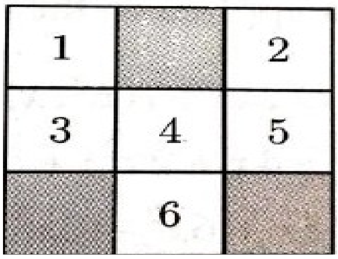
CONTINUOUS INTERNAL EVALUATION- 2

Dept: CSE	Sem / Div: 3rd A and B	Sub: Discrete Mathematical Structures	S Code: 18CS36
Date: 03/12/2020	Time: 2:30 - 4:00 PM	Max Marks: 50	Elective: N
Note: Answer any 2 full questions, choosing one full question from each part.			

QN		Questions	Marks	RBT	COs
		PART A			
1	a	In a survey of 260 college students, the following data were obtained, 64 had taken mathematics course, 94 had taken CS course, 58 had taken EC course, 28 had taken both Mathematics and EC course, 26 had taken both Mathematics and CS course, 22 had taken CS and EC course and 14 had taken all three types of course. Determine how many of these students had taken none of the three subjects.	5	L3	CO3
	b	Find the number of derangements of 1, 2, 3, 4. List all the derangements	6	L3	CO3
	c	By using expansion formula, find the rook polynomial for the board C shown below (made up of unshaded parts): 	6	L3	CO3
	d	In how many ways can one 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 at least three pairs of consecutive identical letters?	8	L3	CO3
		OR			
2	a	In how many ways can each of 10 people select a left glove and a right glove out of a total of 10 pairs of gloves so that no person selects a matching pair of gloves?	5	L3	CO3
	b	Determine in how many ways can the letters in the word ARRANGEMENT be arranged so that (i) There are exactly two pairs of consecutive identical letters (ii) At least two pairs of consecutive identical letters.	6	L3	CO3
	c	Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$ for $n \geq 2$, given that $a_0 = 5$ and $a_1 = 12$.	6	L3	CO3
	d	An apple, a banana, a mango and an orange are to be distributed to four boys B1, B2, B3, B4. The boys B1 and B2 do not wish to have apple, the boy B3 does not want banana or mango, and B4 refuses orange. In how many ways the distribution can be made so that no boy is displeased?	8	L3	CO3

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PART B					
3	a	Find the rook polynomial for the 3 × 3 board by using the expansion formula	5	L3	CO3
	b	The number of bacteria in a culture is 1000(approximately) and this number increases 250% every two hours. Use a recurrence relation to determine the number of bacteria present after one day.	6	L3	CO3
	c	Let A = {1, 2, 3, 4, 5, 6} and B= {6, 7, 8, 9, 10}. If a function f: A → B is defined by f = {(1, 7),(2, 7),(3, 8),(4, 6),(5, 9),(6, 9)}. Determine $f^{-1}(6)$ and $f^{-1}(9)$. If B1 = {7, 8} and B2 = {8, 9, 10}. Find $f^{-1}(B1)$ and $f^{-1}(B2)$.	6	L3	CO3
	d	Solve the following: a) Prove that if 30 dictionaries in a library contain a total of 61,327 pages, then at least one of the dictionaries must have at least 2045 pages. b) Prove that in any set of 29 persons at least five persons must have been born on the same day of the week.	8	L3	CO3
OR					
4	a	Let A = {1, 3, 5}, B= {2, 3} and C= {4, 6}. Write down the following: A x B, A ∪ (B x C) and (A x B) ∩ (B x A).	5	L3	CO3
	b	Let A = {1, 2, 3} and B = {1, 2, 3, 4, 5}. Find the whether the following functions from A to B are (a) one-to-one (b) onto. (i) f = {(1, 1), (2, 3), (3, 4)} (ii) g ={(1, 1),(2, 2),(3, 3)}	6	L3	CO3
	c	Consider the functions f and g defined by $f(x) = x^3$ and $g(x) = x^2 + 1$, $\forall x \in R$. Find $g \circ f$, $f \circ g$, f^2 and g^2.	6	L3	CO3
	d	Let A = {a, b, c, d} and B = {1, 2, 3, 4, 5, 6}. (a) Find how many functions are there from A to B. How many of these are one-to-one? How many are onto? (b) Find how many functions are there from B to A. How many of these are one-to-one? How many are onto?	8	L3	CO3

Prepared by: Mr.Nagaraj K HOD