CRM08	Rev 1.16	CD	24/05/2025

CONTINUOUS INTERNAL EVALUATION - 2

Dept:AI/CD/CS	Sem / Div: IV	Sub:Sub:Discrete Mathematical Structures	S Code:BCS405A
Date:29/05/2025	Time: 3:00-4:30	Max Marks: 50	Elective:Y

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's
		PART A			
1	a	In how many ways one can arrange the letters of the word "CORRESPONDENTS" so that there are (i) no pair (ii) at least 2 pairs of Consecutive identical letters.	8	L2	CO4
	b	4 persons P_1, P_2, P_3, P_4 who arrive late for a dinner party find that only one chair at each of five tables T_1, T_2, T_3, T_4 and T_5 is vacant. P_1 will not sit at T_1 or T_2. P_2 will not sit at T_2. P_3 will not sit at T_3 or T_4. P_4 will not sit at T_4 or T_5. Find the number of ways they can occupy the vacant chairs.	10	L3	CO4
	c	State pigeon hole principle. Prove that if 30 dictionaries in a library contain a total of 61,327 pages then atleast one of the dictionaries must have atleast 2045 pages.	7	L2	CO3
		OR			
2	a	In how many ways, the 26 letters of the English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs?	8	L2	CO4
	b	Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$ for $n \geq 2$ with $a_0 = 5$, $a_1 = 12$.	10	L3	CO4

	c	Draw the Hasse diagram representing the Positive divisor of 36.	7	L2	CO3
PART B					
3	a	If G be a set of all non zero real numbers and let a * b =ab/2 then show that (G, *) is an abelian group.	10	L2	CO5
	b	Define Klein-4 group and if A = {e, a, b, c} then show that this is a Klein-4 group.	10	L2	CO5
	c	Prove that intersection of two subgroups of a group G is also a subgroup of G.	5	L2	CO5
OR					
4	a	State and prove Lagrange's theorem. Let G be a group with subgroup H and K. If $\|G\|=660$ and $\|K\|=66$ and $K\subset H\subset G$ then find the possible value for $\|H\|$.	10	L2	CO5
	b	Prove that $(Z_4, +)$ is a cycle group. Find all its generators.	10	L2	CO5
	c	If * is an operation on Z defined by xy=x+y+1, prove that (Z, *) is an abelian group.	5	L2	CO5

Akhila 24/05/2025

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HOD