b. What do you mean by standard error of a statistic? What role does it play in the testing of hypothesis? 5

c. An examination was given to two classes consisting of 40 and 50 students. In the first class the mean grade was 74 with a standard deviation of 8 while in the second class the mean grade was 78 with a standard deviation of 7. Is there a significant difference between the performance of the two classes? Test at 5% level of significance. 5

8. a. What are exact sampling tests? Discuss their utility in the testing of hypothesis. 6

b. What do you mean by power of a test? How can it be minimized. 2

c. In a sample of 8 observations, the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in another sample of 10 observations it was 102.6. Test whether this difference is significant at 5%. 6

UNIT-V

9. What do you mean by Analysis of Variance (ANOVA)? Explain how you will use ANOVA to test the equality of several population means using one way classified data. 4+10=14

10. What do you understand by Non-Parametric tests. Describe appropriate non-parametric tests that you would use to test. 4+5+5=14

a. Randomness of a sample

b. Equality of means of two populations.

★★★

PG Even Semester Exam, May 2025

Economics

2nd Semester

COURSE NO. ECO-553

[Statistics for Economics]

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer five questions, taking one from each Unit

UNIT-I

1. a. Consider the following cost function

$C_i = \hat{\alpha}_0 + \hat{\alpha}_1 X_i + \hat{u}_i$

where C is cost, X is quantity of output and $\hat{u}_i$ is the stochastic error term. Obtain the estimators $\hat{\alpha}_0$ and $\hat{\alpha}_1$ using ordinary least squares (OLS) method. 10

b. What is Multiple correlation co-efficient? Derive the relation between multiple and partial correlation co-efficients in case of 3 variables. 1+3=14

2. a. Can the product of two regression coefficients be greater that unity? Explain. 2

b. Give:

$N = 100$, $\Sigma X_i = 5000$, $\Sigma Y_i = 10{,}000$, $\Sigma X_i^2 = 2{,}60{,}600$, $\Sigma Y_i^2 = 10{,}40{,}000$ and $\Sigma X_i Y_i = 5{,}16{,}000$.

Turn over

Assuming that the relation between X and Y is linear.

i. Obtain the regression equation of Y on X. 4

ii. Calculate the correlation coefficient between X & Y. 2

iii. Find the predicted value of Y when X= 60. 1

c. Prove that Spearman's rank correlation co-efficient is given by $1 - \frac{6\,\Sigma {d_i}^2}{n^3 - n}$

where, di denotes difference between ranks of i^{th} individual. 5

UNIT-II

3\. a. Derive the p.m.f of a Binomial distribution. 5

b. The probability of a bomb, hitting a target is $\frac{2}{5}$. Four direct hits are necessary to destroy a bridge completely. If 6 bombs are aimed at the bridge, what is the probability that the bridge will be destroyed? 3

c. State the relation between mean variance of a Binomial variety. 1

d. The life time in hours of a certain electrical equipment is normally distributed with mean 80 and standard deviation 16. Find the probability that the equipments lasts at least 1000 hours. 3

e. Write the area properties of normal distribution. 2

4\. a. A coin is tossed 3 times. If X is a random variable giving the number of heads that arise, construct a table showing the probability distribution of X. 3

b. Prove that in a normal distribution, mode and median are equal to the mean. 8

c. A continuous random variables X has the density function

$$f(x) = \begin{cases} ce^{-3x} & , \quad x > 0 \\ 0 & , \quad x \leq 0 \end{cases}$$

Find the value of c. Hence find the distribution function of X. 3

UNIT-III

5\. a. Distinguish between point estimation and internal estimation. 3

b. The mean random sample of size n drawn from an infinitely large normal population with variance σ^2 is $\bar{x}$. Find 95% confidence interval for the population mean μ 3

c. A population consists of 5 numbers, 3+1+4=8

2, 3, 6, 8, 11

Consider all possible samples of size 2 which can be drama without replacement from this population when samples are unordered. Find mean of the population and sow that sample mean is an unbiased estimator of the population mean.

6\. a. What do you mean by Margin of Error in the context of sampling theory? What factors influence the size of the Margin of Error? 3+3=6

b. A researcher wishes to deep the margin of error in a survey at 5%. If the population consists of 2000 members , what would be the optimal sample size? 2

c. Distinguish between probabilistic and non-probabilistic sampling. Discuss the different ways of selecting a probabilistic sample. 6

UNIT-IV

7\. a. What do you mean by a statistical hypothesis? Explain the different types of statistical hypothesis. 4