PG Odd Semester (CBCS) Exam., December—2018

ECONOMICS

(1st Semester)

Course No. : ECOCC–104

(Statistics for Economists)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Show that two independent variables are uncorrelated. Is the converse of the theorem always true? Verify with a suitable illustration. 2+3=5

(b) Distinguish between partial correlation coefficient and multiple correlation coefficient. Establish the relationship among simple correlation coefficient, partial correlation coefficient and multiple correlation coefficient. 2+5=7

(c) Find the arithmetic mean of regression coefficients provided there is a case of positive and perfect correlation between the variables. 2

2. *(a)* Define rank correlation. Add a note on its significance in statistics. 2+3=5

(b) Distinguish between Pearsonian correlation coefficient and Spearman's rank correlation coefficient. 5

(c) If the value of rank correlation coefficient for 10 paired observations is 0·5, then find the value of the sum of the square of the difference between two series of ranks. 2

(d) How would you calculate rank correlation coefficient in case of tied rank? 2

UNIT—II

3. *(a)* State and prove compound theorem of probability. 4

(b) An unbiased coin is tossed three times. Construct the relevant sample space and hence find the expectation and variance of the number of heads. 2+4=6

(c) Derive the moment-generating function of binomial distribution. 4

4. (a) State and prove Baye's theorem of probability. 4

(b) Show that $V(X \quad Y) \quad V(X) \quad V(Y)$, if X and Y are two independent random variables. 4

(c) State the properties of normal distribution. 4

(d) The distribution function of a random variable X is given as

$$F(X) \quad e^{\ x} \quad e^{x}$$

Find the probability density function of X. 2

UNIT—III

5. (a) Define the following terms : 2×4=8

(i) Statistic

(ii) Sampling distribution of a statistic

(iii) Standard error

(iv) Unbiased estimator

(b) Distinguish between multistage sampling and multiphase sampling with the help of suitable examples. 4

(c) Show that for large samples, sample variance is the unbiased estimator of population variance. 2

6. (a) Write short notes on the following : 3×2=6

(i) Parameter vs. Statistic

(ii) SRSWR vs. SRSWOR

(b) A population consists of four units, viz., 2, 4, 6 and 8. Draw all possible simple random samples of size 2 in case of SRSWOR and calculate their sample means. Verify whether sample mean is an unbiased estimator of population mean or not. 3+3=6

(c) Define efficient estimator. 2

UNIT—IV

7. (a) Define the following terms : 2×4=8

(i) Level of significance

(ii) Power of a test

(iii) Degrees of freedom

(iv) Critical region

(b) State the assumptions underlying t-test. 2

(c) The mean years of schooling for a sample of 100 individuals in a region say, *A* is 10·3 and the mean years of schooling for a sample of 90 individuals in another region, say *B* is 10·1. By using a suitable statistical test, examine whether the mean years of schooling in regions *A* and *B* are significantly different from each other. Apply 5% level of significance. It is also given that both the regions belong to the same state with a common variance of 36 in the years of schooling. 4

8. *(a)* Discuss the applications of ^{2}-test. 4

(b) Write a short note on paired *t*-test. 4

(c) Distinguish between one-tail test and two-tail test. 2

(d) A researcher has calculated the value of Pearson's correlation coefficient (*r*) between earnings and educational level as 0·64. The total number of observations are 20. Test the statistical significance of *r* at 1% level of significance. 4

UNIT—V

9. *(a)* Distinguish between parametric tests and non-parametric tests. 4

(b) Explain Spearman's rank correlation test. 10

10. *(a)* Define ANOVA. State the assumptions underlying ANOVA. State the advantage of ANOVA over *t*-test. 2+3+2=7

(b) Explain sign test for a single population median. 7

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