



Registration Number:

Date & Session

ST JOSEPH'S UNIVERSITY, BENGALURU -27
OPEN ELECTIVE- 4th SEMESTER
SEMESTER EXAMINATION: APRIL 2024
(Examination conducted in May / June 2024)
STOE 3 – APPLIED STATISTICS

(For current batch students only)

Time: 2 Hours

Max Marks: 60

This paper contains TWO printed pages and ONE part

Note: Scientific Calculators are allowed & Graphs are to be provided.

PART-A

I. Answer any SIX of the following

6x10=60

1. a. Define Time Series and mention any two merits and demerits of semi-averages method.
b. Highlight the differences between the two most acknowledged weighted index numbers.
c. Elaborate on importance of index numbers in any two scenario's which you have come across. (5+2+3)
2. a. Describe the concept of consumer price index (CPI) numbers and discuss two practical applications and utilities of this measure.
b. An enquiry into the budgets of the middle-class families of a certain city revealed that on an average the percentage of expenses on the different groups were Food 45, Rent 15, Clothing 12, Fuel and Lighting 8 and Miscellaneous 20 during 1981. The group index number for the current year 1982 as compared to base 1981 were 410,150,343,248 and 285 respectively. Calculate a suitable CPI for the current year 1982. Mr. X was getting Rs. 240 wages in the base year. State how much he should get to maintain his former standard of living during the current year. (5+5)
3. Given below are the data relating to the sales of a product in a district.
 - a. Fit a straight-line trend by the method of least squares and Method of semi-averages and tabulate the trend values.
 - b. Justify your thoughts on the method which serves as a best one for measuring the trend component. (8+2)

Year	1995	1996	1997	1998	1999	2000	2001	2002
Sales	6.7	5.3	4.3	6.1	5.6	7.9	5.8	6.1

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4. a. A manufacturing company produces bolts, and they monitor the diameter of bolts to ensure quality control. A sample of 3 bolts is taken each day, and the diameter measurements (in millimetres) are recorded. They record the average diameter and range of the diameter for a sample of 3 bolts. The data for a week are summarised as follows:

\bar{X}	10.3	10.27	10.3	10.27	10.3	10.4	10.3
R	0.2	0.4	0.2	0.4	0.2	0.2	0.2

Use an \bar{X} -R chart to determine if there are any significant variations in patients waiting times. ($A_2=1.023$, $D_3=0$, $D_4=2.574$).

- b. Define Process control and product control with an example, also differentiate between chance and assignable causes. (5+5)
5. a. Define Statistical Quality Control and list its objectives.
 b. What is Single Sampling Plan? Outline the procedure for the same. (5+5)
6. a. Elaborate in detail on principle steps of a sample survey.
 b. Define simple random sampling with replacement and give a real-life example for the same. (8+2)
7. a. Give a detailed note on Stratified Sampling.
 b. Define fecundity and fertility.
 c. In a small town, the population at the beginning of the year was 10,000 people. During the year, there were 300 live births recorded. The number of women aged 15-49, the typical childbearing ages, was 3,000. Calculate the crude birth rate and general fertility rate for the town. (5+2+3)
8. a. Define Gross Reproduction Rate (GRR) and provide an example illustrating its significance. Then, using the given age-specific fertility rate data for a country, calculate the GRR and interpret the results.

Age	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Fertility Rate (per 1000 women)	50	120	180	160	110	60	20

- b. In a city with a population of 500,000, there were 2,500 deaths recorded in the past year. Calculate the crude death rate and specific death rate for each of the following age groups. Interpret crude death rate and compare the specific death rates across the age groups and discuss any trends or patterns observed. (5+5)

Age group (in years)	0-4	5-14	15-64	>65
Population	50,000	75,000	300,000	75,000
