



SE – 172

Sixth Semester B.Sc. Examination, September 2020
(CBCS) (Fresh) (2019-20 & Onwards)
STATISTICS – VII
Applied Statistics

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Answer **any five** questions from Section – A and **five** questions from Section – B.
2) Scientific calculators are **allowed**.

SECTION – A (25 Marks)

- I. Answer **any five** of the following questions : (5×5=25)
- 1) a) What is meant by a time-series ? Mention its important uses.
b) Explain business cycle.
 - 2) Explain the method of finding trend by fitting a straight line.
 - 3) Define the following index numbers and discuss their merits and demerits.
 - i) Laspeyre's index number
 - ii) Paasche's index number and
 - iii) Fisher's ideal index number
 - 4) What are time reversal and factor reversal tests ? Show that Fisher's index numbers satisfies both these tests.
 - 5) What are vital statistics ? Explain their sources and uses.
 - 6) What is a life table ? Explain its construction. Also write the uses of life table.
 - 7) Give a brief account of the statistical system in India.
 - 8) Discuss the origination of N.S.S.O. and its publications.

SECTION – B (45 Marks)

- II. Answer **any five** of the following questions : (5×9=45)
- 9) a) What is a secular trend ? Describe the method of measuring trend by fitting a curve of the type $y = ab^x$.
b) What is a seasonal variation ? Explain the method of measuring seasonal variation by the ratio to moving average method. (4+5)

P.T.O.



- 10) a) Explain the problem of the construction of index numbers with special reference to (i) selection of base period (ii) selection of commodities and markets, (iii) selection of weights.
b) What is meant by consumer price index ? What are its uses ? Explain the methods of computing consumer price index. (5+4)
- 11) a) Define :
i) CDR [Crude Death Rate]
ii) ASDR [Age Specific Death Rate]
iii) IMR [Infant Mortality Rate]
iv) MMR [Maternal Mortality Rate]
b) Define :
i) CBR [Crude Birth Rate]
ii) GFR [General Fertility Rate]
iii) TFR [Total Fertility Rate]
iv) GRR [Gross Reproduction Rate]
v) NRR [Net Reproduction Rate]. (4+5)
- 12) a) What is expectation of life ? Distinguish between 'Curate expectation' and 'Complete expectation' of life.
b) Define central mortality rate, stable population and stationary population.
c) With usual notations, prove that $m_x = \frac{2q_x}{2 - q_x}$. (3+3+3)
- 13) a) What are clinical trials ? Mention its phases.
b) Write a note on observational studies. (5+4)
- 14) a) What is meant by odds ratio ? Interpret it and write 95% confidence interval for odds ratio.
b) What is Receiver Operating Characteristics (R.O.C.) curve ? State its uses.
c) Define Body Mass Index (BMI). The BMI of an individual is (i) 25 (ii) 28. Interpret these values. (3+3+3)
- 15) a) Mention the activities of C.S.O.
b) What is National Income ? Mention the methods of estimating national income. (4+5)

**Sixth Semester B.Sc. Examination, September 2020
(CBCS) (Freshers) (2019-20 and Onwards Scheme)
STATISTICS – VIII
Operations Research**

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Answer **five** questions from Section – A and **five** questions from Section – B.
2) Scientific calculators are **allowed**.

SECTION – A (25 marks)

I. Answer any five questions. (5×5=25)

- 1) What is Operations Research (OR) model ? Describe various types of OR models.
- 2) What is Linear Programming Problem (LPP) ? State the characteristics of LPP. Also, distinguish between canonical and standard forms of LPP.
- 3) What is Assignment Problem (AP) ? Explain Hungarian's method of solving an AP.
- 4) What is a game problem ? Explain the following terms with reference to a game problem :
 - i) Two person zero-sum game
 - ii) Strategy
 - iii) Pay-off
 - iv) Saddle point.
- 5) What is meant by inventory ? State its objectives and its limitations.
- 6) What is a replacement problem ? Obtain an optimum replacement policy for replacing of items when the value of money remains same over a period of time.
- 7) a) Define traffic intensity.
b) Distinguish between steady and transient states of a queueing system.
- 8) Describe the queueing model : M/M/1/(∞ , FCFS). Also, derive expressions for average expected waiting time of a customer in the system and in the queue.



SECTION - B (45 marks)

II. Answer **any five** questions : (5×9=45)

- 9) a) What is OR ? Mention the areas of applications of OR.
b) Explain the graphical method of solving a LPP and sketch the graphs for the cases of infeasible and unbounded solutions. (4+5)

- 10) a) Convert the following into canonical and standard forms :

$$\text{Max } Z = 3x + 4y$$

i) S.t : $3x + y \geq 3$

$$4x + 3y \geq 6$$

ii) $x_1 + x_2 \geq 2$

$$2x_1 + x_2 + 6x_3 \leq 6.$$

- b) Describe simplex algorithm of finding a solution to a LPP. (4+5)

- 11) a) What is the significance of duality theory of linear programming ? Describe the general rules for writing the dual of a LPP.

- b) Use duality to solve the L.P.P.:

$$\text{Maximize } z = 8x_1 + 6x_2$$

$$\text{Subject to the constraints } x_1 - x_2 \leq 3/5$$

$$x_1 - x_2 \geq 2; x_1 \geq 0 \text{ and } x_2 \geq 0 \quad (5+4)$$

- 12) a) Give the mathematical formulation of Assignment Problem (AP).

- b) Explain various steps involved in finding an optimal solution to a Transportation Problem (TP). (3+6)

- 13) a) Explain Vogel's approximation method of finding IBFS to a T.P.

- b) State and prove necessary and sufficient conditions for the existence of a feasible solution to a T.P. (4+5)

- 14) a) Explain the properties of a game problem.

- b) Derive expressions for optimal mixed strategies of a (2×2) game problem without a saddle point. (3+6)

- 15) a) What is an EOQ model ? Derive an expression for the minimum cost of maintaining an inventory without shortages for an EOQ model.

- b) Explain individual and group replacement policies. (5+4)