Program: Computer Science & Engineering (AIML)
CONTINUOUS INTERNAL EVALUATION-II

Semester: IV CS(AIML)   Date:27/05/2025
Course:Discrete Mathematical Structures   Code:BCS405A   Max. Marks: 50
Course Coordinator: Prof. Shweta Patil   Duration: 1 Hour 30 Min

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

Q. No.	Question	Marks	CO	R.B.T. Level
	Part -A			
1 a)	Determine the coefficient of xyz^2 in the expansion of $(2x - y - z)^4$.	8	2	L3
1 b)	In how many ways can one distribute eight identical balls into 4 distinct containers so that i) No container is empty? ii) The 4th container gets an odd no of balls?	8	2	L3
1 c)	Determine the number of positive integers n such that $1 \le n \le 100$ and n is not divisible by 2,3 & 5.	9	4	L3
	OR			
2 a)	Determine the coefficient of $x^2y^2z^3$ in the expansion of $(3x - 2y - 4z)^7$	8	2	L3
2 b)	In how many ways can 10 identical pen be distributed among 5 children in the following cases.i) There are no restrictions ii) Each child gets atleast one pen iii) The youngest child gets atleast 2 pens	8	2	L3
2 c)	In how many ways 5 number of a's 4 number of b's & 3 number of c's can be arranged so that all the identical letters are not in a single block.	9	4	L3
	Part – B			
3 a)	In how many ways can 26 letters of English alphabet be permuted so that i) none of the patterns CAR,DOG,PUN,BYTE occurs ii) exactly two iii) exactly three iv) atleast two v) atleast three	8	4	L3
3 b)	Solve the recurrence relation $c_n = 3c_{n-1} - 2c_{n-2}$ for $n \ge 2$ given $c_1 = 5, c_2 = 3$	8	4	L3
3 c)	State and prove Lagranges theorem	9	5	L3
	OR			
4 a)	In how many ways one can arrange the letters in the word **CORRESPONDENTS** so that i) there is no pair of consecutive identical letters? ii) there are exactly two pairs of consecutive identical letters? iii) there are atleast three pairs of consecutive identical letters.	8	4	L3
4 b)	An apple, a banana, a mango and an orange are to be distributed to 4 boys B_1, B_2, B_3, B_4. The B_1 & B_2 do not want to have an apple, the boy B_3 does not want banana or mango and B_4 refuses orange. In how many ways can the distribution be made so that no boy is displeased?	8	4	L3
4 c)	Define Klein 4 Group. If $A = \{e, a, b, c\}$ then show that this is a Klein 4 group.	9	5	L3