

2015
[July]
ECONOMICS
Techniques of Statistical Analysis

Full Marks: 75; Time: 3 hours

The figures in the margin indicate full marks for the questions
Answer **five** questions, selecting at least **one** from each Credit

CREDIT – I

1. (a) Examine critically the different schools of thought on probability 8
 (b) Derive the formulae of variance under the binomial probability distribution. 4
 (c) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband getting selected is $\frac{1}{7}$ whereas that of wife is $\frac{1}{5}$. What is the probability that (i) both of them will be selected; (ii) only one of them will be selected, and (iii) none of them will be selected? 3
2. (a) Write an explanatory note on Poisson distribution. 7
 (b) A card is drawn from a well shuffled deck of playing cards. Find the probability of drawing a card which is neither a heart nor a king. 2
 (c) A University has to select an invigilator from a list of 50 persons, 20 of them are women and 30 men, 10 of them speaking Khasi and 40 other languages, 15 of them being teachers and the remaining 35 are non-teaching staff. What is the probability of selecting a Khasi-speaking woman teacher? 3
 (d) Is there any inconsistency in the statement that the mean of a binomial distribution is 20 and its standard deviation is 4? If no inconsistency is found, what shall be the values of p, q and n? 3

CREDIT – II

3. (a) Use normal equations to estimate the increase in sales revenue expected from 15 per cent increase in advertisement expenditure: 10

Percentage increase in advt. expenditure:	1	3	4	6	8	9	11	14
Percentage increase in revenue:	1	2	2	4	6	8	8	9

3. (b) Derive the formula of rank correlation coefficient. 5
4. (a) Obtain the rank correlation coefficient between the variables X and Y from the following pairs of observed values: 10

X	50	55	65	50	55	60	50	65	70	75
Y	110	110	115	125	140	115	130	120	115	160

- (b) Write a note on Coefficient of Determination. 5

CREDIT – III

5. (a) Explain different components of a time series data. 7
- (b) Assume a four-yearly cycle and estimate the trend by the method of moving average from the following data relating to the production of tea in India: 8

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Production	464	515	518	467	502	540	557	571	586	612

6. Calculate the seasonal index by the method of Ratio to Moving Average from the following quarterly data for the period from 2011 to 2014: 15

Year	Quarter			
	I	II	III	IV
2011	75	60	53	59
2012	86	65	63	80
2013	90	72	66	85
2014	100	78	72	93

CREDIT – IV

7. (a) What is sampling distribution of sample mean? Explain the concept taking an example of drawing a sample of size of 2 with replacement from a population set 2,4,6,8. Also draw a histogram of sampling distribution of sample mean. 8+2
- (b) Given a population with mean, 7 and standard deviation, 3.26, if a sample of size 10 is drawn with replacement, what is the probability that the sample mean is less than 6 but more than 4? 5

8. (a) Write an explanatory note on Chi-square distribution. 5
- (b) A random sample of size 16 has 53 as the mean. The sum of the squares of deviation from the mean is 150. Can this sample be regarded as taken from the population having 56 as the mean? (Given $t_{0.01} = 2.95$ at 15 degrees of freedom) 5
- (c) In a random sample of 1000 persons from Guwahati town, 400 are found to be consumers of wheat whereas from another sample of 800 persons from Kolkata, 50 per cent are found to be consumers of wheat. Do the data indicate differences in habits of the people in wheat consumption between Guwahati and Kolkata? (Given $z_{0.05} = 1.96$) 5