SEAT No._____ [35]

No. of Printed Pages: 3

Sardar Patel University

B.Sc. Semester-III Examination - 2022

Thursday, 17th November, 2022

Time: 10 to 1 p.m | Course Code: USC03CSTA51 | M.Marks: 70

(Descriptive Statistics)

Note: (i) Simple/Scientific calculator is allowed (ii) Q.3 to 6 each sub questions have 5 marks.

Q.1 Multiple Choice Questions (10×1)

(1) Quartile Deviation (Q.D) ignores
(a) 50% of the observations (b) lower 50% of the observations
(c) middle 50% of the observations (d) lower 25% and upper 25% of the observations

(2) Which of the following is false?
(a) G.M of two numbers is the square root of their products
(b) G.M of n numbers in G.P is the G.M of first and last numbers
(c) A.M of n numbers in A.P is the A.M. of first and last numbers
(d) A.M. of n numbers in G.P is A.M of first and last numbers

(3) Price relatives are a percentage ratio of current year price and
(a) Base year quantity (b) current year quantity (c) base year price (d) none of these

(4) In computing STDR of Two countries A and B considering Country A as standard population using direct method of standardization then STDR of country A is
(a) same as CDR of A (b) same as population of A (c) same as CDR of B (d) Same as population of B

(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) Which of the following is false?
(a) the numbers $3, 3, 3, 3$ have a standard deviation of zero
(b) the numbers $3, 4, 5$ have the same standard deviation as $1003, 1004, 1005$
(c) the numbers $1, 5, 9$ have a smaller standard deviation then $101, 105, 109$
(d) the standard deviation is a measure of spread around the centre of the data.

(7) Total Fertility Rate refers to
(a) No. of women in reproductive age (b) No. of births per thousand women
(c) No. of births per thousand women in child bearing age (d) No. of children per women

(8) The curve obtained by joining the points, whose X – coordinates are the upper boundaries of the class intervals and Y – coordinates are corresponding to cumulative frequencies is called
(a) ogive (b) frequency polygon (c) histogram (d) frequency curve

(9) The standard deviation of $1, 2, 3, 4, 5, 6$ and 7 is 2 then the standard deviation of $12, 23, 34, 45, 56, 67$ and 78 is
(a) 2 (b) 4 (c) 22 (d) 11

(10) The first three moments of a distribution about the mean are $1, 4$ and 0. The distribution is
(a) Skewed to the right (b) Skewed to the left (c) Symmetrical (d) None of these

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

(1) The algebraic sum of deviations of a given set of n observations from their _____ is always zero. Fill in the blank and prove the same.

(2) What is sex ratio? How to compute it?

(3) What is an index number? State its uses.

(4) If $n = 10, \sum(Xi - 120) = 20, \sum(Xi - 120)^2 = 200$, find the mean and standard deviation.

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

(6) Find the harmonic mean of the numbers $1, 1/2, 1/3, \ldots 1/n$

(7) 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 an ideal index number.

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

(P.T.O.)

(1)

(9) Explain the concept of (i) positive skewness (ii) negative skewness by sketching suitable diagrams locating measures of central tendency

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

(11) 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.

(12) Which of the following will give the approximate magnitude of complete family size?

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

Choose an appropriate option and write in brief about it.

Q.3(a) Find the mean of n numbers in Arithmetic Progression (A.P)

(b) A man having to drive 120 kms wishes to achieve an average speed of 40 kmph. For the first half of the journey his average speed is only 32 kmph. What must be his average for the second half of the journey if his overall average speed is 45 kmph?

OR

Q.3(a) The following table gives the distribution of daily expenditure (in Rs.) of 500 workers in a factory.

Daily expenditure	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 65% of the workers (iii) no. of workers who ~~earned~~ spent (i) less than 112 (ii) between 162 to 280 (iii) more than 150 (iv) the no. of workers having daily ~~income~~ Spent more than median income.

(b) 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.

Q.4(a) The amount of lactic acid in the blood was examined for 10 men, before and after strenuous exercise, with the results in the following table:

Before	15	16	17	13	20	13	16	14	18	13
After	33	20	40	30	37	18	26	21	19	35

Compute combined variance. Derive the formula for the same.

(b) The arithmetic mean and geometric mean of two numbers are 127.5 and 60 respectively.
Find (i) the two numbers (state and prove the result you had used to find two numbers) (ii) the harmonic mean.

OR

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

(b) The following table gives the distribution of daily income of 500 workers in a factory. Calculate an appropriate measure of skewness and comment about the shape of the distribution.

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

Q.5(a) Write a note on Standardized Death Rate (STDR)

(b) Do as directed:
(i) List out the various measures of ~~mortality~~ fertility. Write in brief about any one of it with its merits and demerits
(ii) Write a note on (i) Age Specific Death Rate (ASDR) (ii) Total Fertility Rate (TFR)

OR

Q.5(a) What is the purpose of standardization of a mortality data? Explain the direct and indirect method of standardization.

(b) Following are the data regarding population and deaths by age of three different cities:

Age group	City - A		City - B		City - 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 STDR of City – A and city – C, considering the population of City - B as standard population.

Q.6(a) If Laspeyre's price index is equal to Paasche's index, show that both the index numbers satisfy the factor reversal test.

(b) Write down the steps in construction of index numbers.

OR

Q.6 Calculate Unweighted and weighted index numbers. ~~Comment on your findings~~ Verify time reversal te

Commodity	2020		2021	
	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

—x—

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