

2012
[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. Explain different approaches to the theory of probability using appropriate examples. 15
2. (a) Write explanatory notes on the following: 5+3
- (i) Normal probability distribution
- (ii) Density function
- (b) A player is asked to toss three coins. He wins Rs.12/-, Rs.7/- and Rs.2/- if three tails, two tails and one tail occurs respectively. If the game is to be fair, how much she should win or lose in case three heads occur. 4
- (c) A die is thrown twice. Let E_1 be the event of getting a sum of the face values being 8, and E_2 be the event of getting face values 3, 4, and 5. Find the probability of occurrence of event E_1 given that event E_2 has already occurred. 3

CREDIT – II

3. (a) Derive the normal equations for the linear regression model:
- $$Y = b_0 + b_1X_1 + b_2X_2 + u \quad \text{5}$$
- (b) What is the standard error of estimate? 4
- (c) The ranking of 10 students in accordance with their performance in two subjects A and B are as follows:

A	6	5	3	10	2	4	9	7	8	1
B	3	8	4	9	1	6	10	7	5	2

- Calculate the rank correlation coefficient and comment on its value. 6
4. What is sampling? Discuss the well known methods of probability and non-probability sampling.

3 + 12 = 15

CREDIT – III

5. Describe any two important methods of trend measurement, and examine critically their merits and demerits.

10 + 5

6. Calculate the seasonal indices by the ratio-to-trend method from the following sales (in Rs. lakhs) figures:

Year	Sales in Quarter			
	I	II	III	IV
2006	108	130	107	93
2007	86	120	110	91
2008	92	118	104	88
2009	78	100	94	78
2010	82	110	98	86
2011	106	118	105	98

Forecast the value of sales for each quarter of 2013.

15

CREDIT – IV

7. (a) What is sampling distribution of the difference of sample means? Explain the concept taking an example of drawing sample sizes of 3 and 2 with replacement from respective population sets 3, 6 and 1, 2, 3.

10

(b) One University in a metropolitan city has 1500 students on its roll. Enrolment record shows that 30 students are of foreign origin. If sampling is taken with replacement, what is the probability that in a random sample of 91 students more than 0.025 students are of foreign origin? [Given: $P(0 < Z < 0.35) = 0.1368$]

5

8. (a) Explain the concept of sampling distribution of sample proportions taking an example of drawing a sample size of 3 balls with replacement from a population of one white and one black ball.

10

(b) The average breaking strength of the cables supplied by a manufacturer is 1800 with standard deviation 100. By a new technique in the manufacturing process it is claimed that the breaking strength of the cables have increased. In order to test the claim a sample of 50 cables is tested and found that average breaking strength is 1850. Can we support the claim? [Given: $Z_{0.01} = 2.32$]

5