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Odd Semester Examination-2024 (Backlog)

Paper Name: Mathematical Foundations of Computer Science
 Paper Code: MTCSEDS101 (Backlog)

Time: 2.5 Hours
 Maximum Marks: 60

PART –A

(All questions are compulsory)

(4 X 5 = 20)

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level
Q.1	Explain the following terms with example: (a) Adjacent Vertices (b) Adjacent Edge (c) Out-degree (d) In-degree	5	CO4	L2
Q.2	Estimate median, first quartile and third quartile from the following distribution of marks obtained by forty-nine students in the Mathematics class. Marks(M): 0-5 5-10 10-15 15-20 Frequency (F): 1 4 6 15 Marks(M): 20-25 25-30 30-35 35-40 40-45 Frequency(F):10 5 4 2 2	5	CO3	L4
Q.3	An urn contains six white and ten black balls. Another urn contains four white and three black balls. Two balls are drawn from the first urn one by one and placed into the second urn. Now one ball is drawn from the second urn. What is the probability that it is a white ball?	5	CO1	L3
Q.4	Construct the distribution function and compute $P(X > \frac{1}{2})$, where $f(x) = \begin{cases} kx(1-x) & \text{if } 1 > x > 0 \\ 0 & \text{otherwise} \end{cases}$ is a probability density function for some constant k.	5	CO2	L6

PART – B

(Attempt any Four Questions out of Six)

(4 X 10 = 40)

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level																		
Q.1	Fit a second degree curve (say, parabola) $Y = a + bX + cX^2$ for the following data: <table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Y</td><td>1</td><td>5</td><td>10</td><td>22</td><td>38</td></tr></table>	X	0	1	2	3	4	Y	1	5	10	22	38	10	CO3	L5						
X	0	1	2	3	4																	
Y	1	5	10	22	38																	
Q.2	For the following data: <table><tr><td>Mark s</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>No. of students</td><td>10</td><td>15</td><td>30</td><td>15</td><td>10</td></tr></table> Find (i) first four moments (ii) standard deviation (iii) skewness and (iv) kurtosis.	Mark s	0-10	10-20	20-30	30-40	40-50	No. of students	10	15	30	15	10	10	CO3	L3						
Mark s	0-10	10-20	20-30	30-40	40-50																	
No. of students	10	15	30	15	10																	
Q.3	Explain the following terms with example: (i) Complete Bipartite Graph (ii) walk (iii) Subgraph (iv) Complement of a graph (v) Isomorphic graph.	10	CO4	L2																		
Q.4	The mean and standard deviation of normal variate are 8 and 4 respectively. Compute (i) $P(5 \leq X \leq 10)$ (ii) $P(X \geq 5)$.	10	CO2	L4																		
Q.5	A random variable X has the following distribution <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>f(x)</td><td>k</td><td>2k</td><td>3k</td><td>4k</td><td>5k</td><td>6k</td><td>7k</td><td>8k</td></tr></table> Determine (i) k (ii) the probability distribution function (ii) $E(x)$ (iii) $E(x^2)$ (iv) variance (v) $P(2 \leq x \leq 5)$.	x	1	2	3	4	5	6	7	8	f(x)	k	2k	3k	4k	5k	6k	7k	8k	10	CO2	L3
x	1	2	3	4	5	6	7	8														
f(x)	k	2k	3k	4k	5k	6k	7k	8k														
Q.6	Let $u_1 = (3, 7, 4), u_2 = (3, 7, 4), u_3 = (3, 7, 4)$. Is this set of three vectors linearly dependent?	10	CO5	L4																		

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

CO-Course Outcomes

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