PG Odd Semester (CBCS) Exam., December—2017

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 Karl Pearson's correlation coefficient is independent of change of origin and of scale. 6

(b) The simple correlation coefficients between temperature (X_1), corn yield (X_2) and rainfall (X_3) are r_{12} 0 52, r_{13} 0 46 and r_{23} 0 77. Calculate the partial correlation coefficients $r_{12\,3}$, $r_{23\,1}$, $r_{31\,2}$ and the multiple correlation coefficient $R_{1\,23}$. 8

2. *(a)* Obtain the least square estimators of a two-variable linear regression model. 8

(b) A selection board consisting of two experts for the post of general manager in a company interviewed 10 candidates whom they assigned the following ranks. Calculate the rank correlation coefficient between these ranks and interpret the result : 6

Ranks by first expert	*Ranks by second expert*
7	8
9	10
2	4
4	6
5	4
5	4
8	7
10	9
3	1
1	2

UNIT—II

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

(b) Define mathematical expectation. Show that $E(X)$ $\overline{X}$. 2+2=4

(c) Outline the properties of binomial distribution. 4

(d) If $X \sim N(10, 25)$, then find the points of inflexion of the normal curve. 2

4. *(a)* State the axiomatic definition of probability. 3

(b) Derive the moment generating function of Poisson distribution. 3

(c) A continuous random variable X has the following probability density function :

$$f(x) \quad cx^2(1 \quad x), \quad 0 \quad x \quad 1$$

Find *(i)* the value of constant C and *(ii)* mean. 2+2=4

(d) If X and Y are two independent random variables with means 10 and 20 and variances 2 and 3 respectively, then find—

(i) $V(2 \quad 3X)$;

(ii) $V(3X \quad 4Y)$. 2+2=4

UNIT—III

5. *(a)* Discuss the significance of stratified random sampling in economics research. 4

(b) Show that sample mean is an unbiased estimator of population mean in case of simple random sampling. 4

(c) A population consists of five units viz., 2, 4, 6, 8 and 10. Draw all possible simple random samples of size 3 in case of SRSWOR and calculate their sample means. Also find the variance of the estimate of the population mean. 3+3=6

6. *(a)* Discuss Yamane's method of determining sample size when the universe is known. 4

(b) Write short notes on the following : 3+3=6

(i) SRSWR vs. SRSWOR

(ii) Point estimation vs. Interval estimation

(c) Define standard error. Add a note on the utility of standard error in statistics. 2+2=4

UNIT—IV

7. *(a)* Define the following terms : 1½×4=6

(i) Null hypothesis

(ii) Alternative hypothesis

(iii) Level of significance

(iv) Power of a test

(b) Let X and Y denote the marks of 10 students in a mathematics examination before and after taking private tuition respectively which are shown in the following table. Test the hypothesis that private tuition is effective in raising the marks of the students by using the appropriate statistical test at 5% level of significance : 8

X	84	48	36	37	54	69	83	96	90	65
Y	90	58	56	49	62	81	84	86	84	75

8. *(a)* Discuss the applications of F-test. 5

(b) Distinguish between Type I error and Type II error. Discuss the significance of degrees of freedom in hypothesis testing. 2+2=4

(c) A sample of 64 farm labourers engaged in paddy harvesting shows an average monthly wage rate of ₹ 200 with a standard deviation of ₹ 9. Using 5% level of significance, test whether the sample result indicates that their current average monthly wage rate is higher than ₹ 198. 5

UNIT—V

9. *(a)* Discuss the advantages of non-parametric tests over parametric tests. 4

(b) Discuss sign test for a single-population median and for the difference between two sample medians. 5+5=10

10. *(a)* Explain ^{2}-test of goodness of fit. 5

(b) State the conditions for the validity of ^{2}-test of goodness of fit. 4

(c) The following data shows the distribution of digits in numbers chosen at random from a telephone directory. Test whether the digits may be taken to occur equally frequently in the directory. Use 5% level of significance : 5

Digits	*Frequency*
0	1026
1	1107
2	997
3	966
4	1075
5	933
6	1107
7	972
8	964
9	853
Total =	10000

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