1550

Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech Mid Semester Exam

Semester: 4th **Date: (31/01/2025)**

Subject Code: 303191251 **Time: (1hr: 30min)** 3 to 4:30

Subject Name: Probability, Statistics and Numerical Methods **Total Marks: 40**

Sr. No.		Marks	Co/Po
Q.1	(A) Five One line Questions	05	
	(1) Write the formula of the regression equation of x on y, in terms of mean and standard deviations.		1
	(2) An unbiased coin is tossed 6 times. find the number of points in the sample space.		1
	(3) Write the mean and variance of the Binomial distribution.		2
	(4) For which value of k will F(x) be the probability mass function?		2
	<table><tr><td>X</td><td>-1</td><td>0</td><td>1</td></tr><tr><td>F(X)</td><td>0.5</td><td>0.8</td><td>k</td></tr></table>		4
	(5) Compute the root of function $f(x) = x^2 - 3$ after one iteration using bisection method in the interval [0, 2].		
	(B) Five Fill in the blanks	05	
	(1) The statement "Correlation coefficient is independent of the change of origin but not of scale" is _____ (True/False)		1
	(2) The value of correlation coefficient r when both the regression coefficients are $\frac{-1}{12}$ and $\frac{-4}{3}$ is _____		1
	(3) A and B are two independent events and their probabilities are $P(A) = 0.4$ and $P(B) = 0.5$ then $P(A \cap B) =$_____.		2
	(4) The mean of the Poisson distribution is 0.25, then the variance of the mean i.e. V(mean) is equal to _____		2
	(5) The method which uses latest available values instead of previous iteration values is called _____ (Gauss Jacobi method / Gauss Seidel method		4
Q.2	Attempt any four (Short Questions)	12	
	(1) Find the Pearson's Correlation Coefficient of the following data: <table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Y</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td></tr></table>		1
	(2) The following information is obtained for two variables x and y. $n = 4, \sum x = 20,\ \sum y = 10,\ \sum x^2 = 120,\ \sum y^2 = 30$		1

	& $\sum xy = 42$, Find the regression coefficients b_{yx}, b_{xy} and correlation coefficient.		
	(3) A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (i) a king of red color (ii) a face card (iii)the queen of diamonds.		2
	(4) Find a positive real root for $2x^3 - 2x - 5 = 0$ using Newton-Raphson Method correct upto 3 digit taking $x_0 = 1.5$.		2
	(5) If $P(A) = \frac{1}{2}$, $P(B') = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{5}$, find $P(A \cup B)$, $P(A' \cap B)$ and $P(A'\|B')$.		4
Q.3	Attempt any two questions	08	
	(1) An experiment gave the following values X: 0, 1, 2, 3 Y: 1.05, 2.1, 3.85, 8.3 Fit an exponential curve $y = ae^{bx}$.		1
	(2) In a factory which manufactures bolts, machines X, Y and Z manufacture 30%, 50% and 20% of the bolts respectively. Of their output 3%, 4% and 1% respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective. Find the probability that this is not manufactured by machine Y.		2
	(3) The probability distribution of a random variable X is given below $X = x_i$: 1, 2, 3, 4, 5 $P(X = x_i)$: 0.1, 0.2, 0.3, 0.15, 0.25 Find (i) $E(X)$ (ii) $V(X)$ (iii) $E(2X - 1)$ and (iv) $V(2X - 1)$.		4
Q.4	(A) Using Gauss-Seidel method, solve the system of linear equation, $2x+y+z=5$, $3x+5y+2z=15$, $2x+y+4z=8$. Correct upto three decimal places.	05	2
	(B) Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored. (i) More than 60 marks (ii) Less than 56 marks (iii) Between 45 and 65 marks? $P(0 < z < 0.8) = 0.2881$, $P(0 < z < 3) = 0.4986$, $P(0 < z < 1) = 0.3413$.	05	1
	OR		
	(B) There are 100 misprints in a book of 100 pages. If a page is selected at random, find the probabilities that (i) there will be no misprint in the page (ii) there will be 1 misprint (iii) there will be at the most 2 misprints.	05	4