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Supplementary Examination (For Even Semester)-2023

Paper Name: Mathematical Foundations For Computer Applications
Paper Code: MCA-201
Time: 3 Hours **Maximum Marks: 75**

Note: Programmable calculator is not allowed.

PART –A

(All questions are compulsory) ~~7~~ X 5 = ~~35~~ 30

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level
Q.1	Construct the distribution function and compute $P(X > \frac{1}{2})$, where $f(x) = \begin{cases} cx & if\ 1 > x > 0 \\ 0 & otherwise \end{cases}$ is a probability density function for some constant c.	5	CO3	L6
Q.2	Find the rank of a matrix A, where $A = \begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$.	5	CO2	L3
Q.3	A new couple, known to have two children, has just moved into town. Suppose that the mother is encountered walking with one of her children. If this child is a girl, what is the probability that both children are girls?	5	CO3	L4
Q.4	Estimate mean, mode, median, first quartile and third quartile from the following distribution of marks obtained by forty-nine students in the Mathematics class.	5	CO4	L4
Q.5	Define equivalence relation. Let a relation R on the set of real numbers be defined as $if\ and\ only\ if\ 1 + ab > 0$. Prove that R is symmetric and reflexive but not transitive.	5	CO1	L3

X	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
f(x)	2	4	6	15	10	5	4	3

Q.6	Find the characteristic equation of the matrix $A = \begin{bmatrix} 5 & 7 \\ 3 & 4 \end{bmatrix}$.	5	CO2	L3
Q.7	Define the following terms with example: (a) Complete graph (b) Planar graph (c) Out-degree in directed graph (d) In-degree in directed graph (e) Regular graph.	5	CO5	L2

PART – B

(Attempt any Four Questions out of Six) **(4 X 10 = 40)**

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level
Q.1	Investigate the values of θ & φ so that the equations x+y+z=10, 2x + y -2z=7, x+y+θz=φ have (i) no solution (ii) a unique solution.	10	CO2	L5
Q.2	Explain the following terms with example: (i) Bipartite graph (ii) Eulerian path (iii) Eulerian circuit (iv) Complete bipartite graph (v) Weighted graph. Also explain handshaking theorem.	10	CO5	L2
Q.3	A random variable X has the following distribution x: 1 2 3 4 5 6 7 8 $f(x)$: K 2k 3k 4k 5k 6k 7k 8k Determine (i) k (ii) the probability distribution function (ii) $E(x)$ (iii) $E(x^2)$ (iv) variance (v) $P(2 \leq x \leq 5)$.	10	CO3	L4
Q.4	In a bolt machines A, B and C produces 25%, 35% and 40% respectively of the total product. Of their output, 5%, 4% and 2% are defective bolts. A bolt is chosen at random from the product and found to be defective. What are the probabilities that the bolt was produced either by machine A or by machine B or by machine C?	10	CO3	L4
Q.5	Solve the difference equation $a_r + a_{r-1} + 6a_{r-2} = r^2,\ a_0 = 1,\ a_1 = 2.$	10	CO1	L3
Q.6	Fit the straight line $Y = p + qX$ for the following data: X: 0 1 2 3 4 Y: 1 5 10 22 38	10	CO4	L5

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

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