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Seat No : \_\_\_\_\_

No. of Printed Pages : 03

Sardar Patel University

B.Sc. Semester - III Examination

Thursday, 28<sup>th</sup> November, 2019Saturday, 30<sup>th</sup> November, 2019

Time: 2.00 to 4.00 pm

US03ESTA04

M.Marks: 70

(Biostatistics - I)

- Note: (i) Simple/Scientific calculator is allowed (ii) Graph paper will provided on request.  
 (iii) Statistical table will be allowed/provided on request (iv) Q.3 to 6, each sub question is of 5 marks

## Q.1 Multiple Choice Questions

(10 × 1)

- (1) If the average depth of a lake is 1.4 meters, it means that
  - (a) there could be a spot in a lake where it is deeper than 1.4 meters
  - (b) an adult of average height can walk through the lake
  - (c) the deepest point of the lake is 1.4 meters
  - (d) None of these
- (2) The median of a frequency distribution can be determined graphically with the help of
  - (a) Frequency curve
  - (b) Frequency polygon
  - (c) Histogram
  - (d) Ogives
- (3) A statistical table must have
  - (a) Title
  - (b) Body
  - (c) Caption
  - (d) All of the above
- (4) If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{2}{5}$  and  $P(A \cup B) = \frac{1}{2}$  then  $P(A^c \cup B^c) =$  \_\_\_\_\_
  - (a) 0.85
  - (b) 0.58
  - (c) 0.80
  - (d) 0.50
- (5) Difficulty level of question paper (Very difficult, difficult, so-so, easy, and very easy) is?
  - (a) Nominal
  - (b) Ordinal
  - (c) Discrete
  - (d) continuous
- (6) Which of the following can be determined graphically with the help of ogives?
  - (a) Mean
  - (b) Median
  - (c) Mode
  - (d) Standard Deviation
- (7) Which of the following can be described as categorical variable?
  - (a) Taste of food
  - (b) Pulse rate
  - (c) Time spent on mobile (in hours)
  - (d) Morality rate
- (8) The standard deviation of 4,4,4,4,4,4,4,4 is
  - (a) 1
  - (b) 4
  - (c) 0
  - (d) impossible to calculate
- (9) The formula for computing the number of classes in construction of grouped frequency distribution is
  - (a)  $3.322 \log(N)$
  - (b)  $1 + 0.322 \log(N)$
  - (c)  $1 - 3.322 \log(N)$
  - (d)  $1 + 3.322 \log(N)$
- (10) Consider the following probability distribution:
 
$$P(X = x) = \frac{e^{-2} 2^x}{x!}, x = 0, 1, 2, \dots$$
 The value of  $P(X < 3) =$  \_\_\_\_\_
  - (a) 0.40601
  - (b) 0.85712
  - (c) 0.67668
  - (d) 0.13534

## Q.2 Short Type Questions (Attempt Any Ten)

(10 × 2)

- (1) With reference to probability define the following terms: (a) Sample space (b) mutually exclusive events
- (2) Define variable and categorical variable. Give two examples of each.
- (3) State the importance of diagrams.
- (4) A and B are two events such that  $P(A) = 0.4$ ,  $P(B) = 0.3$  and  $P(A \cup B) = 0.5$  then find  $P(B^c \cap A)$ .
- (5) Name the diagram do you prefer to represent the following data:

①

(P.T.O)

**MARKET SHARE OF LOW CALORY SUGAR IN INDIA**

Brand	Sugar free	Sacharin	Sweetex	Equal	Zero
Market share (%)	65	13	12	6	4

State its objective(s).

- (6) Let  $X$  be a random variable with  $b\left(8, \frac{1}{4}\right)$  distribution.  
 Determine (i) Mean and standard deviation of  $X$  (ii)  $P(X \geq 4)$ .
- (7) What is grouped frequency distribution?
- (8) The variance of Poisson distribution is 0.9. Find its mean, standard deviation and  $P(X > 2)$ .
- (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 an average? State its uses.
- (11) The mean and standard deviation of binomial distribution are 9 and 2 respectively. Find its parameters.
- (12) Define Mean. Write down the formulae to calculate mean.
- Q.3(a) What is grouped frequency distribution? Write down the rules for constructing grouped frequency distribution
- (b) Present the following information through a most suitable diagram. State its objective(s).

Asian Countries	Unemployment Rate		
	Educated	Uneducated	Total
India	8	19	27
Pakistan	11	23	34
Nepal	17	24	41
Bangladesh	16	20	36

OR

- Q.3(a) List out the various types of diagrams you have studied. Describe any one of them by giving an example.
- (b) In a sample study about the coffee habits in two towns, the following information was received:  
 Town A: Females were 40%; Total coffee drinkers were 45% and Male non-coffee drinkers were 20%.  
 Town B: Males were 55%; Males non-coffee drinkers were 30% and females coffee drinkers were 15%. Present the above data in a tabular form.
- Q.4(a) List out the various measures of dispersion. Write in brief about each one of them.
- (b) A study was conducted to comparing female adolescent who suffer from bulimia to healthy females with similar body composition and levels of physical activity. Listed below are measures of daily caloric intake, recorded in kilocalories per kg, for samples of adolescents from each group.
- (i) Find the median daily caloric intake for both the bulimic adolescents and the healthy ones.
- (ii) Which group has a greater amount of variability in the measurement?

Daily Caloric Intake(Kcal/Kg)			
Bulimic		Healthy	
15.9	18.9	20.7	30.6
16	19.6	22.4	33.2
16.5	21.5	23.1	33.7
17	21.6	23.8	36.6
17.6	22.9	24.5	37.1
18.1	23.6	25.3	38.4

OR

- Q.4(a) List out the various measures of central tendency. Write in brief about any one with its merits and demerits.
- (b) A study is conducted to determine if dieting plus exercise is more effective in producing weight loss than

dieting alone. 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	11	12
Diet+ Exercise	24	20	22	15	23	21	16	17	19	25	24	13
Diet alone	16	18	19	16	18	18	17	19	13	18	19	14

(i) Identify the objective (s) of the study (ii) Which group has greater amount of variability in the measurements? Justify your answer by calculating suitable statistical measure.

Q.5 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 Karl – Pearson’s coefficient of skewness and comment on it.

OR

Q.5(a) What is skewness? State its uses. List out the various methods of studying skewness and write in brief about any one of them.

(b) An analysis of the fat content (%) of a random sample of 175 cheese burgers resulted in the following summarized information:

Fat Content (%)	26 - 28	28 - 30	30 - 32	32 - 34	34 - 36	36 - 38	38 - 40
No. of burgers	7	22	36	45	33	28	4

Compute Bowley’s coefficient of skewness and comment on shape of the distribution.

Q.6(a) Only 2% of the people in a city feel that its mass transits system is not adequate. If 160 persons are selected at random, find the probability that (i) Exactly 3 (ii) 2 or more (iii) less than 2, who feels that the system is not adequate?

(b) A and B are two events such that  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cap B) = \frac{1}{4}$

Find (i)  $P(A/B)$  (ii)  $P(B/A)$  (iii)  $P(A \cup B)$  (iv)  $P(A \cap B')$  (v)  $P(A' \cap B)$

OR

Q.6(a) 20% of the students in a college having blood group O. If 12 students from the college are randomly selected, find the probability that (i) 3 or more (ii) exactly 2 (iii) at most 2, students selected at random will have blood group O.

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

(i)  $P(X < 2)$

(ii)  $P(X = 3)$

(iii)  $P(X > 4)$

(iv)  $P(X \geq 1)$

— X —  
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