## Sardar Patel University

B.Sc. Examination (Semester-III)

25th November, 2019

Monday

Subject: Descriptive Statistics

Paper Code:-US03CSTA21

Time:- (02:00 P.M. to 5:00 P.M.)     M.Marks:70

Note:- (i) Simple/ Scientific calculator is allowed. (ii) Graph paper will be provided on request.

**Q.1.     Multiple Choice Questions:-**     [10]

(1)  The arithmetic mean of $1, 2, \ldots\ldots, n$ is_____.

(i) $\dfrac{n(n+1)(2n+1)}{6}$     (ii) $\left(\dfrac{n(n+1)}{2}\right)^2$     (iii) $\dfrac{n(n+1)}{2}$     (iv)None of these

(2)  _____is the only average to be used while dealing with average intelligence among group of people.

(i) Mean     (ii) Mode     (iii) Median     (iv)None of these

(3)  The percentile points are in_____ order.

(i) Ascending     (ii) organized     (iii) unorganized     (iv)None of these

(4)  For a symmetrical distribution, $\mu_1 = \mu_3 = \mu_5$ are _____.

(i) = zero     (ii) > zero     (iii) < zero     (iv) None of these

(5)  The sum of squares of deviations is least (minimum) when measured from_____.

(i) Mean     (ii) Median     (iii) Mode     (iv) None of these

(6)  The first and foremost step in the construction of index numbers is_____.

(i) Choice of base year     (ii) Choice of weights     (iii)Todelineate the purpose of index numbers     (iv) None of these

(7)  _____ is used for the construction of Index numbers.

(i) Median     (ii) Geometric Mean     (iii) Harmonic Mean     (iv) None of these

(8)  Index number of the base year is _____.

(i)100     (ii) 1000     (iii) 1     (iv) None of these

(9)  For comparing the health conditions of two towns, we have to calculate____.

(i)Crude death rate     (ii) Crude birth rate     (iii) Infant mortality rate     (iv) Age specific fertility rate

(10). If we want to know more about deaths occurring in a different section of the population, we have to calculate_____.

(i) CDR     (ii) SDR     (iii) STDR     (iv) None of these

**Q.2.     Short Type Questions:- (Attempt Any Ten)**     [20]

(1)  State and prove any one of the properties of Mean.

(2)  The arithmetic mean of two observations is 127.5 and their geometric

mean is 60. Find (i) their harmonic mean (ii) the two observations.

(3) The numbers 3.2, 5.8,7.9 and 4.5 have frequencies x, ( x+2), ( x-3) and (x+6) respectively. If the arithmetic mean is 4.876, find the value of x.

(4) The first three moments about origin are given by

$\mu_1' = \frac{(n+1)}{2}$; $\mu_2' = \frac{(n+1)(2n+1)}{6}$; $\mu_3' = \frac{n(n+1)^2}{4}$ ;Examine the skewness

(5) In a frequency distribution, the coefficient of skewness based upon the quartiles is 0.6. If the sum of upper and lower quartiles is 100 and median is 38, find the value of the upper and lower quartiles.

(6) The first four moments of a distribution about x=4 are 1,4,10 and 45.Obtain mean, variance and $\mu_3$ , $\mu_4$ .

(7) What is Index numbers? State uses of Index numbers.

(8) What are the time reversal and factor reversal tests?

(9) State the formula used for the calculation of Index numbers. Which one is superior? Why?

(10) What is Crude Death Rate?

(11) Define different indices of mortality and give the formulae used for them.

(12) In what way is standardized death rate superior to crude death rate?

Q.3. (a) An employer decides to offer a cash gift of 5% of the average weekly [05] wage in his factory to every employee. Calculate it taking average to be (i) Mode (ii) Median, (iii) the Cash gift per employee using calculated average.

| Monthly wage ('00 Rs.) | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|
| No. of Employees | 28 | 32 | 45 | 60 | 56 | 40 | 20 |

(b) An incomplete frequency distribution is given below: [05]

| Class | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | Total |
|---|---|---|---|---|---|---|---|---|
| f | 12 | 30 | --- | 65 | ---- | 25 | 19 | 230 |

Given that the median value is 46, determine the missing frequencies.

OR

Q.3. (a) From the following distribution of hourly earnings: [05]

| Class | 25-26 | 26-27 | 27-28 | 28-29 | 29-30 | 30-31 | 31-32 | 32-33 | 33-34 | 34-35 | 35-36 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| f | 25 | 70 | 210 | 275 | 430 | 550 | 340 | 130 | 90 | 55 | 25 |

Calculate (i)Mode (ii) the percentage of persons earning more than Rs.31.50. (iii)the percentage of persons earning less than Rs. 27.50 per hour.(iv)the percentage of persons earning between Rs.28.50&Rs. 30.50 per hour.

