2024/FYUG/ODD/SEM/
STADSC–101T/144

FYUG Odd Semester Exam., 2024

STATISTICS

(1st Semester)

Course No. : STADSC–101T

(Descriptive Statistics and Probability)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *two* from the following : 2×2=4

(a) Define time-series data with an example.

(b) Briefly explain the limitations of statistics.

(c) Write the sources of secondary data.

2. Answer *either (a) or (b)* : 10

(a) *(i)* Discuss the major sources of collecting primary data. 6

(ii) Write a short note on drafting a questionnaire. 4

(b) Define the terms 'frequency', 'mid-value of the class-interval', 'width of the class-interval', 'inclusive class-interval' and 'exclusive class-interval' with an example. 2+2+2+2+2=10

UNIT—II

3. Answer any *two* from the following : 2×2=4

(a) Define geometric mean.

(b) Name two measures of location.

(c) What do you mean by measures of central tendency?

4. Answer *either (a) or (b)* : 10

(a) (i) Explain the graphic method of locating the values of median, quartiles and mode. 2+2+2=6

(ii) If $\bar{x}_i (i = 1, 2, ..., k)$ are the means of k component series of sizes $n_i, (i = 1, 2, ..., k)$ respectively, then prove that the mean $\bar{x}$ of the composite series is given by

$$\bar{x} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2 + \cdots + n_k\bar{x}_k}{n_1 + n_2 + \cdots + n_k}$$ 4

(b) (i) Define raw moments and central moments of a frequency distribution. Obtain the effect of change of origin and scale on moments. 2+4=6

(ii) Establish the relationship between the moments about mean. 4

UNIT—III

5. Answer any *two* from the following : 2×2=4

(a) What do you mean by association of attributes? When are two attributes said to be positively or negatively associated?

(b) Examine the consistency of the following data :

$N = 500$, $(A) = 410$, $(B) = 380$, $(AB) = 270$

(c) What is the necessary and sufficient condition for the consistency of data? Also define the coefficient of association.

6. Answer *either (a) or (b)* : 10

(a) (i) Describe the fitting of a second-degree polynomial. 5

(ii) Describe the fitting of the exponential curve of the form $Y = ae^{bX}$. 5

(b) (i) Given the following ultimate class frequencies, find the frequencies of positive class : 5

$(ABC) = 149$, $(AB\gamma) = 738$, $(A\beta C) = 225$, $(A\beta\gamma) = 1196$, $(\alpha BC) = 204$, $(\alpha B\gamma) = 171$, $(\alpha\beta C) = 171$ and $(\alpha\beta\gamma) = 21842$

(ii) 800 candidates of both sexes appeared at an examination. The boys outnumbered the girls by 15% of the total. The number of candidates who passed exceed the number failed by 480. Equal number of boys and girls failed in the examination. Prepare a 2×2 table and find the coefficient of association. Comment. 5

UNIT—IV

7. Answer any *two* from the following : 2×2=4

(a) Define Spearman's rank correlation coefficient.

(b) Define the line of regression of X on Y. What is the relationship between correlation coefficient and regression coefficient?

(c) Define intra-class correlation coefficient.

8. Answer *either (a) or (b)* : 10

(a) (i) Define correlation coefficient. What purpose is being served by correlation coefficient? 2+4=6

(ii) Define coefficient of determination and correlation ratio. 4

(b) State and prove the properties of regression coefficients. 2½+2½+2½+2½=10

UNIT—V

9. Answer any *two* from the following : 2×2=4

(a) Define random experiment with an example.

(b) Define sample point and sample space.

(c) Write the statistical definition of probability.

10. Answer *either (a) or (b)* : 10

(a) (i) Explain the limitations of classical and statistical definition. 2+2=4

(ii) Let A, B and C are three arbitrary events. Find expression for the events in the context of A, B and C—only A occurs; both A and B, but not C occurs; all three events occur; at least one occurs; at least two occur; one and no more occurs. 6

(b) (i) A, B and C are mutually exclusive and exhaustive events associated with a random experiment. Find $P(A)$ given that

$$P(B) = \frac{3}{2} P(A) \text{ and } P(C) = \frac{1}{2} P(B).$$ 3

(ii) Define pairwise and mutually independent events. 2

(iii) The contents of urns *I*, *II* and *III* are as follows :

1 white, 2 black and 3 red balls

2 white, 1 black and 1 red balls

4 white, 5 black and 3 red balls

One urn is chosen at random and two balls drawn from it. They happen to be white and red. What is the probability that they come from urns *I*, *II* or *III*? 5

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