Registration No.:

23242MTH25011
Paper Code: A

Course Code:MTH302
Course Title:PROBABILITY AND STATISTICS

Time Allowed: 01:30hrs. **Max Marks: 30**

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.

2. This question paper contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.

3. All questions are compulsory.

4. Do not write or mark anything on the question paper and/or on rough sheet(s) which could be helpful to any student in copying, except your registration number on the designated space.

5. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q(1) If X and Y denote the random variables and f is the differentiable function, then

(a) $e^{X/Y}$ is random variable but $|X|$ is not.

(b) $|X|$ is random variable but $|X/Y|$ is not.

(c) $f(X+Y)$ is random variable.

(d) $f(X-Y)$ is not random variable.

CO1,L1

Q(2) For a discrete random variable X, Probability P and cumulative distribution function F

(a) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha) - P(X=\alpha)$

(b) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha) + P(X=\alpha)$

(c) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha) + P(X=\beta)$

(d) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha) - P(X=\beta)$

CO1,L1

Q(3) If X is continuous random variable, P is Probability and F is distribution functions then consider the following:

(i) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha)$

(ii) $P(\alpha \le X \le \beta) = F(\beta) - F(\alpha) + P(X=\alpha)$

(a) (i) is correct but not (ii)
(b) (ii) is correct but not (i)
(c) (i) and (ii) both are correct
(d) (i) and (ii) both are not correct

CO1,L1

Q(4) If $p(x) = \begin{cases} \frac{x}{15}, & x = 1,2,3,4,5 \\ 0, & otherwise \end{cases}$ then $P(\frac{1}{2} < X < \frac{5}{2})$

(a) $\frac{1}{15}$ (b) $\frac{2}{15}$ (c) $\frac{3}{15}$ (d) 1

CO1,L1

Q(5) Consider the statements:

(i) For a discrete random variable X, the probability at a point is always vanishes.

(ii) For a continuous random variable X, the probability at a point is always vanishes.

(a) The statement (i) is correct but not (ii)
(b) The statement (ii) is correct but not (i)
(c) The statement (i) and (ii) both are correct.
(d) The statement (i) and (ii) both are not correct.

CO1,L1

Q(6) If the joint probability distribution is: $f(x,y) = k, x^2 \le y \le x, 0 \le x \le 1$, otherwise vanishes then value of the constant k is

(a) ± 6 (b) $\pm\frac{1}{6}$ (c) 6 (d) -6

CO1,L1

Q(7) If two random variables are stochastically independent then
(a) Joint probability is equal to product of their marginal probability.
(b) Joint probability is equal to sum of their marginal probability.
(c) Joint probability is equal to difference of their marginal probability.
(d) Joint probability is equal to division of their marginal probability.

CO1,L1

Q(8) Statement: The variance $var(-a) = a^2$.
Reason: The variance is $var(aX) = a^2 var(X)$.

(a) Statement and reason both are correct.
(b) Statement is correct but not the reason.
(c) Reason is correct but not the statement.
(d) Neither the statement nor the reason is correct.

CO1,L1

Q(9) The covariance $Cov(X - a, -Y)$ is
(A) $\pm cov(X, Y)$
(B) $cov(X, Y)$
(C) $-cov(X, Y)$
(D) $cov(-X - a, Y + a)$

CO1,L1

Q(10) Consider the data

X	-1	1
Y	1	1

Then Covariance between X and Y is

(a) 0 (b) 1 (c) -1 (d) does not exist

CO1,L1

Q(11) If $r(X,Y)$ denotes the correlation coefficient of the random variables X and Y and σ_{XY} denotes the covariance of the random variables X and Y then
(a) $r(X,Y) = \sigma_{XY}/\sigma_X\sigma_Y$ where σ_X and σ_Y are standard deviations of X and Y respectively
(b) $r(X,Y) = \sigma_{XY} \times \sigma_X\sigma_Y r(X,Y) = \sigma_{XY} + \sigma_X\sigma_Y$ where σ_X and σ_Y are standard deviations of X and Y respectively
(c) $r(X,Y) = \sigma_{XY}/\sigma_X\sigma_Y$ where σ_X and σ_Y are standard deviations of X and Y respectively
(d) None of the above

CO1,L1

Q(12) If the increase /decrease in one variable results in the corresponding increase/decrease in other variable, then the variables are said to be
(a) Uncorrelated
(b) Negatively Correlated
(c) Both Negatively and Positively Correlated
(d) None of the above

