

Ex/1-Stat/IS/16/2017

BACHELOR OF SCIENCE EXAMINATION, 2017

(1st Year, 1st Semester)

STATISTICS

Paper - 1-Stat

(Descriptive Statistics - I)

Full Marks : 50

Time : Two Hours

The figures in the margin indicate full marks.

Answer Question No. 1 and any *three* from the rest.

1. Draw the histogram of the following frequency distribution showing the no. of boys on the registers of primary schools in a certain state :

Age (in years)	No. of boys (in thousands)	Age (in years)	No. of boys (in thousands)
2-5	150	13-14	496
5-11	3066	14-15	143
11-12	497	15-17	162
12-13	477		

2

[Turn over]

[2]

2. (a) The weights in grams of 50 apples picked out at random from a consignment are as follows :

106, 107, 76, 82, 109, 107, 115, 93, 187, 95, 123, 125, 111, 92, 86, 70, 126, 68, 130, 129, 139, 119, 115, 128, 100, 186, 84, 99, 113, 204, 111, 141, 136, 123, 90, 115, 98, 110, 78, 90, 107, 81, 131, 75, 84, 104, 110, 80, 118, 82.

- (i) Form the grouped frequency table by dividing the variate range into intervals of equal width, each corresponding to 20 grams, in such a way that the mid-value of the first class corresponds to 70 grams.
- (ii) Find the mean, median and mode of the frequency distribution so obtained. 4+6

- (b) Calculate the three quartiles for the following frequency distribution of the no. of marks obtained by 49 students in a class :

Marks group	No. of Students	Marks group	No. of Students
5-10	5	25-30	5
10-15	6	30-35	4
15-20	15	35-40	2
20-25	10	40-45	2

[Turn over]

[3]

3. (a) For a grouped frequency distribution, show that
arithmetic mean \geq geometric mean \geq harmonic mean
mentioning the case when equality holds. 7+1

(b) Show that

(i) sum of deviations about arithmetic mean is zero,

(ii) sum of absolute deviations about median is least,

(iii) sum of squares of deviations about arithmetic mean
is least. 1+4+3

4. (a) If for a random variable x , the absolute moment of order
 K exists for ordinary $K = 1, 2, 3, \dots, n$, then prove
that the following inequalities

(i) $\beta_K^2 \leq \beta_{K-1} \beta_{K+1}$

(ii) $\beta_K^{1/K} \leq \beta_{K+1}^{1/(K+1)}$

hold for $K = 1, 2, 3, \dots, n - 1$, where β_K is the K^{th}
absolute moment about the origin. 6

(b) Find the mean deviation about mean and standard
deviation of the frequency distribution of the data
mentioned in the question no. 2(b). Also find the

[Turn over]

[4]

coefficients of skewness and Kurtosis for the same distribution. 5

(c) Describe the methods of determining the skewness and Kurtosis of a given frequency distribution. 5

5. (a) Find the mean, variance and coefficients of skewness and Kurtosis of the Poisson's distribution with parameter λ . 8

(b) Find the mode of the binomial distribution with parameters n and p . 4

(c) Define correlation coefficient between two random variables. Show that, if the two random variables are independent, their correlation coefficient is zero, but its converse is not necessarily true. 1+3

6. (a) An employment bureau asked applicants their weekly wages on jobs last held. The actual wages were obtained for 54 of them and are recorded in the table below ; x represents reported wage, y actual wage, and the entry in the table represents frequency. Find the correlation coefficient and comment on the significance of the computed value.

[*Turn over*]

[5]

y →	15	20	25	30	35	40
↓ x						
40						2
35				3	5	
30			4	15		
25			20			
20		3	1			
15	1					

8

(b) Determine the constants of the curve $y = ax^b$ which best fits the data given below :

x	4	5	6	7	8
y	8	12.5	18	24.5	32

8