CSM – 69/16
Statistics
Paper – II

Time : 3 hours

Full Marks : 300

The figures in the right-hand margin indicate marks.

Candidates should attempt Q. No. 1 from Section – A and Q. No. 5 from Section – B which are compulsory and any ***three*** *of the remaining questions, selecting at least* ***one*** *from each Section.*

SECTION – A

1. Answer any **three** of the following :

   (a) What do you mean by control charts ? Explain the basic principle of construction of control charts. Discuss the role of control charts in manufacturing processes. 20

   (b) Discuss the problem in life-testing for censored and truncated experiments for exponential models. 20

(c) What do you understand by seasonal variation ? Explain the link relative method for computing the indices of seasonal variation. 20

(d) Describe the scope of Agriculture Statistics. Give brief account of defects in collection of Agriculture Statistics. How these defects can be reduced ? Give your suggestions for better method of collection of Agriculture Statistics. 20

2. (a) Describe how will you construct a $\bar{X}$ – Chart and R – Chart. Explain their uses. 20

(b) Discuss the utility of statistical quality control from the producer's as well as consumer's point view. 20

(c) What is Average Sample Number (ASN) and Average Total Inspection (ATI). Explain method of their calculation for single sampling plan. Why are ASN and ATI calculated ? 20

3. (a) Define reliability. Show that if a component has a survival probability over an additional period of length 'y' which is same as its parent age, the hazard rate is constant. 20

(b) Explain : 20

(i) Stationary Time Series

(ii) ARIMA Model

(iii) Moving Average Model. State their properties.

(c) Describe the different methods of determining trend in time series. Examine critically the merits and demerits of these methods. 20

4. (a) What do you understand by "Cost of living index number". Discuss the problem faced while constructing the "Cost of living index number". 20

(b) What is NSSO ? What are the objectives and functions of NSSO ? What role does it play in the country ? 20

(c) What do you understand by population census ? Describe briefly the aim, objectives and functions of census. 20

SECTION – B

5. Answer any three of the following :

(a) What do you mean by linear programming problem ? What are the basic characteristics of a linear programming model ? Describe the advantages and limitations of a linear programming model. 20

(b) Define a Poission process. State the underlying assumptions. Derive the generating function for this process. 20

(c) Explain crude and standardized death rates. In what way standardized death rate is superior to crude death rate ? Give briefly the direct and indirect method of finding standardized death rate. 20

(d) What do you mean by scaling technique ? Discuss different scales of measurements and their relative importance in measuring responses. 20

6. (a) Discuss two phase method to solve a LPP. 20

(b) Find the initial basic feasible solution for following transportaion problem by VAM. 20

		Destination				
		D_1	D_2	D_3	D_4	Supply
	O_1	11	13	17	14	250
Origin	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	950

(c) Using the principle of dominance, solve the following game : 20

$$\begin{array}{c} \\ \text{Player} - \text{A} \end{array} \begin{array}{c} \text{Player} - \text{B} \\ \begin{bmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix} \end{array}.$$

7. (a) Define a Markov Chain. When it is said to be irreducible ? What is the first return time of a Markov Chain ? 20

(b) Define a Queuing System. Discuss different elements and the operating characteristics of a queuing system. 20

(c) What do you understand by Standard score and T-score ? Describe the method of converting raw test scores in to Standard scores and T-scores ? Discuss their uses. 20

8. (a) With reference to a life table define : 20

(i) Standardized death rate

(ii) Death rate in a stationary community

(iii) Expectation of life at birth

(iv) Force mortality

(v) Probability of survival

(b) What do you mean by health statistics ? How a health survey is conducted ? What are the difficulties faced while a health survey is conducted ? Do you think use of hospital statistics is necessary to conduct a health survey ? Justify your answer. 20

(c) Explain the importance of reliability and validity in test standardization. What are their relationship to each other ? Describe different methods of obtaining the reliability coefficient and the validity coefficient. 20