*End Term Examination 2016*
*Course Title: Statistical Methods*
*Course Code: PGECO1C003T*

*Time Duration: 3 Hours* *Maximum Marks: 100*

## Section A (Multiple Choice Questions)

**Note: Answer all the questions. Each question carries 1.5 marks.** **1.5*10=15**

(1) Which of the following are true for all sets of data?

(a) A.M ≤ Median ≤ Mode (b) A.M ≥ Median ≥ Mode

(c) A.M = Median = Mode (d) None of these

(2) 10 is the mean of a set of 7 observations and 5 is the mean of a set of 3 observations. The mean of a combined set is given by

**(a)** 7.5 (b) 10

**(c)** 8.5 (d) None of these

(3) The coefficient of correlation is independent of

*(a) Change of scale only* (b) Change of origin only

*(c) Both change of scale and origin* (d) Neither change of scale and origin

(4) When r is zero the regression cut each other making an angle of

**(a)** $30^0$ (b) $60^0$

**(c)** $90^0$ (d) None of these

(5) In the simultaneous tossing of two perfect coins, the probability of obtaining at least one head is

**(a)** 0.5 (b) 0.25

*(c) 0.75* (d) None of these

*(6) If two event A and B are dependent, the conditional probability of A given B, i. e., P(A/B) is calculated as:*

*(a) P(AB) / P(B)* (b) P(B) / P(AB)

*(c) P(AB) / P(A)* (d) P(A) / P(B)

(7) When observed and expected frequencies completely coincide, chi-square value will be

**(a)** One

**(b)** Greater than one

**(c)** Less than one

**(d)** Zero

(8) If the mean and variance of Binomial distribution are 8 and 4 respectively then the number trails N is

**(a)** 12

**(b)** 16

*(c) 4*

*(d) None of these*

*(9) If a test reject the null hypothesis when it is true, we call it*

**(a)** Type I error

**(b)** Type II error

**(c)** Either (a) or (b)

**(d)** None of these

(10) Which of the following index satisfied both Time reversal and factor reversal test

**(a)** Laspeyre's Price Index

**(b)** Paasche's Price Index

**(c)** Fisher's Price Index

**(d)** Walsch's Price Index

## Section B (Short Answer type Questions)

**Note: Answer all the questions. Each question carries eight marks.** 8*5=40

### Unit-I

(1) The expenditure of 1000 families is given as under:

| Expenditure (Rs.) | 400-600 | 600-800 | 800-1000 | 1000-1200 | 1200-1400 |
|---|---|---|---|---|---|
| No. of families | 50 | ? | 500 | ? | 50 |

The median and mean for the distribution are both Rs.900. Calculate the missing frequencies.

**Or**

*State and prove the mathematical properties standard deviation.*

### Unit-II

*(2) The two regression lines involving two variables X and Y are Y=5.6+1.2X and X=12.5+0.6Y. Find the (i) mean of value X and Y, (ii) standard deviation of X and Y, (iii) Covariance of X and Y and (iv) their correlation coefficient.*

If the variables x and y are connected by the linear equation ax+by+c=0, then the correlation coefficient between x and y is (+1) if the signs of **a** and **b** are different and (-1) if the sign of **a** and **b** are alike.

## Unit-III

**(3)** A random variable X has the following probability distribution

| X: | -2 | -1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| p(x): | 0.1 | K | 0.2 | 2K | 0.3 | 3K |

*(a) Find the value of K*

*(b) Evaluate* P(X<2) and P(-2<X<2)

*(c)* Find the Cumulative Distribution Function (CDF) of X.

*(d)* Evaluate the mean of X.

**Or**

What is Bayes's Theorem? In a factory, the machines A, B and C manufacture respectively 30, 25 and 45 percent of the total product. Of their 3, 5 and 6 percent respectively are defective product. One product is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine A?

## Unit-IV

**(4)** Why is testing of hypothesis at all necessary? Describe the various steps involved in *testing hypothesis*. What is the role of standard error in testing of hypothesis?

**Or**

*Eight unbiased coins are tossed 256 times and the following results are obtained:*

| No. of heads | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| No. of Frequency | 2 | 6 | 30 | 52 | 67 | 56 | 32 | 10 | 1 |

Test whether the observed and expected frequencies are significantly different from each other. (Note: Tab Chi-square =15.5)

## Unit-V

**(5)** Discuss the various steps and problems involved in the construction of index numbers.

**Or**

*Explain the various methods of measurement of the trend component of time series. Which method is best and why?*

## Section C (Long Answer type Questions)

**Note: Attempt any three questions. Each question carries 15 marks.** 15*3=45

(1) (a) State chief sources of secondary data and point out the dangers involved in their use. What precautions are necessary before using such data? "A secondary source is not as reliable as a primary source" Justify the statement with your arguments.

(b) In the frequency distribution of 100 families given below, the number of families corresponding to expenditure groups 20-40 and 60-80 are missing from the table. However, the median is known to be 50. Find the missing frequencies.

| Expenditure: | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
|---|---|---|---|---|---|
| No. of families: | 14 | ? | 27 | ? | 15 |

(2) A researcher wished to know if proficiency in Mathematics and Statistics had any relationship with performance in Economics. He took a random sample of 7 students from a class of 20 students and recorded the marks secured in the three papers:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Economics: | 30 | 40 | 30 | 25 | 60 | 55 | 70 |
| Mathematics: | 30 | 50 | 25 | 30 | 60 | 70 | 80 |
| Statistics: | 50 | 60 | 40 | 45 | 70 | 50 | 90 |

Calculate the regression equation of marks in Economics on marks in Mathematics and marks in Statistics and estimate the probable marks in Economics of a student securing 65 and 50 marks respectively in Mathematics and Statistics.

(3) What are the conditions under which Poisson distribution are used? Give any two examples of Poisson distribution. Derive the probability function of Poisson distribution. Also calculate the mean and variance of Poisson distribution.

(4) (a) Discuss the concept of an estimator and its sampling distribution with a suitable example. State and explain the desirable properties of a good estimator.

(b) Explain the concepts (i) Confidence intervals (ii) Level of significance

(5) Calculate the seasonal index by using Link Relatives method for the following data relating to production in thousand tonnes of a firm:

| Year | I Quarter | II Quarter | III Quarter | IV Quarter |
|---|---|---|---|---|
| 2001 | 30 | 40 | 36 | 34 |
| 2002 | 34 | 52 | 50 | 44 |
| 2003 | 40 | 58 | 54 | 48 |
| 2004 | 54 | 76 | 68 | 62 |
| 2005 | 80 | 92 | 86 | 82 |