SEAT No._____ **No. of Printed Pages:** 3

[897]

SARDAR PATEL UNIVERSITY

B.Sc Semester – III (CBCS) Examination

Saturday, 2nd January 2021

Time : 2 to 4 pm

Statistics

M.Marks : 70

US03CSTA21 (Descriptive Statistics)

Q.1 Multiple Choice Questions (10×1)

1 The mean of 50 observations is 36. If two observations 30 and 42 are removed then the mean of remaining observations is

(a) 58 (b) 48 (c) 38 (d) 36

2 The number of births per thousand women of child bearing age is

(a) Crude Birth Rate (b) General Fertility Rate

(c) Total Fertility Rate (d) None of these

3 A person walks 8 km at 4 km/hour, 6 km at 3 km/hour and 4 km at 2 km/hour. The average speed for the person is

(a) 4.5 km/hour (b) 2 km/hour (c) 6km/hour (d) 3 km/hour

4 For a symmetrical distribution all the odd order central moments are _____

(a) > 0 (b) < 0 (c) $= 0$ (d) Any

5 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

6 In a symmetrical distribution, $Q_3 - Q_1 = 20$, median$= 15$. $P_{75} =$ _____

(a) 25 (b) 20 (c) 15 (d) 5

7 The formula $\frac{\sum p_0 q_1}{\sum p_0 q_0} \times 100$ is used to calculate the

(a) Laspeyre's price index (b) Paasche's price index

(c) Laspeyre's quantity index (d) Paasche's quantity index

8 Which of the following will give the approximate magnitude of complete family size?

(a) GFR (b) CDR (c) ASDR (d) TFR

9 Juhi wants to calculate his grade in the subject of statistics. The teacher's policy is that the internal test weight 40%, quizzes 20%, homework 10%, projects 15% and the final examination is 15%. The marks obtained by Hardik is given below:

	Marks
Internal test	92
Quizzes	95
Homework	100
Projects	90
Final Examination	92

What will be his final grade in the class be?

(a) 93.1 (b) 93.6 (c) 93.8 (d) 93.7

10 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

Q.2 Fill in the blanks (4×1)

1 The standard deviation of observations 31, 32, ..., 47 is _____

2 Fertility rates mainly depends on _____

3 The ratio of current price to the base year price is called the _____

4 For a box – and – whisker plot, the box itself represents _____percent of the observations.

True – False (4×1)

5 Mode can be determined graphically with the help of Ogives.

6 The algebraic sum of deviations of a given set of n observations from their median is always zero.

7 With reference to index numbers, base period should be normal year.

8 Total Fertility Rate (TFR) refers to no. of births per thousand women.

Q.3 Short Type Questions (Attempt Any Ten) (10×2)

1 Verify whether Paasche's formulae satisfy factor reversal test or not.

2 Find the harmonic mean of the numbers $1, \frac{1}{2}, \frac{1}{3}, \ldots, \frac{1}{n}$

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

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

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

6 The lower and upper quartiles of a distribution are 80 and 120 respectively, while the 50^{th} percentile is 100. Determine the shape of the distribution.

7 Why index numbers are called barometer of economic activity?

8 List out the various measures of mortality. For comparing mortality of two populations which measure of mortality do you recommend? Name and define it.

9 The first three moments of a distribution about the value 2 are 1, 22 and 10. Find its mean, standard deviation and moment measure of skewness.

10 Find the variance of first n natural numbers.

11 Write in brief about any two uses of index numbers.

12 The total population of city is 2,00,000 and of them 45% are females. Among the females 48% are of child bearing age. If GFR of the city is 35, find the expected no. of children that will born during next year.

Q.4 Long Answer Questions (Attempt Any Four) (4×8)

(a) (i) The sum of squares of deviations is least (minimum) when measured from

(a) mean (b) median (c) mode (d) All of the above

Choose most suitable one and prove the same.

(ii) State and prove relationship between A.M., G.M., and H.M.

(b) What is an index number? Write down the steps in construction of index number.

(c) A study is conducted to determine if dieting plus exercise is more effective in producing weight loss than dieting alone. Twelve pairs of matched subjects are run in the study. Subjects are matched on initial weight, initial level of exercise, age, and sex. One member of each pair is put one diet for 3 months. The other member receives the same diet but in

addition is put on a moderate exercise regime. The following scores indicate the weight loss in pounds over the 3 months period for each subject:

Pair	1	2	3	4	5	6	7	8	9	10
Diet + Exercise	24	20	22	15	23	21	16	17	19	25
Diet alone	16	18	19	16	18	18	17	19	13	18

(i) Compare the amount of weight loss by two different ways of reducing weight, using box – and – whisker plots (ii) compute combined variance.

(d) 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. Derive the formula for combined variance.

Verify the same in each of the following cases:

$(i)\ \overline{X_1} = \overline{X_2}$ $(ii)\ n_1 = n_2$

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

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

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

(f) From the following data, calculate standardized death rates for country – I and II using direct and indirect method of standardization. Comment on your findings.

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

(g) (i) Define raw and central moments. Establish the relationship between the central moments in terms of raw moments.

(ii) A man having to drive 90 kms wishes to achieve an average speed of 30 kmph. For the first half of the journey his average speed is only 20 kmph. What must be his average for the second half of the second half of the journey if his overall average speed is 30 kmph?

(h) Calculate an ideal index number from the following data and show that it satisfies both the time reversal and factor reversal test.

Commodity	2015		2018	
	Price	Expenditure	Price	Expenditure
A	8	80	10	120
B	10	120	12	96
C	5	40	5	50
D	4	56	3	60
E	20	100	25	150