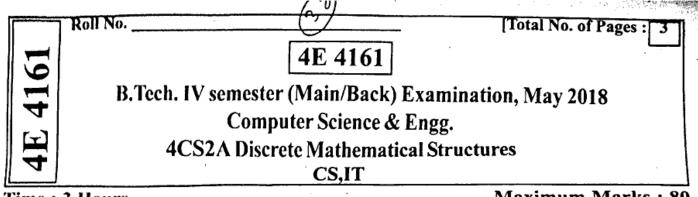
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Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 26

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit - I

- If $A \cap C \subseteq B \cap C$ and $A \cap \overline{C} \subseteq B \cap \overline{C}$ then show that $A \subseteq B$. 1. (4)
 - Determine the number of positive integers n where $1 \le n \le 100$ and n is not b) divisible by 2,3 or 5. (4)
 - Explain pigeonhole and extended pigeonhole principle with example. (8) c)

OR

- Write short notes on 1. a)
 - Principle of Inclusion and Exclusion i)
 - Recursive Definition of sets

(4+4)

Show that the set of odd positive integers is a countable set. b)

(8)

Unit - II

- Let R be the relation defined on a set of natural numbers N such that for $x, y \in N, xRy \Leftrightarrow x - y$ is divisible by 3, then show that R is an equivalence relation 2. a) on N. Find equivalence classes also.
 - Using Warshall's algorithm, find the transitive closure of the relation b) $R = \{(a,a),(a,b),(a,d),(c,b),(c,c),(d,b)(d,c),(d,d)\} \text{ on } \{a,b,c,d\}.$ (8)

If R and S be two equivalence relations in a set A, then prove that $R \cap S$ is also 2. an equivalence relation in A.

[Contd....

(1)

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5.	a)	S	how that $\sim (p \vee (\sim p \wedge q)) = ((\sim p) \wedge (\sim q))$	(4)			
		-	Unit - V				
	b)		Explain the krushal algorithm with example.	(8)			
4.	a)		uppose that $G = (V, E)$ be a graph with k - component, where each component at tree. Derive a formula in terms of $ V , E $ and k .	oonent ,°∨(8)			
			OR				
	b)	D ea	befine chromatic number of a graph. Show that a graph G with one or dges is bipartite if and only if the chromatic number of G is 2.	more (8)			
		iv	Transitional Graph	×2=8)			
		iii					
		ii)					
٠.	a)	i)		ЛΠ			
7	<i>a)</i>	E-	Unit - IV Explain the following terms with example http://www.rtuonline.co	nm.			
7	c)	So	rt the list $X = \{64, 25, 12, 22, 11\}$ using selection sort algorithm.	(6)			
	b)		nd gcd of 414 and 662 using Euclidean algorithm.	(5)			
•	a)	Fin	and prove a formula for the sum of the first n cubes, that is, 1^3+2^3+1	+n³. (5)			
		Б.	OR) (:= 1			
		of s	size $n \ge 0$.	(6)			
	c)		eve that the binary search algorithm works correctly for every order				
	b)	Giv	ve an indirect proof of the theorem "If 3n+2 is odd, then n is odd".	(5)			
;	a)	Pro	we that there is no rational number $\frac{a}{b}$ whose square is 2.	(5)			
			Unit - III	• • •			
		iv)	Find GLB of {60,72}, if exists	(8)			
		iii)	Find LUB of {2,9}, if exists				
		ii)	Find the greatest and least elements, if exists				
		i)	Find the maximal and minimal elements				
b	,		({2,4,6,9,12,18,27,36,48,60,72}				
1.	,	D	Draw the Hasse diagram and answer the following concerning the poset				

3.

3.

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b)	Define conditional and biconditional statements. Explain the following terms by giving suitable example			
	i)	Converse		
	ii)	Contrapositive		
	iii)	Inverse (4)		
c)		ain the principle disjunctive normal form of $(p \wedge q) \vee (\neg p \wedge r) \vee (q \wedge r)$ by structing truth table. (8)		
		OR		
a)	Write an english sentence corresponding to each of the following:			
	a)	$\forall x P(x)$		
	b)	$\exists x Q(x)$		
	c)	$\forall x \exists y R(x, y)$		
	d)	$\exists x \forall y R(x,y)$		
	e)	$\forall x (\sim Q(x))$		
	f)	$\exists y (\sim Q(y))$		
	g)	$\sim (\exists x P(x))$		
	h)	$\sim (\forall x Q(y))$		
	Wh	ere P(x): x is even		
		Q(x): x is prime numbers http://www.rtuonline.com		
	R(x	$(x) \cdot (x+y)$ is even, $x, y \in \mathbb{Z}$ (set of integers)		
b)	Examine the validity of the following arguments, "If prices are higher than wages are high. Prices are high or there are price controls. 'If there are price controls then there is not an inflation. There is an inflation therefore wages are high". (8)			

5.