University of Barishal

Department of CSE

B.S (Hon's) 1st Year 2nd Semester Final Examination-2023

Exam Session: 2022-23

Course name: Statistics and Probability **Course code: STAT-1211**

Total Marks: 60 **Time: 3 Hours**

Answer any FIVE questions. Marks are indicated at the end of the question

1. (a) What do you mean by statistics? Write down the applications and limitations of statistics mentioning at least one example in each case. [4]

   (b) Distinguish between (i) Population and Sample and (ii) Descriptive statistics and Inferential statistics. [4]

   (c) Briefly describe different types of variables with appropriate example. [4]

2. (a) Define primary and secondary data. Mention various sources of collecting primary and secondary data. [4]

   (b) The data below represent the number of employees of an organization who were sick per day on 30 working days: [8]

7	5	14	11	10	12	8	9	14	13
10	10	11	11	14	9	11	7	13	12
12	16	18	13	13	17	11	14	14	12

   i. Display the dataset with an stem-leaf display.

   ii. Construct a frequency distribution and draw histogram.

   iii. Find the five-number summary and comment.

3. (a) What do you mean by measures of central tendency? Write down the properties of mode. [3]

   (b) For n non-zero positive numbers, prove that $AM \geq GM \geq HM$. [3]

   (c) An incomplete frequency distribution is as follows, where median is 72, then find f_1 and f_2, [6]

Income (TK.)	40-50	50-60	60-70	70-80	80-90	90-100	Total
No. of Families	8	15	f_1	25	f_2	5	100

4. (a) What do you mean by measures of dispersion? Mention Skewness and Kurtosis. [3]

   (b) "Variance is not always non-negative"-explain. [3]

   (c) i. Mean and standard deviation of the age of 100 students are 30 years and 5 years respectively. But the age of one student was written 30 years instead of 40 years at the time of processing the data. Find out the corrected mean and standard deviation. [6]

   ii. For a distribution, $mean = 65$, $median = 70$ and coefficient of $Skewness = -0.5$. Find the mode and coefficient of variation.

5. (a) What is correlation? Write down the differences between correlation and regression. [4] Graphically plot, $r_{xy} = -0.89$, $r_{xy} = -1$, $r_{xy} = +1$ and $r_{xy} = +0.92$

   (b) What do you mean by regression analysis? Mention the properties of regression analysis. [4]

   (c) Estimate the regression equation of y on x and x on y when regression coefficient is 0.61 for the following dataset [4]

	Advertising expenditure (Lakh)	*Sales (Crore)*
Mean	*35.00*	*82.00*
Standard deviation	*9.03*	*17.16*

6 (a) Define random variable and mention the properties of it. [3]

   (b) If X is a random variable with expectation $E[X]$, then $E[aX + b] = aE[X] + b$ for any numerical constants a and b. [3]

   (c) A continuous random variable has the following pdf, [6]

$$f(x) = \frac{3}{4}x(2 - x); \qquad 0 < x < 2$$

   i. Find the cumulative distribution function of X.

   ii. Calculate mean and mode.

   iii. Plot Skewness using (ii) and comment.

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7. (a) Define Poisson distribution and the properties of it. [4]

(b) Prove that mean>variance of Binomial distribution. [4]

(c) Over a long period of time it has been observed that a given rifleman can hit a target on a single trial with probability equal to 0.8. Suppose that he fires four shots at the target. [4]

(i) what is the probability he will hit the target exactly two times?

(ii) what is the probability that he will hit the target at least once?

8. (a) Define normal distribution and mention its properties. [3]

(b) Show that mean and median of normal distribution is equal. [3]

(c) The average number of calls received by a telephone operator during a time interval of 10 minutes during 5 PM to 5.10 PM daily is 3. What is the probability that the operator will receive (i) no call (ii) exactly one call and (iii) at least two calls tomorrow during the same time interval? [3]

(d) The grade-point average score of 50 students of the department of CSE of BU in their final examination was found to follow approximately a normal distribution with a mean 2.1 and variance 0.36. How many of these students are expected to have a score between 2.5 and 3.5? [3]

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