

- Note:- 1) All questions are compulsory.
 2) Figures to the right indicate maximum marks.

Q.1. Attempt any three of the following:

(15M)

a) Prove that if \bar{X} is the mean of n observations $X_1, X_2, X_3, \dots, X_n$, then the mean of $X_1 * a, X_2 * a, X_3 * a, \dots, X_n * a$ is $\bar{X} * a$.

where a is any number different than zero. (CO- 1 E)

b) The mean of 100 items was found to be 30. if at the time of calculation two items were wrongly taken as 32 and 12 instead of 23 and 11. Find the correct mean. (CO- 1 A)

c) Find the mode. (CO- 1 A)

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|-----------|-----|-----|------|-------|
| Group | 0-4 | 4-8 | 8-12 | 12-16 |
| Frequency | 10 | 20 | 30 | 30 |

d) Find S.D. of 120, 60, 80, 20, 100, 40, 140. (CO- 1A)

e) State and explain quartiles with example. (CO- 1 R)

f) Write a short note on R- variables. (CO- 1 R)

Q.2. Attempt any three of the following:

(15M)

a) Write a short note on Kurtosis. (CO- 1 A)

b) Compute S_k for the following observations 2, 3, 5, 7, 4, 8, 1. (CO- 1 A)

c) Define probability distribution and determine which of the following can be probability distributions of random variable x. (CO- 2 A)

(i)

| | | | |
|------|-----|-----|-----|
| X | 0 | 1 | 2 |
| P(x) | 0.4 | 0.4 | 0.2 |

(ii)

| | | | |
|------|-----|-----|-----|
| X | 0 | 1 | 2 |
| P(x) | 0.6 | 0.1 | 0.2 |

d) If a pair of dice is thrown and x denotes the sum of numbers on them. Find the probability of distribution of x. Also, find the exception of x. (CO- 2 A)

e) A population consist of the fine numbers 3, 4, 7, 9 and 12 consider all possible samples of size 2 that can be drawn with replacement from this population. (CO- 2 A)

Find: (i) mean of population

(ii) standard deviation of population

(iii) the mean of sampling distribution of mean.

f) Write a short note on standard errors.(CO-1 R)

Q.3. Attempt any three of the following:**(15M)**

- a) What is point estimate? Explain interval estimation. (CO- 1 R)
- b) A survey of 40 retired women revealed the mean age at which their income was maximum to be with 45 years S.D. of 6.3 years. Find 95% confidence limit for the mean age of maximum earnings of women who survive till they retire. (CO- 1 A)
- c) What is statistical hypothesis test? Explain in detail. (CO- 1 R)
- d) Explain one tailed & two tailed test. (CO- 2 R)
- e) The mean lifetime of a sample of 100 fluorescent light bulbs produce by a company is found to be 1570 hours with a standard deviation 120 hours test the hypothesis that the mean of lifetime bulbs produced by the company is 1600 hours the alternative hypothesis that it is less than 1 at 5% level of significance. (CO- 2 A)
- f) How do you find confidence interval? (CO- 1 R)

Q.4. Attempt any three of the following:**(15M)**

- a) The number of accidents on a holiday Sunday in a certain town has poisson distribution $m=2$. The number of such accidents occurring on different holiday are independent.

What can you say about the distribution of mean number of such accidents resulting in a town on 4- holiday Sunday of year? (CO- 1 A)

- b) State and explain properties of Chi-Square. (CO- 2 R)
- c) If x is a Chi-Square variant with S.D.4. Find the mean, median and mode of x . (CO- 1 A)
- d) Four identical coins are tossed 100 times and the following results are obtained. (CO- 2 A)

| | | | | | |
|-----------------|---|----|----|----|---|
| No. of tails(x) | 0 | 1 | 2 | 3 | 4 |
| Frequency | 8 | 29 | 40 | 19 | 4 |

- e) Fit a position distribution to the following data and test the goodness of fit. (CO- 2 A)

| | | | | | | |
|----|----|----|----|----|---|---|
| X: | 0 | 1 | 2 | 3 | 4 | 5 |
| F: | 20 | 34 | 27 | 15 | 3 | 1 |

- f) If x is Chi-Square variate with 17 degree freedom. Find x_0 , x_1 , and α , β .

- (i) $p(x > x_0) = 0.01$; $p(x \leq x_1) = 0.95$; and $(x \leq 8.67) = \alpha$. (CO- 2 A)

Q.5. Attempt any three of the following:**(15M)**

- a) Explain the method of least square. (CO- 2 R)

- b) Fit a least squares line to the data.

| | | | | | | | | |
|---|---|---|---|---|---|----|----|----|
| x | 1 | 3 | 4 | 6 | 8 | 9 | 11 | 14 |
| y | 2 | 4 | 5 | 6 | 7 | 10 | 9 | 12 |

- c) Prove that a least squares line always passes through the pont. (\bar{X}, \bar{Y}) . (CO- 2 E)

- d) Write a short note on linear correlation. (CO- 2 A)

- e) Draw the line or scatter diagram for the data & state of correlation between the variables. (CO- 1 A)

(i)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| x | 3 | 4 | 5 | 8 | 7 | 9 | 6 | 2 | 1 |
| y | 6 | 3 | 4 | 7 | 9 | 8 | 6 | 1 | 2 |

(ii)

| | | | | | | | | |
|---|----|----|----|----|----|----|----|----|
| x | 4 | 8 | 7 | 6 | 1 | 3 | 5 | 2 |
| y | 30 | 10 | 20 | 60 | 80 | 40 | 25 | 70 |

- (iii)

| | | | | | | |
|---|----|----|----|----|----|----|
| x | 10 | 20 | 30 | 40 | 50 | 60 |
| y | 50 | 10 | 35 | 20 | 40 | 55 |

- f) Prove that $\sum(y - \bar{y})^2 = \sum(y - \text{test})^2 + \sum(\text{test} - \bar{y})^2$. (CO- 1 E)