APPLIED STATISTICS - I

Time Allowed : Three Hours **Maximum Marks : 100**

Note : Attempt one question each from Sections A, B, C and D carrying 20 marks each. Section E is compulsory consisting of 10 short answer type questions carrying 2 marks each.

SECTION-A

I. (a) Discuss the various sources of demographic data with their advantages and disadvantages. 12

(b) What do you understand by Infant mortality rate ? Also define Neonatal and Post-neontal mortality rate. 8

II. (a) State the meanings of various columns of a life-table and explain how a life-table can be constructed from data usually available. Mention the uses of a life-table. Explain the relationship between different columns. 15

(b) Fill in the blanks in a portion of life-table given below :-

Age in Years	l_x	d_x	p_x	q_x	L_x	T_x	e_x^0
4	95000	500	?	?	?	4850300	?
5	?	400	?	?	?	?	?

5

SECTION - B

III. (a) Why is the multiplicative model the most commonly used as compared to additive model in time series analysis ? What are the various uses of time series ? 8

(b) Explain how the 'principle of least squares' used to estimate trend in a time series. Below are given the figures of production (in thousand tons) of a sugar factory :

Year (t)	1975	1976	1977	1978	1979	1980	1981
Production (y)	77	88	94	85	91	98	90

Fit a straight line by the method of least squares, and obtain the trend values. 12

IV. Explain what is meant by seasonal fluctuations of a time series. Discuss the various methods for determining seasonal fluctuations of a given time series. Discuss the relative merits and demerits of each of these methods. Also state the conditions of applicability for each of these methods. 20

SECTION - C

V. (a) What are Index Numbers ? How are they constructed ? Explain the role of weights in the construction of general Price Index Number. 15

(b) From the following data, calculate Index Number by Simple Aggregate Method :

Commodity	Prince in 1990	Price in 1991
A	162	171
B	256	164
C	257	189
D	132	145

5

VI. (a) Write short notes on "Marshall-Edgeworth" and "Fisher's Ideal" Index numbers. 10

(b) "Marshall-Edgeworth index number is a good approximation to Fisher's ideal index number." Verify the truth of this statement from the following data : 10

	Rice		Wheat		Jawar	
Year	Price	Quantity	Price	Quantity	Price	Quantity
1990	9.3	100	6.4	11	5.1	5
2000	4.5	90	3.7	10	2.7	3

SECTION - D

VII. What do you understand by Cost of Living index number ? Discuss the main steps in the construction of cost of living index number. Also explain the methods of constructing these idex numbers. 20

VIII. (a) Explain Price Elasticity of Demand, and indicate its significance. 15

(b) The demand functions of two commodities A and B are

$D_A = 10 - p_A - 2p_B$

and $D_B = 16 - p_A - p_B$,

and the corresponding supply functions are

$S_A = -3 + p_A + p_B$

and $S_B = -2 + p_B$,

where p_A and p_B denote the prices of A and B respectively. Find

(i) the equilibrium prices, and

(ii) the equilibrium quantities exchanged in the market. 5

SECTION - E

(Compulsory Question)

IX. Write short answers of the following :

(a) Define Crude Death Rate.

(b) Give two merits of Age-specific death rate.

(c) If N.R.R. of a population is equal to one then what interpretation regarding the population increase or decrease can be made ?

(d) What do you understand by irregular component of a time series ?

(e) A study of demand (d) for the past 12 years (t = 1, 2,..., 12) has indicated the following :

$d = 100, t = 1, 2, 3, 4, 5$

$= 20, t = 6$

$= 100, t = 7, 8, 9, 10, 11, 12.$

Compute 5 yearly moving average.

(f) Discuss method of construction of Volume index number briefly.

(g) Give formulae for Laspeyre's and Paache's Price index numbers.

(h) Write a short note on Time Reversal Test.

(i) Define static laws of demand and supply.

(j) Write any two important properties of log normal distribution. 2×10=20