

2011
[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) Explain the concept of Bayesian probability with an example and derive the formula of Bayes in generalized form. 2+6
- (b) An urn contains 4 defective and 8 non-defective balls. A second urn has 2 defective and 6 non-defective balls. A ball is drawn from one of the urns selected at random. Find the probabilities that
- i. the ball drawn is defective;
 - ii. the ball drawn is non-defective, and
 - iii. a ball is drawn from the 1st urn, given that it was a defective ball.
- 2+2+3
2. (a) Derive the formulae of mean and variance under the binomial probability distribution. 2+3
- (b) Write an explanatory note on Poisson distribution. 4
- (c) A fair coin is tossed 400 times. Using a normal approximation to the binomial, find the probability that a head will occur
- (i) more than 180 times, and (ii) less than 195 times.
- 3+3

CREDIT – II

3. (a) What are the limitations of the correlation coefficient? 5
- (b) Explain the concept of the coefficient of determination. 5
- (c) What does the square of partial correlation coefficient $r_{yx2.x1}$ measure? In what way partial correlations are important? 2+3
4. (a) From the following data estimate the regression line of Y on X:

X	2	4	6	8	10	12	14	16
Y	5	7	9	8	11	15	15	19

(b) Explain the meanings of the following terms: 2 X 5 = 10

- (i) Parameter, (ii) Statistic, (iii) Random sampling, (iv) Sampling distribution and (v) Standard error of a statistic.

CREDIT – III

5. (a) Explain different components of a time series data. 4
- (b) Write short notes on adjusting a time series data for price changes and calendar variations. 4
- (c) Estimate the seasonal indices by the Ratio to Moving Average method from the following data: 7

Year	Quarter			
	I	II	III	IV
2006	75	60	53	59
2007	86	65	63	80
2008	90	72	66	85
2009	100	78	72	93

6. (a) Explain the method of Link Relatives using an appropriate example. 5
- (b) The following table relates to the tourists arrivals (in millions) during 2004 to 2010 in India:

Year	2004	2005	2006	2007	2008	2009	2010
No. of tourists arrived	18	20	23	25	24	28	30

Forecast the number of tourists that would arrive in the year 2014. 10

CREDIT – IV

7. (a) Explain the concept of sampling distribution of sample means when a sample of size 2 is taken with replacement from a population consisting of numbers 2, 4, 6 & 8. 10

(b) A basket ball player plays 200 shots. What is the probability that she makes more than 85 and less than 110 goals? [Given: $P(0 < Z < 1.48) = 0.4306$ & $P(0 < Z < 2.19) = 0.4857$]. 5

8. (a) Write short notes on: 3 X 3 = 9

(i) Confidence interval, (ii) Properties of a good estimator, and (iii) Null & alternative hypotheses

(b) A course in Applied Economics is being taught to a group of 10 students with the traditional lecture method while another group of students with the case study method. The examination results of both the group of students revealed that the average and standard deviation marks of these two groups are respectively as follows:

$$\bar{X}_1 = 64, \sigma_{s1} = 6, \bar{X}_2 = 67 \text{ and } \sigma_{s2} = 3$$

Test the difference in the impacts of teaching methods at 1 per cent level of significance. [Given: $t_{0.01} = 2.807$ at $\nu = 23$]. 6