(b) Following is the distribution of marks in Statistics obtained by 50 [05] students.

| Marks (More than) | 00 | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|
| No .of students | 50 | 46 | 40 | 20 | 10 | 3 |

Calculate the median marks. If 60% of the students pass this test, find the minimum marks obtained by pass candidates.

Q.4. (a) If $\bar{X}_1, \bar{X}_2, ..., \bar{X}_i, ...\bar{X}_k$ be the means & $S_1^2, S_2^2, ..., S_i^2, ...S_k^2$ be the variances [06] of $k$ groups with $n1, n2, ..., ni, ..., nk$ no.of observations respectively; then obtain the variance $S^2$ of the combined group (all the

observations) with $n1 + n2 + \cdots + ni + \cdots + nk$ observations.

(b) Creating a Stem Leaf Plot. Here is a set of data on showing the test [04]
scores on the last science quiz.
56, 78, 82, 82, 90, 94, 93, 67, 67, 69, 74, 77, 92, 88, 81, 83, 84, 77, 72.

**OR**

Q.4. (a) Explain about Lorenz curve. [03]
(b) Scores of two golfers ( A and B) for 24 rounds were as follows:- [07]

Golfer A

| 74 | 75 | 78 | 78 | 72 | 77 | 79 | 78 | 81 | 76 |
|----|----|----|----|----|----|----|----|----|----|
| 72 | 72 | 77 | 74 | 70 | 78 | 79 | 80 | 81 | 74 |
|    |    |    | 80 | 75 | 71 | 73 |    |    |    |

Golfer B

| 86 | 84 | 80 | 88 | 89 | 85 | 86 | 82 | 82 | 79 |
|----|----|----|----|----|----|----|----|----|----|
| 86 | 80 | 82 | 76 | 86 | 89 | 87 | 83 | 80 | 88 |
|    |    |    | 86 | 81 | 84 | 87 |    |    |    |

(i) which group has greater amount of variability in the measurement
(ii) Draw Box -and–Whisker plot for both the groups and comment on it.

Q.5. (a) DOC Company produces and sells four types of electric appliances. The [06]
prices and quantities in 2009 and 2010 are shown below:
(2009 as Base Year)

|  | 2009 | | 2010 | |
|---|---|---|---|---|
| Type | Price (Rs) | Quantity | Price (Rs) | Quantity |
| Radio | 100 | 20 | 120 | 15 |
| Toaster | 200 | 40 | 250 | 25 |
| Clock | 130 | 30 | 130 | 50 |
| Hair dryer | 225 | 10 | 250 | 10 |

Calculate the Laspeyre's price index , Passche's price index, Fisher's
ideal Index number and Marshall Edge worth's Price Index number to
measure the overall changes between 2009 and 2010

(b) Using Data in Q.5.(a). Are Laspeyre's price index and Passche's price [04]
index satisfies Time Reversal Test or not?

**OR**

Q.5. (a) Explain the steps for the Construction of Index Numbers. [06]
(b) Show that Fisher's index numbers satisfies Time Reversal test and [04]
Factor reversal test.

Q.6. (a) Explain about the growth of the population of a country or region. [05]
(b) Calculate the crude and standardized death rates for the local [05]
population from the following data and compare them with crude death
rate of the standard population.

| Age group | Standard Population | Death | Local Population | Death |
|-----------|---------------------|-------|------------------|-------|
| 0-10 | 600 | 18 | 400 | 16 |
| 10-20 | 1000 | 5 | 1500 | 6 |
| 20-60 | 3000 | 24 | .2400 | 24 |
| 60-100 | 400 | 20 | 700 | 21 |

**OR**

Q.6. The following table gives the population of a country, together with the [10]

(P.T.O)

estimated numbers of births and deaths based on a special vital statistics enquiry conducted in the country.

Calculate

(i) Crude death rates for the total population and for males and females.

(ii) Crude birth rate for the total population

(iii) General fertility rate

(iv) Total fertility rate

(v) Gross reproduction rate.

| Age | Males | | Females | | Births | |
|---|---|---|---|---|---|---|
| | Population | Deaths | Population | Deaths | Males | Females |
| < 14 | 1255117 | 21416 | 1236332 | 20655 | ----- | ----- |
| 15-19 | 308269 | 1233 | 314056 | 1329 | 3578 | 3343 |
| 20-24 | 257852 | 1289 | 269340 | 1481 | 7293 | 6690 |
| 25-29 | 230629 | 1776 | 236187 | 1677 | 6775 | 6361 |
| 30-34 | 204188 | 1633 | 203477 | 1465 | 4233 | 4187 |
| 35-39 | 182270 | 1588 | 176534 | 1289 | 2999 | 2685 |
| 40-44 | 162509 | 1967 | 145037 | 1233 | 593 | 725 |
| 45-49 | 128784 | 2138 | 122946 | 1352 | 129 | 128 |
| 50> | 325483 | 15891 | 321007 | 14416 | ----- | ----- |

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(4)