

SUBJECTIVE

Note: Section I is compulsory. Attempt any Three (3) questions from Section II.

SECTION I

2. Write short answers to any EIGHT (8) questions:

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(2 x 8 = 16)

- i- In a normal distribution, mean is 25 and standard deviation is 5, find mean deviation.
- ii- Write down the equation of standard normal distribution.
- iii- In a normal distribution, first and third quartiles are 65 and 75 respectively, find mean of this normal distribution.
- iv- What is the relation between mean, median and mode of a normal distribution?
- v- Why β_1 is zero in a normal distribution?
- vi- What is meant by statistical inference?
- vii- It is found that 6 children from a sample of 50 children from a large school are left handed. Obtain an unbiased estimate of proportion of left handed children in the school.
- viii- Define composite hypothesis.
- ix- Formulate the null and alternative hypothesis for the following statement.
"No more than 30% of the people pay Zakat"
- x- What is meant by critical region?
- xi- Define computer.
- xii- What is computer hardware?

3. Write short answers to any EIGHT (8) questions:

(2 x 8 = 16)

- i- Define population.
- ii- Differentiate between parameter and statistic.
- iii- Write a note on sampling.
- iv- In a population $\mu = 50$ and $\sigma^2 = 250$, find the mean and variance for the distribution of $\bar{X}$ if $n = 25$.
- v- If $N = 50$, $n = 10$, $\sigma = 4$, find $\sigma_{\bar{x}}$ if sampling is done with replacement.
- vi- Define sampling unit.
- vii- Define simple linear regression co-efficient.
- viii- What is meant by scatter diagram?
- ix- In regression y on x , if $a = 130$, $b = 3.956$ then what is the estimate of y for $x = 12$
- x- Describe perfect positive correlation.
- xi- Find correlation co-efficient from the following equations: $\hat{y} = 3 - 0.38x$, $\hat{x} = 1.5 - 0.27y$
- xii- Write any two formulas of correlation co-efficient.

4. Write short answers to any SIX (6) questions:

(2 x 6 = 12)

- i- What is coefficient of association?
- ii- Define a contingency table.
- iii- Discuss positive association.
- iv- Given $n = 150$, $(A) = 30$, $(B) = 60$, find (AB) .
- v- Write down methods of measuring secular trend.
- vi- Discuss irregular movement with example.
- vii- Give two examples of seasonal variation in a time series.
- viii- What is decomposition of a time series?
- ix- A straight line is fitted to a time series $\hat{y} = 2 + 1.7x$, to the years 1990 to 1992 taking 1990 as origin, find the trend values.

(Turn over)

SECTION II

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- 5- (a) The heights of boys follow a normal distribution with mean 150.3 cm and standard deviation 5 cm. Find probability that a boy picked up at random from this age group has height
(i) less than 158 cm (ii) more than 145 cm 4
- (b) In a normal distribution $\mu = 30$ and $\sigma = 5$, find two points containing middle 95% of area. 4
- 6- (a) A population consists of four values 0, 3, 6, 9. Take all possible samples of size 3 without replacement. Form the sampling distribution of $\bar{X}$ and verify that 4
- (i) $\mu_{\bar{X}} = \mu$ (ii) $\sigma_{\bar{X}}^2 = \frac{\sigma^2}{n} \cdot \frac{N-n}{N-1}$
- (b) Let P_1 represents the proportion of odd numbers in a random sample of size $n_1 = 2$ with replacement from population 4 and 5. Similarly P_2 represents the proportion of odd numbers in a random sample of size $n_2 = 2$ with replacement from another population 2 and 3. Form sampling distribution of $P_1 - P_2$ and verify that $\mu_{P_1 - P_2} = \pi_1 - \pi_2$ 4
- 7- (a) Find a 95% confidence interval for population proportion. If 24 heads are obtained in 40 tosses of a coin. 4
- (b) A random sample of 64 has an average of 21.9 with a standard deviation of 1.42. Test the hypothesis that $\mu = 22.5$ against the alternative hypothesis $\mu < 22.5$ at 5% level of significance. 4
- 8- (a) For 9 observations on Supply (X) and Price (Y) the following data was obtained: 4
- $$\sum (x-90) = -25, \quad \sum (x-90)^2 = 301$$
- $$\sum (y-127) = 12, \quad \sum (y-127)^2 = 1006$$
- $$\sum (x-90)(y-127) = -469$$
- Obtain the estimated line of regression of X on Y and estimate the supply when price is Rs.125
- (b) Calculate the coefficient of correlation from the following data: 4
- | | | | | | | |
|---|----|----|----|----|----|----|
| X | 3 | 4 | 5 | 6 | 7 | 8 |
| Y | 25 | 24 | 20 | 20 | 19 | 17 |
- 9- (a) Find coefficient of association from the following table: 4
- | Height of Son | Height of Father | |
|---------------|------------------|-------|
| | Tall | Short |
| Tall | 500 | 100 |
| Short | 100 | 400 |
- (b) Fit a straight line $\hat{y} = a + bx$ for the years (2005—2015) both inclusive. Find out trend values of y 4
- $$\sum X = 0 \quad \sum Y = 438.9 \quad \sum X^2 = 110 \quad \sum XY = -84.4$$