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School of Engineering Sciences & Technology
Odd Semester Examination-2024

Paper Name: Essential Mathematics & Biostatistics
 Time: 2.5 Hours
 Note: Programmable calculator is not allowed.

Paper Code: MCSB-104
 Maximum Marks: 60

PART - A

(All questions are compulsory)

(4 X 5 = 20)

S. No	Questions	Marks	CO	BL
Q.1	(a): Write the solution set of the equation $x^2 - 4 = 0$, in roster form. (b): In a group of 300 students, 216 students study Hindi and 129 study Punjabi. How many study Hindi only? How many study Punjabi only and how many study both Hindi and Punjabi?	5	CO1	L4
Q.2	(a): If $\alpha + \beta = \frac{\pi}{2}$, find the value of $\tan \alpha \cdot \tan \beta$ (b): If $\sec \theta - \tan \theta = P$, find the value of $\tan \theta$	5	CO2	L5
Q.3	Find the inverse of the matrix by using adjoint of the matrix. $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \end{bmatrix}$	5	CO3	L3
Q.4	$z = x^3 + x^2y + y^3$, prove that $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 3z$.	5	CO4	L2

PART - B

(Attempt any Four Questions)

(4 X 10 = 40)

S. No	Questions	Marks	CO	BL
Q.1	(a): Find $\frac{dy}{dx}$, if $y = u^3 + 1$, $u = \frac{1}{\sqrt{v+2}}$, $v = 9x^3 + 8x^2 - 7x + 2$. (b): A dice is thrown twice and the sum of the numbers appearing is noted to be 8. What is the conditional probability that the number 5 has appeared at least once?	5 5	CO2 CO3	L4 L5

Q.2	In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from Machine A.	10	CO4	L4
Q.3	(a): Solve the differential equation by separation method if $\frac{dy}{dx} = \frac{1 - \cos x}{1 + \cos x}$ (b): Solve the linear differential equation $(1 + x^2) \frac{dy}{dx} + 2xy = 4x^2$.	5 5	CO5	L1 L3
Q.4	Find the co-variance and Karl Pearson's coefficient of correlation between x and y from the following $\begin{array}{cccccc} x: & 1 & 3 & 4 & 5 & 7 \\ y: & 3 & 7 & 9 & 11 & 15 \end{array}$	10	CO3	L2
Q.5	(a): Compute the variance, standard deviation, and coefficient of variation for the given data: 12, 6, 7, 3, 15, 10, 18, 5 (b): Find the value of χ^2 goodness of fit for the following data, also find the degree of freedom. Observed freq. 10 4 15 18 20 15 5 2 3 Expected freq. 10 7 10 15 25 10 5 5 5	5 5	CO1	L4 L5
Q.6	(a): What do you mean by Hypothesis? Define Null and Alternative Hypothesis. (b): Find the average Marks of the students by the Short-cut method. (Assumed mean is 30). Marks: 5 10 15 20 25 30 35 40 45 50 No. of students: 20 43 75 67 72 45 39 9 8 6	5 5	CO5	L1 L4

BL- Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analyzing, 5- Evaluating, 6- Creating)

CO- Course Outcomes,

*****End of Paper*****
