

# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



**B.Sc. DEGREE EXAMINATION – STATISTICS**

**FIFTH SEMESTER – NOVEMBER 2016**

**ST 5508/ST 5506/ST 5502 – APPLIED STATISTICS**

Date: 01-11-2016

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

## PART - A

Answer ALL the questions:

(10 x 2 = 20 marks)

1. Define Index numbers.
2. What is meant by base shifting?
3. Define standard scores.
4. Write the formula for coefficient of reliability of a test.
5. Define stationary population.
6. Define Total Fertility rate.
7. What are the components of time series?
8. Give the additive model of time series.
9. Write the different methods used for measuring Seasonal Variations.
10. Define Cyclic Variations.

## PART – B

Answer any FIVE questions:

(5 x 8 = 40 marks)

11. Prepare price and quantity index numbers for 1983 with 1982 as base year from the following data by using (i) Laspeyre's and (ii) Paasche's method.

|      | Article – I |      | Article – II |      | Article – III |      | Article – IV |      |
|------|-------------|------|--------------|------|---------------|------|--------------|------|
| Year | Price       | Qty. | Price        | Qty. | Price         | Qty. | Price        | Qty. |
| 1982 | 5.00        | 5    | 7.75         | 6    | 9.63          | 4    | 12.50        | 9    |
| 1983 | 6.50        | 4    | 8.80         | 10   | 7.75          | 6    | 12.75        | 9    |

12. Explain (i) Time Reversal test (ii) Factor Reversal test and (iii) Circular test.
13. Describe the Kuder – Richardson method of assessing the reliability of a test.
14. Explain Registration method and Census method of obtaining vital Statistics.
15. Describe the indirect method of standardizing death rates.
16. Find the three – monthly moving averages to the following data:

| Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|
| 57  | 65  | 63  | 72  | 69  | 78   | 82   | 81  | 90  | 92  | 95  | 97  |

17. The data below give the average quarterly prices of a commodity for four years.

| Year | 1 <sup>st</sup> Quarter | 2 <sup>nd</sup> Quarter | 3 <sup>rd</sup> Quarter | 4 <sup>th</sup> Quarter |
|------|-------------------------|-------------------------|-------------------------|-------------------------|
| 1980 | 40.3                    | 44.8                    | 46.0                    | 48.0                    |
| 1981 | 50.1                    | 53.1                    | 55.3                    | 59.5                    |
| 1982 | 47.2                    | 50.1                    | 52.1                    | 55.2                    |
| 1983 | 55.4                    | 59.0                    | 61.6                    | 65.3                    |

Calculate the seasonal Variation indices by method of simple averages.

18. Describe the method of fitting trend by Gompertz Curve.

PART – C

Answer any TWO Questions

(2 x 20 = 40 marks)

19. a) Construct the wholesale price index number for 1982 and 1983 from the data given below, using 1981 as the base year.

Wholesale price (in rupees) per quintal.

| Commodity | 1981 | 1982 | 1983 |
|-----------|------|------|------|
| A         | 140  | 160  | 190  |
| B         | 120  | 130  | 140  |
| C         | 100  | 105  | 108  |
| D         | 75   | 80   | 90   |
| E         | 250  | 270  | 300  |
| F         | 400  | 420  | 450  |

b) In the construction of a certain Cost of Living Index Number the following group index numbers were found. Calculate the Cost of Living Index Number by using.

- (i) the weighted arithmetic mean and
- (ii) the weighted geometric mean

| Group             | Index Number | Weights |
|-------------------|--------------|---------|
| Food              | 352          | 48      |
| Fuel and Lighting | 200          | 10      |
| Clothing          | 230          | 8       |
| House Rent        | 160          | 12      |
| Miscellaneous     | 190          | 15      |

20. a) Fill in the blanks of the following table which are marked with question marks.

| Age<br>$x$ | $l_x$  | $d_x$ | $q_x$ | $p_x$ | $L_x$ | $T_x$        | $e_x^\circ$ |
|------------|--------|-------|-------|-------|-------|--------------|-------------|
| 20         | 693435 | ?     | ?     | ?     | ?     | 35, 081, 126 | ?           |
| 21         | 690673 | –     | –     | –     | –     | ?            | ?           |

b) The reliability coefficient of a test of 50 items is 0.60 (a) How much the test should be lengthened to raise the self-correlation of 0.90? (b) What effect will the (i) doubling and (ii) tripling the test's length have upon the reliability Coefficient?

21. Fit a straight line trend by the method of least squares to the following data. Assuming that the same rate of change continues. What would be predicted earnings for the year 1985?

| Year                | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
|---------------------|------|------|------|------|------|------|------|------|
| Sales<br>(Lakh Rs.) | 76   | 80   | 130  | 144  | 138  | 120  | 174  | 190  |

22. Calculate seasonal indices by the ratio to moving average method from the following data:

|         |                | Year |      |      |      |
|---------|----------------|------|------|------|------|
|         |                | 1980 | 1981 | 1982 | 1983 |
| Quarter | Q <sub>1</sub> | 75   | 86   | 90   | 100  |
|         | Q <sub>2</sub> | 60   | 65   | 72   | 78   |
|         | Q <sub>3</sub> | 54   | 63   | 66   | 72   |
|         | Q <sub>4</sub> | 59   | 80   | 85   | 93   |

\*\*\*\*\*