SEAT No._____ No. of Printed Pages: 3

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SARDAR PATEL UNIVERSITY

B.Sc. Semester – III (CBCS) Examination

Wednesday, 15th June, 2022

Time : 12 to 2 pm | Statistics | M.Marks : 70

US03CSTA21 (Descriptive Statistics)

Q.1 Multiple Choice Questions (10×1)

1 While computing a weighted index number, the current period quantities only are used in the

(a) Laspeyre's method (b) Paasche's method

(c) Fisher's method (d) None of the above

2 The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set

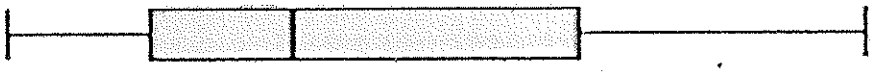
(a) is increased by 2 (b) is decreased by 2

(c) is two times the original median (d) remains the same as that of original set

3 At a health club, 80% of the members are men and remaining are women. If the average age of the men is 30 and the average age of all members is 34 years then the average age of the women is _____ years

(a) 52 (b) 48 (c) 50 (d) 32

4 What term would best describe the shape of the given box – plot?



(a) Symmetric (b) Positively skewed (c) Negatively skewed (d) Impossible to know

5 Infant Mortality Rate (IMR) means

(a) $\frac{No.of\ live\ births\ to\ female\ in\ a\ specified\ age\ group}{Female\ population\ in\ the\ same\ age\ group} \times 1000$

(b) $\frac{No.of\ births}{Total\ population} \times 1000$

(c) $\frac{No.of\ deaths}{Total\ population} \times 1000$

(d) $\frac{No.of\ deaths\ to\ live\ born\ infants\ under\ one\ year\ of\ age}{No.of\ births} \times 1000$

6 Which one of the following is not the problem in the construction of index number?

(a) selection of base period (b) purpose of index number

(c) selection of proper scale (d) selection of weight

7 A person walks 6 km at 3 km/hour, 5 km at 4 km/hour and 4 km at 3 km/hour. The average speed for the person is

(a) 4.58 km/hour (b) 5 km/hour (c) 3.33 kmph (d) None of these

8 Given that $n = 15, \sum Xi = 170, \sum Xi^2 = 2830$. One of the observations, 20 was found to be wrong and 30 is the correct value. The correct value of the variance is

(a) 178.0 (b) 78.0 (c) 233.8 (d) 177.3

9 The general fertility rate is a better measure of fertility than the crude birth rate because the denominator includes

(a) 15 – 49 years of age females (b) 15 – 49 years of population

(c) Total women population (d) Married women population

10 If price index of base year with respect to current year is 125 that means?

(a) 125% of prices increased in current year as compared to base year

(b) 25% of prices increased in current year as compared to base year

(c) 25% of prices increased in base year as compared to current year

(d) 125% of prices increased in base year as compared to current year

(1)

(P.T.O.)

Q.2 Fill in the blanks (4×1)

1 Standard deviation of $X_1, X_2, \ldots X_n$ is k, then the standard deviation of $X_1 + a, X_2 + a, \ldots X_n + a$, Where a is a constant is _____

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

3 Fisher's index numbers is the _____ of Laspeyre's and Paasche's index number.

4 If $n = 9, \sum(Xi - 5) = 9, \sum(Xi - 5)^2 = 45$, the coefficient of variation is _____

True – False (4×1)

5 Inter Quartile Range (IQR) based on middle 50% of observations.

6 Fertility rates mainly depends on female population.

7 Sex ratio means no. of females per 1000 people in the population.

8 The most appropriate average in averaging the price relative is harmonic mean.

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

1 In a group of n people, the mean age of men and women is 30 years. If the mean age of x men is 32 and $(n - x)$ women is 27, find the percentage of men and women in the group.

2 Verify whether Laspeyre's formulae satisfy time reversal test or not.

3 The average monthly income of P and Q is Rs. 5050, the average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. Find the monthly income of P.

4 Given that:

$$\sum p_0 q_0 = 425, \sum p_0 q_1 = 480, \sum p_1 q_0 = 500, \sum p_1 q_1 = 540$$

Calculate Laspeyre's and Paasche's quantity index numbers.

5 Define Vital statistics. State its uses.

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

7 State the various measures of mortality. According to you, which measure is most suitable for studying death rate among the people of various diseases?

8 Write down the steps in construction of index number.

9 Calculate 3rd decile from the data given below:
4, 7, 10, 13... 148

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

11 Find the standard deviation of first n natural numbers.

12 Child bearing age or Reproductive age means what?

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

(1) Two groups of 8 guinea pigs each were injected, respectively with 0.5 mg, 1.0 mg of a new tranquilizer and the following are the time it took to fall asleep in minutes.

Group – I (0.5 mg)	21	23	19	24	25	23	19	24
Group – II (1.0 mg)	19	21	20	18	22	20	21	18

(i) Which group has greater amount of variability in the measurements? Justify your answer by calculating suitable statistical measure. (ii) Compute combined variance (iii) Compare time in minutes it took to fall asleep using Box – and – whisker plots.

(2) (a) Namrata wants to buy a new car, and decides on the following rating system:
Appearance 10%, Reliability 40%, Mileage 20% and Comfort 30%.
The Ford car gets 7 (out of 10) for appearance, 6 for reliability, 9 for mileage and 3 for comfort.
Hyundai car gets 4 (out of 10) for appearance, 7 for reliability, 3 mileage and 9 for comfort.
Toyota car gets 7 (out of 10) for appearance, 6 for reliability, 6 for mileage and 5 for comfort.
Which car is best?

(b) The mean and variance of 5 observations are 4.4 and 8.24 respectively. If 3 of the observations are 1, 2 and 6. Find the remaining two observations.

(3) 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.

(2)

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:

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

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

(4) (a) Prove that the weighted mean of first n natural numbers whose weights are equal to the corresponding number is equal to $\frac{(2n+1)}{3}$

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

(5) The following table gives the distribution of daily income of 500 workers having median income of Rs. 212.5 in a factory.

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

Find the missing frequencies. Determine (i) the limits for the middle 60% of the workers (ii) variance

(6) (a) Define Fisher's index number. Verify whether Fisher's index number satisfies time reversal and factor reversal test or not.

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

(7) Do as directed :

(i) Prove that the geometric mean of n numbers in G.P is equal to geometric mean of its first and last term.

(ii) Define raw moments and central moments. How will you compute coefficient of skewness and kurtosis?

(iii) State the various measures of Fertility. Explain any one of them.

(iv) What is an index number? State its importance.

(8) Following are the data regarding population and deaths by age in three towns of Anand District.

Age group	Town - A		Town - B		Town - C	
	Population	No. of deaths	Population	No. of deaths	Population	No. of deaths
< 15	1,14,350	136	37,164	59	23,961	32
15 – 24	80,259	57	20,036	18	15,420	9
25 – 44	1,33,440	208	32,693	37	21,353	30
45 - 64	1,42,670	1,016	14,947	90	19,609	14
65 +	92,168	3,605	2,077	81	10,685	52

Calculate (i) STDR of Town – A and Town – B considering the population of Town – C as standard population (ii) CDR of Town – C (iii) Is CDR of Town – C is same that of STDR of Town – C?

— X —

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