TDP (Honours) 1st Semester Exam., 2017

STATISTICS

(Honours)

FIRST PAPER (CC-1)

Full Marks : 60 Time : 3 Hours

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Section - A

1. Answer any *six* questions : 2×6=12

(a) Define the term 'Statistics' and discuss some of its limitations.

(b) Distinguish between absolute and relative measure of dispersion.

(c) Determine the correlation coefficient (r) between x and y, when $2x+3y=7$.

(d) What is the probability that a leap year, selected at random will contain 53 Tuesdays ?

[Turn Over]

(e) What is meant by classification ?

(f) What are the demerits of arithmetic mean ?

(g) At what point, the two lines of regression intersect ?

(h) 'A' and 'B' are mutually exclusive events with $P(A)=\frac{1}{2}$ and $P(B)=\frac{1}{3}$; What will be the value of $P(A\cap B)$?

Section - B

(There are four questions from Question No. 2 to Question No. 5. Answer either (a) or (b) of each question.)

Answer the following questions. 12×4=48

2. (a) (i) What is an ogive ? How would you draw an ogive ?

(ii) Name the methods used for collection of primary data with examples. 5+7=12

Or

(b) (i) Mention important merits and limitations of textual presentation of data.

(ii) 1652 men and 1226 women participated in a poll on the opinion about a certain measures. 1006 persons of whom 796 were male, voted against the measure. In all 1425 persons voted for the measure 256 women were indifferent."— Tabulate these data in a suitable tabular form and find the percentage of men were for the measure.

5+7=12

3. (a) (i) What do you mean by central tendency of a frequency distribution? What are its measures?

(ii) In a frequency table, the upper boundary of each class-interval has a constant ratio to the lower boundary. Show that the geometric mean (G) may be expressed as

$$\log G = A + \frac{K}{N} \sum_{i=1}^{r} fi(i-1)$$

where $N = \sum_{i=1}^{r} fi,$

'A' is the logarithm of the class-mark of the first interval,

[Turn Over]

'K' is the logarithm of the ratio between the upper and lower boundaries,

'r' is the total number of classes,

'fi' is the frequency of ith class. 5+7=12

Or

(b) (i) Given a set of n values $x_1, x_2, \ldots x_n$ show that $\sum_{i=1}^{n}(x_i - A)^2$ becomes smallest when 'A' equals the mean of $x_1, x_2, \ldots, x_n$.

(ii) What are the Shepherd's correction for moments ?

(iii) Suppose 's' and 'R' be respectively the standard deviation and Range of a set of 'n' values of a variable 'x'. Then show that,

$$R^2/2n \le s^2 \le R^2/4$$

4+2+6=12

4. (a) (i) Define product-moment correlation coefficient and show that it lies between −1 and +1.

(ii) Prove that correlation coefficient is independent of change of origin and numerically it is also independent of change of scale. 7+5=12

Or

(b) (i) Explain what are regression lines. Why are there two such lines ? Also derive any one of the equations.

(ii) Find the angle between two regression lines.

(2+2+3)+5=12

5. (a) (i) Give the classical definition of probability. What are its limitations ?

(ii) For any two events 'A' and 'B', show that

$$P(A \cap B) \le P(A) \le P(A \cup B) \le P(A) + P(B)$$

(iii) Suppose the events $A_1, A_2, \ldots\ldots A_n$ are independent and $P(A_i) = \frac{1}{i+1}$ for $i = 1, 2, \ldots n.$

Show that $P(A_1 \cup A_2 \cup \ldots \cup A_n) = \frac{n}{n+1}.$

4+4+4=12

[Turn Over]

Or

(b) (i) State and prove Bayes' theorem.

(ii) Two points are taken at random on the given straight line of length 'a'. Prove that the probability of their distance exceeding a given length $c(<a)$ is equal to $\left(1-\frac{c}{a}\right)^2$.

6+6=12