CO1,L1

Q(13) Karl Pearson's Correlation Coefficient is also called
(a) Product Moment Correlation Coefficient
(b) Perfect and Positive Correlation Coefficient
(c) Perfect and Negative Correlation Coefficient
(d) None of the above

CO1,L1

Q(14) Correlation Coefficient is Independent of
(a) Change of Origin only
(b) Change of scale only
(c) Change of Origin and Scale
(d) None of the above

CO1,L1

Q(15) If r denotes the correlation coefficient of random variables X and Y, then which of the following is true
(a) $r < -1$ (b) $r > 1$ (c) $-1 \le r \le 1$ (d) None of the above

CO2,L1

Q(16) If $r(X,Y)$ denotes the correlation coefficient of random variables X and Y and a,b,c,d are provided that $a \neq 0, c \neq 0$, then

(a) $r(aX+b, cY+d) = \frac{ac}{|ac|} r(X,Y)$

(b) $r(aX+b, cY+d) = \frac{ab}{|ac|} r(X,Y)$

(c) $r(aX+b, cY+d) = \frac{ac}{|bd|} r(X,Y)$

(d) None of the above

CO2,L1

Q(17) The independent variable is used to explain the dependent variable in

(a) Non-linear regression analysis
(b) Multiple regression analysis
(c) Linear regression analysis
(d) None of the above

CO1,L1

Q(18) If one regression coefficient is greater than unity then the other must be

(a) Greater than unity (b) Equal to unity (c) Less than unity (d) None of the above

CO2,L1

Q(19) Regression Coefficients are Independent of the

(a) Change of origin and scale
(b) Change of origin but not of scale
(c) Change of scale only
(d) None of the above

CO2,L1

Q(20) If the two variables are uncorrelated, then the lines of regression are

(a) Parallel (b) Perpendicular (c) Coincide (d) None of the above

CO2,L1

Q(21) To find the probability that the person tossing a coin gets fourth head on the seventh toss, which distribution is used?

(a) Binomail Distribution
(b) Poisson Distribution
(c) Negative Binomail Distribution
(d) Geometric distribution

CO3,L3

Q(22)

The probability that a patient recovers from a rare blood disease is 0.3 and 12 people are known to have contracted this disease. What is the mean of X, representing the number of people who survive?

(a) 6.3 (b) 2.52 (c) 4 (d) 3.6

CO3,L3

Q(23) In a poisson distribution, the second moment about origin is 6. Then, its first moment about origin is

(a) 36 (b) $\frac{1}{6}$ (c) 6 (d) -6

CO3,L3

Q(24) Which of the following statement is not true?

(a) Mean of Binomail distribution is 6 and variance is 3.6.
(b) The poisson distribution is a limiting case of Binomail distribution when $n \to \infty, p \to 0, np \to \lambda$.
(c) Geometric distribution is a special case of Negative Binomial distribution where k=1.
(d) Mean of a Poisson distribution is 5 and variance is 2.3.

CO3,L3

Q(25) Find the probability of failure if getting a number greater than 4 is termed as success when a die is rolled.

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{4}{3}$ (d) $\frac{2}{5}$

CO3,L3

Q(26) The mean of a random variable following a Geometric distribution is 20. The probabilty of failure is

(a) 20 (b) 0.42 (c) 0.05 (d) 0.95

CO3,L3

Q(27) In a manufacturing process, on an average, 1 in every 20 items is defective. What is the probability that the second item inspected is the first defective item found?

(a) 0.002 (b) 0.03 (c) 0.0475 (d) 0.5

CO3,L3

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Q(28) Find the probability that a person flipping a coin gets the third head on the seventh flip.

(a) 0.1172 (b) 0.0625 (c) 0.599 (d) 0.42

CO3,L3

Q(29) If X is a random variable which satisfies Binomial distribution with $\sigma_X^2 = \frac{9}{16}$ and $p = \frac{1}{4}$, then $n = ?$

(a) 4 (b) 5 (c) 3 (d) 9

CO3,L3

Q(30) If a random variable X satisfies Poisson distribution with $n = 400$ and $p = 0.005$, then mean is

(a) 0.005 (b) 1.99 (c) 2 (d) 0.5

CO3,L3

--End of Question paper--