S. D., β_1 and β_2 [05]

2. Calculate the coefficient of correlation for the following data [05]

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

3. The first four moments about 44.5 of a distribution are –0.4, 2.99, –0.08 and 27.63. Calculate moments about mean, coefficients of Skewness and Kurtosis. [4]

4. (a) A random sample of 200 screws is drawn from a population which represents size of screws. If a sample is normally distributed with a mean 3.15 cm and S.D. 0.025 cm, find expected number of screws whose size falls between 3.12 cm and 3.2 cm. [4]

[Given : For $z = 1.2$, area = 0.3849; for $z = 2$, area = 0.4772]

(b) The first four monents of a distribution about the value 5 are 2, 20, 40 and 50. Obtain the first four central moments, mean, standard deviation and coefficient of skewness and kurtosis. [4]

5. (a) In an intelligence test administered to 1000 students the average score was 42 and standard deviation 24. Find the number of students with score lying between 30 and 54.

(Given : For $z = 0.5$, area = 0.1915). [4]

(b) The first four moments of a distribution about the value 4 are –1.5, 17, –30 and 108. Obtain the first four central moments, mean, standard deviation and coefficient of skewness and kurtosis. [4]

6. (a) The first four moments about the working mean 3.5 of a distribution are 0.0375, 0.4546, 0.0609 and 0.5074. Calculate the first four moments about the mean. Also calculate the coefficient of skewness. [4]

(b) The first four moments of a distribution about 30.2 are 0.255, 6.222, 30.211 and 400.25. Calculate the first four moments about the mean. Also calculate coefficient of skewness. [4]

7. (a) The first four moments of a distribution about 25 are –1.1, 89, –110 and 23300. Calculate the first four moments about the mean. [4]

(b) If the two lines of regression are $9x + y - \lambda = 0$ and $4x + y - \mu = 0$ and the means of x and y are 2 and –3 respectively, then find λ and μ and the coefficient of correlation between x and y. [4]

(c) A random sample of 500 screws is drawn from a population which represents the size of screws. If a sample is distributed normally with a mean 3.15 cm and standard deviation 0.025 cm, find expected number of screws whose size falls between 3.12 cm and 3.2 cm. (Given for z = 1.2, area = 0.3849, z = 2.0, area = 0.4772). [4]

8. A sample of 100 dry battery cells tested to find the length of life produced the following results; $\bar{X}$ = 12 hours, σ = 3 hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life between 10 and 14 hours ? [Given : For z = 0.67, area = 0.2487] [4]

9. Find the correlation coefficient for the following data : [4]

x	43	21	25	42	57	69
y	99	65	79	75	87	81

10. (*a*) The first four moments of a distribution about the value 4 of the variable are –1.5, 17, –30 and 108. Find the central moments, $_1$ and $_2$. [4]

(*b*) By the method of least squares, find the straight line that best fits the following data : [4]

x	***y***
1	14
2	27
3	40
4	55
5	68

(*c*) The lifetime of a certain component has a normal distribution with mean of 400 hours and standard deviation of 50 hours. Assuming a normal sample of 1000 components, determine approximately the number of components whose lifetime lies between 340 to 465 hours. Given : [4]

Z = 1.2 Area = 0.3849

Z = 1.3 Area = 0.4032.

11. (*a*) Calculate the coefficient of correlation for the following data : [4]

x	10	14	18	22	22	30
y	18	12	24	6	30	36

12. (*a*) Calculate the first four central moments from the following data and hence find β_1 and β_2 : [4]

x	0	1	2	3	4	5	6
f	5	15	17	25	19	14	5

(*b*) Fit a straight line to the following data by least square method : [4]

x	0	5	10	15	20	25
y	12	15	17	22	24	30

13. (*a*) The average test marks in a particular class is 79 and standard deviation is 5. If the marks are normally distributed, how many students in a class of 200, did not receive marks between 75 and 82. Given $z = 0.8$, Area = 0.2881 and $z = 0.6$, Area = 0.2257. [4]

(b) The two variables x and y have regression lines : [4]

$3x + 2y - 26 = 0$ and $6x + y - 31 = 0$

Find :

(*i*) the mean values of x and y and

(*ii*) correlation coefficient between x and y.

