D1BHM2303 **Reg.No.....**

Name: .....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(Regular/Improvement/Supplementary)

HONOURS IN MATHEMATICS

GMAH1B03T: PROBABILITY AND STATISTICS

Time: 3 Hours **Maximum Marks: 80**

PART A: Answer *all* the questions. Each carries *one* mark.

1. The empirical relationship between mean, median and mode is given by:
   a) Mode = 3 Mean – 2 Median. b) Mode = 3 Median – 2 Mean.
   c) Mode = 3 Mean – 2 Median. d) Mode = 2 Median – 3 Mean.
2. If the minimum value in a set is 12 and its range is 60, the maximum value of the set is:
   a) 50 b) 5 c) 48 d) 72
3. For a platykurtic curve, the coefficient of kurtosis is:
   a) Less than 3. b) Greater than 3. c) Equal to 3. d) None of these.
4. In a correlation analysis, if r = +0.32, then we say that, there is .....between variables.
   a) No correlation. b) Positive correlation.
   c) Negative correlation. d) Perfect positive correlation.
5. If both regression coefficients are negative, then the correlation coefficient is.....
   a) Negative. b) Positive. c) Zero. d) None of these.

Fill in the Blanks.

6. If two variables are moving and varying in the same direction; Correlation is said to be.....
7. When two coins are tossed simultaneously, the probability of getting at least one head is.....
8. If P(A) = 0.40 , P(B) = 0.30 , P($A \cup B$) = 0.60 , then P ($A \cap B$) is …….
9. P($A \cup B$) = P(A) + P(B) implies A and B are.....
10. If $F(x)=\frac{x+1}{2}; 0 \le x \le 2$
    then its pdf f(x) = ……

(10 x 1 = 10 Marks)

(PTO)

PART B: Answer any *eight* questions. Each carries *two* marks.

11. The mean weight of 45 boys is 70 kg and means weight of 55 girls is 62 kg. Compute the mean weight of all the persons.
12. Find QD for the following data: 13, 15, 20, 15, 45, 26, 24, 12, 19, 9, 18 and 15.
13. The second, third and fourth central moments of a distribution are 2.5, 0.7 and 18.75. Find the measures of kurtosis.
14. The coefficient of rank correlation of the marks obtained by 10 UG students in two courses was 0.83. It was later discovered that the difference in ranks in the two courses of one of the students was wrongly taken as 2 instead of 4. Find the correct rank correlation coefficient.
15. If the covariance between X and Y is 690 and variance of X and Y are 900 and 1600 respectively. Find out the coefficient of correlation.
16. From the following data calculate coefficient of correlation.
    x = 0.854y , y = 0.89x
17. Suppose a student is selected at random from 80 students where 30 are taking Mathematics, 20 are taking Statistics, and 10 are taking Mathematics and Statistics. Find probability that the student is taking Mathematics or Statistics.
18. Three newspapers A, B and C are published in a certain city. It is estimated that from a survey that of the adult population: 25% read A, 14 % read B, 12% read C, 6% read both A and B, 6% read both A and C, 5% read both B and C, 3% read all three. Find what percentage read at least one of the papers?
19. If X is a random variable with p.d.f $f(x)=e^{-x}$, $x \geq 0$. Find the distribution function of X.
20. If P(X = x) = $\frac{1}{2}$, x = 1, 2. Find the probability distribution of Y = X - 2.

(8 x 2 = 16 Marks)

PART C: Answer any *six* questions. Each carries *four* marks

21. Compute geometric mean of the following data:

Marks	0 - 10	10 - 20	20 - 30	30 -40	40 - 50
No of students	25	16	13	10	6

22. Calculate MD about Median and the coefficient of MD.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
f	15	16	25	21	15	8

23. What is meant by skewness? Explain different methods for measuring skewness.
24. Find out coefficient of kurtosis by the method of moments from the following data.

x	5	10	12	15	17
f	4	7	9	10	5

25. Ten students have obtained the following marks in mathematics and statistics. Calculate Rank correlation coefficient.

Mathematics:	60	30	50	30	40	10	30	70
Statistics:	45	29	48	45	60	70	40	90

26. From a group of 15 students consisting of 10 boys and 5 girls, 4 students are selected at random. Compute the probability that the selected group contains:

    (i) No boys. (ii) More girls than boys.

27. Let X be a random variable such that

    $P(X = -2) = P(X = -1)$, $P(X = 2) = P(X = 1)$ and $P(X > 0) = P(X < 0) = P(X = 0)$

    Obtain the probability mass function and distribution function of X and X^2.

28. Given $f(x) = e^{-x}, x \geq 0$ is the pdf of a random variable X, find the pdf of Y = 7 - 3X.

(6 x 4 = 24 Marks)

(PTO)

PART D: Answer any *two* questions. Each carries *fifteen* marks.

29. Given the two equations for the regression lines : 3 x + 12 y = 19 and 3y + 9x = 46
    (i) Identify the regression lines of Y on X and X on Y.
    (ii) Obtain the regression coefficients and the correlation coefficient.
    (iii) Find the mean of x and y.
    (iv) Given the standard deviation of X = 4 , find the standard deviation of Y.
    (v) Given the standard deviation of Y = 6 , find the standard deviation of X.
30. Women in a city college constitute 60% of the freshmen, 40% of the sophomores, 40% of the juniors, and 45% of the seniors. The college population is 30% freshmen, 25% sophomores, 25% juniors, and 20% seniors. A student from City College is chosen at random. Find the probability that the student is a sophomores.
31. (a) Define distribution function of a random variable. State its important properties.
    (b)Let X be a continuous random variable with p.d.f $f(x)=\begin{cases} k, & -2\le x\le 12 \\ 0, & otherwise \end{cases}$
    Determine (i) k (ii) The cumulative distribution function F(x).

(2 x 15 = 30 Marks)