

[74]

SARDAR PATEL UNIVERSITY

B.Sc Semester – III Examination (CBCS) (NC) (Old Course)

Thursday, 7th January, 2021

Statistics

M.Marks: 70

Time : 2 to 4 Pm

US03ESTA04 (Biostatistics - I)

Q.1 Multiple choice questions (1 × 10)

- 1 Which of the following can be described as a continuous variable?
 (a) Time spent on Whatsapp (b) Fat content in milk
 (c) Time to complete work (d) All of the above
- 2 A sample of 5 body weights (in pounds) is as follows:
 116, 168, 124, 132 and 110. The mode is:
 (a) 130 (b) 116 (c) 124 (d) None of these
- 3 A statistical table must have
 (a) Title (b) Body (c) Caption (d) All of the above
- 4 Which diagram do you considered to be most suitable to present the data given below?

Temperature of Metropolitan cities ('in degree Celsius)

City	Mumbai	Delhi	Chennai	Bangalore	Calcutta
Max	32	38	36	28	38
Min	27	28	27	21	29

- (a) Simple Bar (b) Sub divided Bar (c) Percentage Bar (d) Multiple Bar
- 5 Which one of the following measurement divides a set of observations in to equal parts?
 (a) Quartiles (b) Octiles (c) Deciles (d) All of the above
- 6 Consider the following probability distribution:
 $P(X = x) = \binom{7}{x} (0.2)^x (0.8)^{7-x}, x = 0, 1, \dots, 7$, then $P(X > 3) =$ _____
 (a) 0.9667 (b) 0.0333 (c) 0.8520 (d) none of these
- 7 If A and B are two mutually exclusive events then $P(A \cup B)$ is _____
 (a) $P(A) + P(B)$ (b) $P(A) \cdot P(B)$ (c) $P(A) + P(B) - P(A \cap B)$ (d) 0
- 8 Severity of pain (none, mild, moderate, severe) is?
 (a) Nominal (b) Ordinal (c) Discrete (d) Continuous
- 9 For a symmetrical distribution
 (a) Mean = Median = Mode (b) Coefficient of skewness is zero
 (c) $Q_2 = \frac{Q_1 + Q_3}{2}$ (d) All of the above
- 10 Which of the following can be determined graphically with the help of ogives?
 (a) Mean (b) Median (c) Mode (d) Range

Q.2 Fill in the blanks (4 × 1)

- 1 Qualitative data can be represented graphically by using _____
- 2 The standard deviation of 4, 4, 4, 4, 4, 4, 4 is _____
- 3 The formula for calculating no. of class intervals in the construction of grouped frequency distribution is _____
- 4 If $P(A) = 1/4, P(B) = 2/5$ and $P(A \cup B) = 1/2$ then $P(A^c \cup B^c) =$ _____
 True - False (4 × 1)
- 5 Poisson distribution has two parameters.

[1]

[P.T.O.]

- 6 Median is also called positional average.
 7 Quartile Deviation (Q.D) is not based on all the observations.
 8 The headings of the columns of a table are called stubs.
 Q.3 Short Type Questions (Attempt Any Ten) (10 × 2)

- 1 Define Poisson distribution. Give some examples where it can be used.
 2 Give two examples each of nominal and ordinal data.
 3 State an additive law of probability for two events. Write down the same if both the events are (i) Independent (ii) Mutually exclusive.
 4 Define mean. State its uses.
 5 List out the various types of diagrams you had studied. Write in brief about any one of them.
 6 Write in brief about grouped frequency distribution.
 7 Calculate standard deviation of the data given below:

6.7	2.7	2.5	3.6	3.4	4.1	4.8	5.9	8.3
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- 8 The mean and standard deviation of binomial distribution are 9 and 2 respectively. Find $P(X \leq 3)$.
 9 List out the various measures of central tendency. Which measure do you considered to be most suitable in case of open end classes? Why?
 10 What is Skewness? Draw sketches of (i) Positive Skewness (ii) Negative Skewness (iii) Zero Skewness.
 11 List out the various parts of statistical table. Write in brief about any one of them.
 12 State an empirical relationship between mean, median and mode. When will you use it?

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

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

No.	1	2	3	4	5	6	7
Left-hand	140	90	125	130	95	121	85
Right-hand	138	87	110	132	96	110	76

- Present the above data through a most suitable diagram. State its objective(s).
 (ii) Among the 144 individuals who had experienced acute myocardial infraction (Heart attack), 46 were diagnosed with diabetes. Among 144 individuals who were free of heart disease only 25 suffered from diabetes (a) Present the above data in the two-way frequency table (b) State its objectives.

- (b) Following is the frequency distribution of systolic b.p. of 100 low – birth infants.

Systolic b.p	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
No. of Infants	1	6	14	43	21	13	1	1

- Calculate (i) Standard Deviation (S.D) (ii) Q_1, D_3, P_{25} (iii) Bowley's coefficient of skewness and comment on it.
 (c) (i) The probability that a patient will get side effect of a remdesivir injection is 0.02. If 120 patients are given that injection, find the probabilities that (a) Exactly 4 (b) less than 3 (c) at least 2, will get reaction.
 (ii) It was claimed that 1 out of 10 dentists recommend Colgate sensitive tooth paste to his patients in sensitivity of teeth. Suppose that the claim is true. If 15 dentists are selected independently and at random. Let X be the no. of dentists who recommend Colgate sensitive paste to his/her patients. Name the distribution of X . Calculate (a) $P(X > 3)$ (b) $P(X < 2)$

- (d) The weights of coffee (in gms) of 70 jars is shown in the following table:

Weight	200 - 201	201 - 202	202 - 203	203 - 204	204 - 205	205 - 206
No. of jars	13	27	18	10	1	1

Calculate mean, median and mode.

- (e) Blood cholesterol levels were recorded for 40 persons sampled in a medical study group and the following data were obtained.

233	212	249	227	249	258	265	196	310	244
256	161	195	233	199	282	286	163	205	176
195	299	210	301	357	195	226	297	227	218
355	234	195	179	174	281	154	330	223	284

(i) Construct a frequency distribution of equal class - width taking 210 - 240 as one of the classes (ii) Determine median.

- (f) (i) Let X be a Poisson variate with variance 2. Determine the following probabilities:

(a) $P(X < 2)$ (b) $P(X = 3)$ (c) $P(X > 4)$ (d) $P(X \geq 1)$

(ii) It is known that 20% of plants produced by a certain species of corn seed will be infertile. Find the probability that (a) exactly 3 (b) more than 2 (c) less than 3, seeds be infertile in a random sample of 12 such plants.

- (g) Following is the ages of 543 blood relatives of patients with Wolfram syndrome.

Age	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
No. of Persons	55	93	113	90	85	73	29	5

Is the given distribution symmetrical? Justify your answer by calculating suitable statistical measure.

- (h) Two groups of six guinea pigs each were injected, respectively with 0.5 mg, 1.0 mg of a new tranquilizer and the following are the number of minutes it took to fall asleep:

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

Which group has greater amount of variability in the measurements? Justify your answer by calculating suitable statistical measure.

————— X —————

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