

JAMIA HAMDARD
Department of Computer Science & Engineering
School of Engineering Sciences & Technology
Odd Semester Examination-2024

Paper Name: Mathematical Foundations of Computer Science
 Paper Code: MTCSE 101 /MTDS 101 /MTCFIS 101

Time: 2.5 Hours
 MM: 60

PART –A

(All questions are compulsory)

(4 X 5 = 20)

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level								
Q.1	State Central Limit Theorem. Box A contains 5 red and 3 white marbles, and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of the same color? .	5	CO1	L4								
Q.2	Apply Euclidean algorithm to compute greatest common divisor of 3076 and 1976.	5	CO6	L3								
Q.3	Define a vector space V over a field F. Express $v = (1, -2, 5)$ in R^3 as a linear combination of the vectors $v_1 = (1, 1, 1)$, $v_2 = (1, 2, 3)$, $v_3 = (3, -1, 1)$.	5	CO5	L2								
Q.4	Let X be random variable with the following probability distribution <table border="1"><tr><td>X</td><td>-3</td><td>6</td><td>9</td></tr><tr><td>P(X = x)</td><td>1/6</td><td>1/2</td><td>1/3</td></tr></table> Find first four central moments.	X	-3	6	9	P(X = x)	1/6	1/2	1/3	5	CO2	L3
X	-3	6	9									
P(X = x)	1/6	1/2	1/3									

PART – B

(Attempt any Four Questions out of Six)

(4 X 10 = 40)

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level												
Q.1	From the following data, fit the regression equation for Y on X. Also obtain the coefficient of correlation between X and Y <table><tr><td>X</td><td>6</td><td>2</td><td>10</td><td>4</td><td>8</td></tr><tr><td>Y</td><td>9</td><td>11</td><td>5</td><td>8</td><td>7</td></tr></table>	X	6	2	10	4	8	Y	9	11	5	8	7	10	CO3	L5
X	6	2	10	4	8											
Y	9	11	5	8	7											
Q.2	The probability density function of a random variable X is $f(x) = \begin{cases} e^{-2x} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$ Compute (i) $E(X)$ (ii) $E(X^2)$ (iii) $Var(X)$ (iv) $P(X > 1)$.	10	CO1	L4												

Q.3	Compute the remainder when 193^{183} is divided by 19.					10	CO6	L4
Q.4	For the following data:					10	CO3	L3
	Marks	0-5	5-10	10-15	15-20			
	No. of students	7	12	25	12			
	Find (i) mean (ii) mode (iii) median (iv) standard deviation.							
Q.5	Define a linear transformation from a vector space V to U over a field F . Suppose the mapping $F: R^2 \rightarrow R^2$ is defined by $F(x, y) = (x + y, y)$. Show that F is linear.					10	CO5	L3
Q.6	Explain the following terms with example: (i) Complete Graph (ii) Euler Graph (iii) Simple Graph (iv) Complement of a Graph (v) .					10	CO4	L2

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

CO-Course Outcomes

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