14. (a) The first four moments of a distribution about the value 5 are –4, 22, –117 and 560 respectively. Find the moments about the mean. Also calcualte β_1 and β_2. [4]

(b) Fit a straight line of the form y = ax + b to the following data by the least square method : [4]

x	0	6	8	10	14	16	18	20
y	3	12	15	18	24	27	30	33

(c) Obtain the line of regression of y on x for the following data. Also, estimate the value of y for x = 10. [4]

x	2	4	5	6	8	11
y	18	12	10	8	7	5

15. (a) The lifetime of an article has a normal distribution with mean 400 hours and standard deviation 50 hours. Assuming normal distribution, find the expected number of articles out of 2000 whose lifetime lies between 335 hours to 465 hours. (Given : Z = 1.3, A = 0.4032). [4]

(b) The first four moments of a distribution about the value 4 are –1.5, 17, –30 and 108. Obtain the first four central moments, $_1$ and $_2$. [4]

(c) Fit a straight line of the form Y = aX + b to the following data by least squares method : [4]

X	Y
–2	17
1	14
3	12
6	9
8	7
9	6

16. (a) The height of a student in a school follows a normal distribution with mean 190 cm and variance 80 cm^2. Among the 1,000 students from the school, how many are expected to have height above 200 cm ?

[Given : Z = 1.118, A = 0.3686] [4]

(b) For a bivariate data, the regression equation of Y on X is 4x + y = and the regression equation of X on Y is 9x + y = . Find the values of and . Also, find the correlation coefficient between X and Y, if the means of X and Y are 2 and –3 respectively. [4]

17. (a) The first four moments of a distribution about the value 5 are 2, 20, 40 and 50. Obtain the first four central moments, μ_1 and μ_2. [4]

(b) Fit a straight line of the form $Y = aX + b$ to the following data by the least square method : [4]

X	1	3	4	5	6	8
Y	–3	1	3	5	7	11

18. (a) In a sample of 1,000 cases, the mean of a certain examination is 14 and standard deviation is 2.5. Assuming the distribution to be normal. Find the number of students scoring between 12 and 15. [4]

[Given : Z = 0.4, A = 0.1554, Z = 0.8, A = 0.2881]

(b) For a bivariate data, the regression equation of Y on X is $8x - 10y = -66$ and the regression equation of X on Y is $40x - 18y = 214$. Find the mean values of X and Y. Also, find the correlation coefficient between X and Y. [4]

19. (a) The first three moments of a distribution about the value 2 are 1, 16 and –40. Find the first three central moments, standard deviation and μ_1. [4]

(b) Fit a straight line of the form $X = aY + b$ to the following data by the least square method : [4]

X	Y
2	2
5	3
8	4
11	5
17	7
20	8

(c) Find the regression equation of Y on X for a bivariate data with the following details. $n = 25,\ \sum_{i=1}^{n} x_i = 75,\ \sum_{i=1}^{n} y_i = 100$

$\sum_{i=1}^{n} x_i^2 = 250,\ \sum_{i=1}^{n} y_i^2 = 500,\ \sum_{i=1}^{n} x_i y_i = 325.$ [4]

20). Runs scored in 10 IPL matches by two batsmen A & B are as :

A	46	34	52	78	65	81	26	46	19	47
B	59	25	81	47	73	78	42	35	42	10

Who is better batsman & who is more consistent.

21). Fluctuations in the Aggregate of marks obtained by two groups of students are given below. Find out of which shows greater variability.

Group A	50	52	53	59	54	64	51	50
Group B	82	83	83	81	84	81	89	86

22). Calculate the first four moments of the following distribution about the mean β_1, β_2.

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

23). Calculate the first four moments of distribution about 5 are 2,20,40, and 50. Calculate first four central moments , mean, standard deviation, β_1, β_2.

24). The first four moments of a distribution about 2 are 1, 2.5, 5.5 and 1.6. Calculate first four moments about mean. Also find β_1 , β_2 and $\bar{x}$, σ

25). Compute the correlation coefficient between supply and price using following data.

Supply (x)	14	20	22	16	12	15	13
Price (y)	16	21	26	21	15	16	14

26). Compute the regression lines for the following data

x	10	14	19	26	30
y	12	16	18	26	29

And estimate a) y for x=14.5 b) x for y=29.5

27). Compute the regression lines for the following data

x	6	2	10	4	8
y	9	11	5	8	7

And estimate *a* , *y for x*=5

28). The regression equations are $8x - 10y + 66 = 0$ *and* $40x - 18y = 214$. The value of variance of x is 9. Find : A) The mean value of x and y B) The correlation coefficient C) The standard deviation of y

29). The two regression equations of the variables x and y are **x = 19.13-0.87y , y = 11.64-0.50x**
Find (i) $\bar{x}, \bar{y}$ (ii) The correlation coefficient between x and y.

30). If P is the pull required to fit a load W by means of a pulley block, Find a linear law of the form P = mW+c connecting P and W, Using following data:

P	12	15	21	25
W	50	70	100	120

Where P and W are taken in kg-wt . compute P when W=150 kg-wt.