Sardar Patel University
B.Sc. Semester - III Examination
Monday, 25th November, 2019

Time: 2 - 00 to 5 - 00 pm

Course Code: USC03CSTA01

M.Marks: 70

(Descriptive Statistics)

Note: (*i*) Simple/Scientific calculator is allowed.   (*ii*) Graph paper will be provided on request.
       (*iii*) Figures to the right indicate marks.   (*iv*) Q.3 to 6 each sub question is of 5 marks

Q.1 Multiple Choice Questions   (10×1)

(1)   If the average depth of a lake is 1.4 meters, it means that
       (a) there could be a spot in a lake where It is deeper than 1.4 meters
       (b) an adult of average height can walk through the lake
       (c) the deepest point of the lake is 1.4 meters
       (d) None of these

(2)   A cyclist travels from place A to B at a speed of 10 km/hr and back at 15 km/hr. What is the average speed of his whole journey?
       (a) 14 km/hr   (b) 12 km/hr   (c) 12.5 km/hr   (d) None

(3)   For a box – and – whisker plot, both whiskers represent _____ percent of the observations.
       (a) 25   (b) 50   (c) 75   (d) 100

(4)   Index numbers are free from a unit of measurement because the index number shows
       (a) Average changes   (b) Relative changes   (c) Variations   (d) None of these

(5)   Fertility rates mainly depends on
       (a) total female population   (b) total population
       (c) female population of child bearing age   (d) no. of newly born babies

(6)   If 75% of the students in a class get more than 45 marks, then _____
       (a) the average score is more than 45   (b) the upper quartile is 45   (c) the lower quartile is 45   (d) the median is 45

(7)   A numerical records of data pertaining to events connected with the population studies are called
       (a) Vital statistics   (b) Death Statistics   (c) Birth Statistics   (d) Live Statistics

(8)   The first two moments about value 2 of a variable are 1 and 16, the variance will be
       (a) 13   (b) 15   (c) 16   (d) Difficult to tell

(9)   The first and foremost step in the construction of index numbers is
       (a) Choice of base year   (b) Choice of weights
       (c) To delineate the purpose of index numbers   (d) All of the above

(10) The base period should be
       (a) Abnormal   (b) Normal   (c) Current year   (d) None of these

Q.2   Short Type Questions (Attempt Any Ten)   (10×2)

(1)   The lower and upper quartiles of a distribution are 80 and 120 respectively, while the median is 100. Determine the shape of the distribution.

(2)   If $n = 9, \sum (Xi - 5) = 9, \sum (Xi - 5)^2 = 45$, find the mean and standard deviation.

(3)   With reference to index number, define base year and current year. Write down ideal characteristics of base year.

(4)   State the various measures of mortality. According to you, which measure is most suitable for studying death rate among the people of various occupations?

(5)   For two numbers 3 and 5 show that $SD = \frac{1}{2}(Range)$

(6)   Verify whether Fisher's formulae satisfy factor reversal test or not.

(7)   A bus travels between two cities A and B. From A to B, the bus has an average speed of V_1. On its way back, the average speed is V_2. Express the average speed of the bus in terms of V_1 and V_2.

(8)   Child bearing age or Reproductive age means what?

(9)   With reference to box – and – whisker plot, what is an outlier? How will you find an outlier?

(10) State the various measures of mortality. According to you, which measure is most suitable for studying death rate among

the people of various occupations?

(11) List out the various partition values. State its uses: Write down the relationships between them.

(12) Write in brief about Infant Mortality Rate (IMR).

Q.3(a) The mean and variance of seven observations are 8 and 16 respectively. If five of the observations are 2, 4, 10, 12, 14, find the remaining two observations. Draw Box – and – whisker plot based on all observations and find outlier, if any.

(b) Prove that the arithmetic mean of n observations in A.P. is equal to arithmetic mean of its first and last term. State the formula for calculating variance for the same.

OR

Q.3 (a) For two positive numbers, Prove that G.M lies between A.M and H.M.

(b) The following table gives the distribution of daily income of 500 workers in a factory.

Daily income(Rs.)	50 - 100	100 - 150	150 - 200	200 - 250	250 - 300	300 - 350
No. of workers	10	25	145	220	70	30

Determine (i) mode wage (ii) the limits for the middle 70% of the workers (iii) no. of workers who earned (i) less than 120 (ii) between 165 to 280 (iii) more than 178 (iv) the no. of workers having daily income more than mean income.

Q.4(a) Define raw moments and central moments. Express central moments in terms of raw moments. How will you calculate coefficient of skewness and kurtosis based on it?

(b) Measurements of the left - hand and right - hand gripping strengths of left- handed writers are recorded.

No.	1	2	3	4	5	6	7	8	9	10
Left-hand	140	90	125	130	95	121	85	97	131	110
Right-hand	138	87	110	132	96	120	86	90	129	100

Compare the gripping strength of left - handed writers with left - hand and right hand using the concept of skewness and comment on your findings.

OR

Q.4 Two groups with n_1 and n_2 observations having mean $\overline{X_1}$ and $\overline{X_2}$, standard deviations S_1 and S_2 respectively.

Prove that $S^2 = \frac{n_1(S_1^2+d_1^2)+n_2(S_2^2+d_2^2)}{n_1+n_2}$ where $d_1 = \overline{X_1} - \overline{X}, d_2 = \overline{X_2} - \overline{X}$ and $\overline{X} = \frac{n_1\overline{X_1}+n_2\overline{X_2}}{n_1+n_2}$

Derive the same in each of the following cases:

$(i)\ \overline{X_1} = \overline{X_2}$

$(ii)\ n_1 = n_2$

$(iii)\ n_1 = n_2\ and\ \overline{X_1} = \overline{X_2}$

$(iv)\ n_1 = n_2\ and\ \overline{X_1} = \overline{X_2}\ and\ S_1 = S_2$

Q.5(a) If Laspeyre's price index is equal to Paasche's index, show that both the index numbers satisfy the factor reversal test.

(b) What is an index number? Why index number are called economical barometer?

OR

Q.5 (a) What is an index number? State its uses. Write in brief about any two.

(b) If the ratio between Laspeyre's and Paasche's index number is 28: 27, find the missing figure in the following table.

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	1	10	2	5
B	1	5	?	2

Verify whether Laspeyre's and Paasche's index numbers satisfies time reversal and factor reversal test or not?

Q.6 (a) List out the various measures of fertility. Write in brief about any two of them.

(b) From the following data, calculate standardized death rates for country – I and II

Age – group (in years)	Death rate per 1000		Standard population (In Lakhs)
	Country - I	Country - II	
Below 5	35.60	42.04	118
5 – 15	19.06	16.09	232
15 - 35	22.11	17.78	190
35 – 50	78.27	96.34	187
Above 50	69.00	90.59	109

OR

Q.6 (a) What is the purpose of standardization of a mortality data? Explain the direct and indirect method of standardization.

(b) What is fertility rate? State its uses. List out the various fertility rates. Write in brief about each one of them.

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